Government of Mizoram
Department of Agriculture

PRADHAN MANTRI KRISHI SINCHAYEE YOJANA (PMKSY)

DISTRICT IRRIGATION PLAN (DIP)

MAMIT DISTRICT

2016

District level Implementation committee
Mamit District : Mizoram

C O N T E N T S

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FOREWORD

The District Irrigation Plan under Pradhan Mantri Krishi Sinchayee Yojanan (PMKSY) in respect of Mamit district Mizoram has been prepared using Remote Sensing & GIS technique with the officers of the concerned Line department during survey & investigation works and as per their willingness and in accordance with the template of PMKSY issued by the Department of Agriculture & Co-operation, Ministry of Agriculture, Cooperation and Farmers' Welfare, Government of India.

It is hope that this programme will enhance the physical access of water on the farm and expand cultivable area under assured irrigation which will benefit all the cultivators of the village in Mamit District. The District Irrigation Plan comprises of strategies to meet the aims of 'Har Khet Ko Pani', "Per Drop More Crop", PMKSY, IWMP and MGNRGA and bring agriculture land under the cover of irrigation.

The District Irrigation Plan under Pradhan Mantri Krishi Sinchayee Yojanan (PMKSY) prepared under the supervision of District Level Implementation Committee (DLIC), Mamit District, Mizoram, is verified and found technically feasible as per guidelines and hereby, recommended for approval and implementation of PMKSY.

Dated 15th November, 2016

15/11/16

(LALBIAKSANGI)
Deputy Commissioner
&
Chairman (DLIC)
Government of Mizoram
Mamit District, Mizoram

EXECUTIVE SUMMARY
INTRODUCTION

The major objective of PMKSY is to achieve convergence of investments in irrigational the field level, expand cultivable area under assured irrigation, improve on-farm water use efficiency to reduce wastage of water, enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop), enhance recharge of aquifers and introduce sustainable water conservation practices by exploring the feasibility of reusing treated municipal waste water for peri-urban agriculture and attract greater private investment in precision irrigation system.

PMKSY has been conceived amalgamating ongoing schemes viz. Accelerated Irrigation Benefit Programme (AIBP) of the Ministry of Water Resources, River Development & Ganga Rejuvenation (MoWR, RD&GR), Integrated Watershed Management Programme (IWMP) of Department of Land Resources (DoLR) and the On Farm Water Management (OFWM) of Department of Agriculture and Cooperation (DAC). The scheme will be implemented by Ministry of Agriculture, Water Resources and Rural Development. Ministry of Rural Development is to mainly undertake rain water conservation, construction of farm pond, water harvesting structures, small check dams and contour bunding etc. MoWR, RD &GR, is to undertake various measures for creation of assured irrigation source, construction of diversion canals, field channels, water diversion/lift irrigation, including development of water distribution systems. Ministry of Agriculture will promote efficient water conveyance and precision water application devices like drips, sprinklers, pivots, rain-guns in the farm "(Jal Sinchan)", construction of micro-irrigation structures to supplement source creation activities, extension activities for promotion of scientific moisture conservation and agronomic measures Programme architecture of PMKSY will be to adopt a 'decentralized State level planning and projectised execution' structure that will allow States to draw up their own irrigation development plans based on District Irrigation Plan (DIP) and State Irrigation Plan (SIP). It will be operative as convergence platform for all water sector activities including drinking water & sanitation, MGNREGA, application of science & technology etc. through comprehensive plan. State Level Sanctioning Committee (SLSC) chaired by the Chief Secretary of the State with the authority to oversee its implementation and sanction of projects.

The programme will be supervised and monitored by an Inter-Ministerial National Steering Committee (NSC) will be constituted under the Chairmanship of Prime Minister with Union Ministers from concerned Ministries. A National Executive Committee (NEC) constituted under the Chairmanship of Vice Chairman, NITI Aayog to oversee programme implementation, allocation of resources, inter ministerial coordination, monitoring & performance assessment, addressing administrative issues etc.

Components and responsible Ministries/Departments

a) AIBP by MoWR, RD &GR To focus on faster completion of ongoing Major and Medium Irrigation including National Projects.

b) PMKSY (Har Khet ko Pani) by MoWR,RD & GR Creation of new water sources through Minor Irrigation (both surface and ground water). Repair, restoration and renovation of water bodies; strengthening carrying capacity of traditional water sources, construction rain water harvesting structures (Jal Sanchay); Command area development, strengthening and creation of distribution network from source to the farm. Improvement in water management and distribution system for water bodies to take advantage of available source, which is not utilised to its fullest capacity (deriving benefits from low hanging fruits). At least 10% of the command area to under micro/precision irrigation. Diversion of water from source of different location where it is plenty to nearby water scarce areas, lift irrigation from water bodies/rivers at lower elevation to supplement requirements beyond IWMP and MGNREGS irrespective of irrigation command. Creation and rejuvenation of traditional water storage systems like Jal Mandir (Gujarat); Khatri, Kuhl (H.P.); Zabo (Nagaland); Eri, Ooranis (T.N.); Dongs (Assam); Katas, Bandhas (Odisha and M.P.) etc. at feasible locations.

c) PMKSY (Watershed) by Dept. of Land Resources, MoRD Water harvesting structures such as check dams, nala bund, farm ponds, tanks etc. Capacity building, entry point activities, ridge area treatment, drainage line treatment, soil and moisture conservation, nursery raising, afforestation, horticulture, pasture development, livelihood activities for the asset-less persons and production system & micro enterprises for small and marginal farmers etc. Effective rainfall management like field bunding, contour bunding/trenching, staggered trenching, land levelling, mulching etc.

d) PMKSY (Per drop more crop) by Dept. of Agriculture & Cooperation, MoA Programme management, preparation of State/District Irrigation Plan, approval of annual action plan, Monitoring etc. Promoting efficient water conveyance and precision water application devices like drips, sprinklers, pivots, rain-guns in the farm (Jal Sinchan) Topping up of input cost particularly under civil construction beyond permissible limit (40%), under MGNREGS for activities like lining inlet, outlet, silt traps distribution system etc.

Construction of micro irrigation structures to supplement source creation activities including tube wells and dug wells (in areas where ground water is available and not under semi critical /critical /over exploited category of development) which are not supported under PMKSY (WR), PMKSY (Watershed) and MGNREGS. Secondary storage structures at tail end of canal system to store

water when available in abundance (rainy season) or from perennial sources like streams for use during dry periods through effective on-farm water management Water lifting devices like diesel/electric/solar pump sets including water carriage pipes.

Extension activities for promotion of scientific moisture conservation and agronomic measures including cropping alignment to maximise use of available water including rainfall and minimise irrigation requirement (Jal sarankchan) Capacity building, training for encouraging potential use water source through technological, agronomic and management practices including community irrigation.

Awareness campaign on water saving technologies, practices, programmes etc. organisation of workshops, conferences, publication of booklets, pamphlets, success stories, documentary, advertisements etc. Improved/ innovative distribution system like pipe and box outlet system with controlled outlet and other activities of enhancing water use efficiency.

District Irrigation Plans (DIPs)

District Irrigation Plan (DIP) shall be the cornerstone for planning and implementation of PMKSY. DIP will identify the gaps in irrigation infrastructure after taking into consideration the District Agriculture Plans (DAPs) already prepared for Rashtriya Krishi Vikas Yojana (RKVY) vis-à-vis irrigation infrastructure currently available and resources that would be added during XII Plan from other ongoing schemes (both State and Central), like Mahatma Gandhi National Rural Employment Guarantee Scheme(MGNREGS), Rashtriya Krishi Vikash Yojana (RKVY), Rural Infrastructure Development Fund (RIDF), Member of Parliament Local Area Development (MPLAD) Scheme, Member of Legislative Assembly, Local Area Development (MLALAD) Scheme, Local body funds etc. The gaps indentified under Strategic Research & Extension Plan (SREGP) are be used in preparation of DIP.

DIPs will present holistic irrigation development perspective of the district outlining medium to long term development plans integrating three components viz. water sources, distribution network and water use applications incorporating all usage of water like drinking & domestic use, irrigation and industry. Preparation of DIP will be taken up as joint exercise of all participating departments. DIP will form the compendium of all existing and proposed water resource network system in the district.

The DIPs may be prepared at two levels, the block and the district. Keeping in view the convenience of map preparation and data collection, the work would be primarily done at block level. Block wise irrigation plan is to be prepared depending on the available and potential water resources and water requirement for agriculture

sector prioritising the activities based on socio-economic and location specific requirement. In case of planning is made based on basin/sub-basin level, the comprehensive irrigation plan may cover more than one district. The activities identified in the basin/sub-basin plan can be further segregated into district/block level action plans. Use of satellite imagery, topo-sheets and available database may be appropriately utilised for developing irrigation plans at least on pilot basis to begin with and subsequently extended to all projects.

i) Background:

Hon'ble President in his address to the joint Session of the Parliament of 16th Lok Sabha indicated that "Each drop of water is precious. Government is committed to giving high priority to water security. It will complete the long pending irrigation projects on priority and launch the 'Pradhan Mantri Krishi Sinchayee Yojana' with the motto of 'Har Khet Ko Paani'. There is a need for seriously considering all options including linking of rivers, where feasible; for ensuring optimal use of our water resources to prevent the recurrence of floods and drought. By harnessing rain water through 'Jal Sanchay' and 'Jal Sinchan', we will nurture water conservation and ground water recharge. Micro irrigation will be to ensure 'Per drop-More crop'. Out of about 141 m.Ha of net area sown in the country, about 65 million hectare (or 45%) is presently covered under irrigation. Substantial dependency on rainfall makes cultivation in unirrigated areas a high risk, less productive profession. Empirical evidences suggest that assured or protective irrigation encourages farmers to invest more in farming technology and inputs leading to productivity enhancement and increased farm income. The overreaching vision of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) will be to ensure access to some means of protective irrigation to all agricultural farms in the country, to produce 'per drop more crop', thus bringing much desired rural prosperity.

ii) Vision:

To use the available water resources in the district to the maximum potential in an efficient way catering to the basic needs of every living being and enhancing the livelihoods of rural population to the maximum extent thus alleviating poverty in a sustainable way without compromising the interests of future generations.

iii) Objective: The broad objectives of PMKSY will be:-

a) Achieve convergence of investments in irrigation at the field level (preparation of district level and, if required, sub district level water use plans).

b) Enhance the physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet ko pani).

c) Integration of water source, distribution and its efficient use, to make best use of water through appropriate technologies and practices.

d) Improve on-farm water use efficiency to reduce wastage and increase availability both in duration and in extent.

e) Enhance the adoption of precision-irrigation and other water saving technologies (more crops per drop).

f) Enhance recharge of aquifers and introduce sustainable water conservation practices.

g) Ensure the integrated development of rainfed areas using the watershed approach towards soil and water conservation, regeneration of ground water, arresting runoff, providing livelihood options and other NRM activities.

h) Promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries.

i) Explore the feasibility of reusing treated municipal wastewater for peri-urban agriculture.

j) Attract greater private investments in irrigation.

This will in turn increase agricultural production and productivity and enhance farm income.

iv) Strategy/approach:

To achieve above objectives, PMKSY will strategize by focussing on end-to end solution in irrigation supply chain, viz. water sources, distribution network, efficient farm level applications, extension services on new technologies & information etc. Broadly,

PMKSY will focus on:-

a) Creation of new water sources; repair, restoration and renovation of defunct water sources; construction of water harvesting structures, secondary & micro storage, groundwater development, enhancing potentials of traditional water bodies at village level like Jal Mandir (Gujarat); Khatri, Kuhl (H.P.); Zabo (Nagaland); Eri, Ooranis (T.N.); Dongs (Assam); Katas, Bandhas (Odisha and M.P.) etc.

b) Developing/augmenting distribution network where irrigation sources (both assured and protective) are available or created;

c) Promotion of scientific moisture conservation and run off control measures to improve ground water recharge so as to create opportunities for farmer to access recharged water through shallow tube/dug wells;

d) Promoting efficient water conveyance and field application devices within the farm viz, underground piping system, Drip & Sprinklers, pivots, rain-guns and other application devices etc.

e) Encouraging community irrigation through registered user groups/farmer producers' organisations/NGOs.

f) Farmer oriented activities like capacity building, training and exposure visits, demonstrations, farm schools, skill development in efficient water and crop management practices (crop alignment) including large scale awareness on more crops per drop of water through mass media campaign, exhibitions, field days, and extension activities through short animation films etc.

g) The aforesaid areas only outline the broad contours of PMKSY; combination of interventions may be required depending on location specific conditions and requirements, which will be identified through District and State Irrigation Plans.

v) Methodology:

The preparation of District Irrigation plan is an integration of geospatial technology, Space application technologies and spatial and non-spatial data.

1) Transformation of available thematic information (district provided Gyan data) on to the village level on Bhuvan portal and extract geo-referenced village map data.

2) Integration of thematic layers with socio-economic data for classification of area into specific composite land units on village level.

3) Preparation of appropriate action plan based on potential of composite land units and developmental needs of study area is on the basis of available data.

4) Field visit to validate the recommended measures with respect to the ground situation and requirement of the local people.

5) Finalization of development plans based on field observation.

Available thematic information for preparation for water resource and land resource development plan.

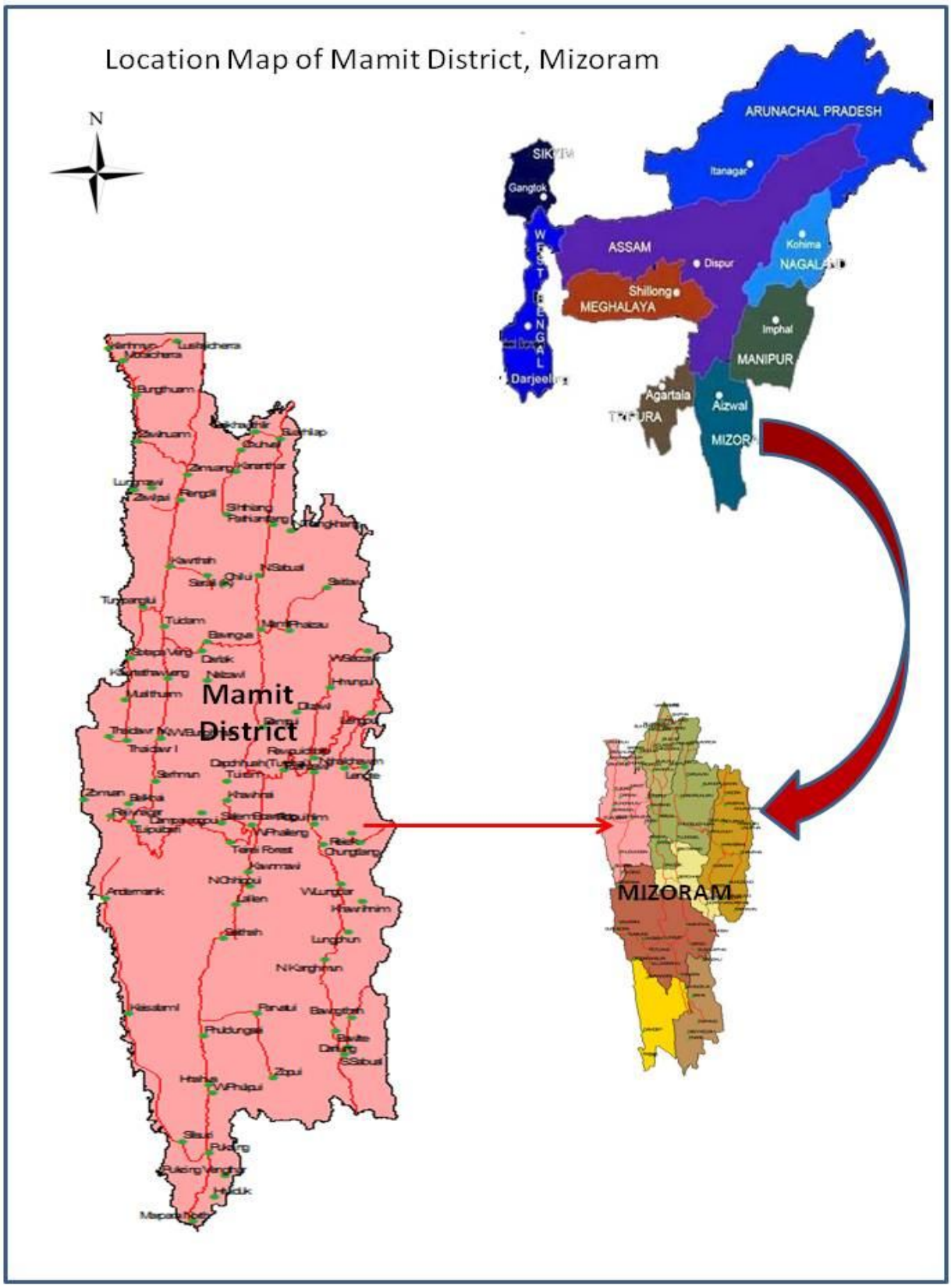
- Land Use/land cover map
- Groundwater potential map
- Soil map - depth, texture, erosion and land capability
- Slope map.
- High resolution Satellite mage through Bhuvan portal.
- Lithology.
- Hydro geomorphology.
- Land Irrigability Class map
- Slope map
- Agroclimatoc zone map
- Hydro soils map
- Watershed map
- Geology & Geomorphology map

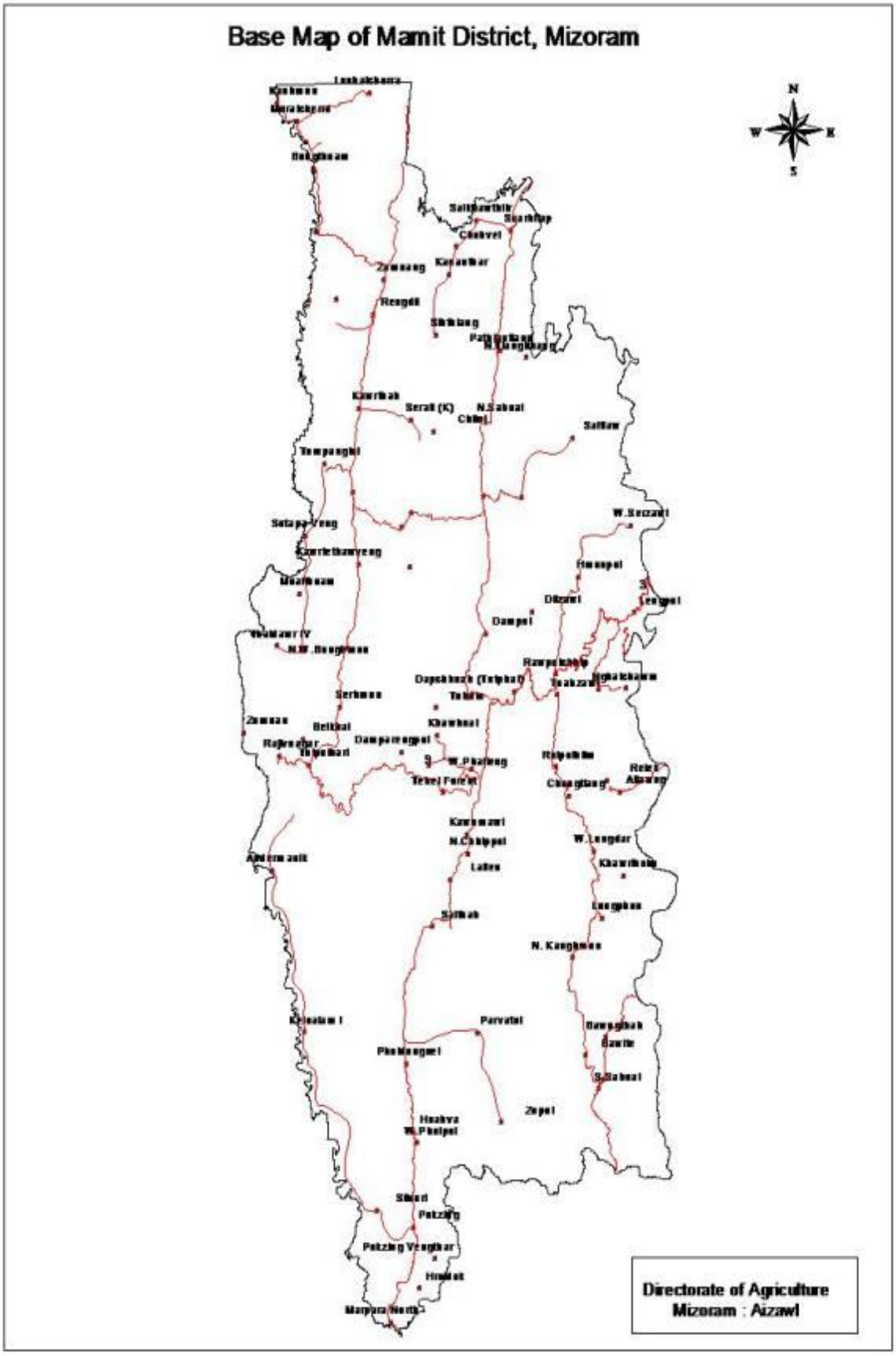
Area for development of water resources structure geospatial technology has been used in this process first identify the area of crop land based on high resolution satellite data and then identify the irrigated area by different source of irrigation methods. To identify the un irrigated area an overlay method is used. District irrigation plan covers the fallowing planning component of the district in sustainable development approach:

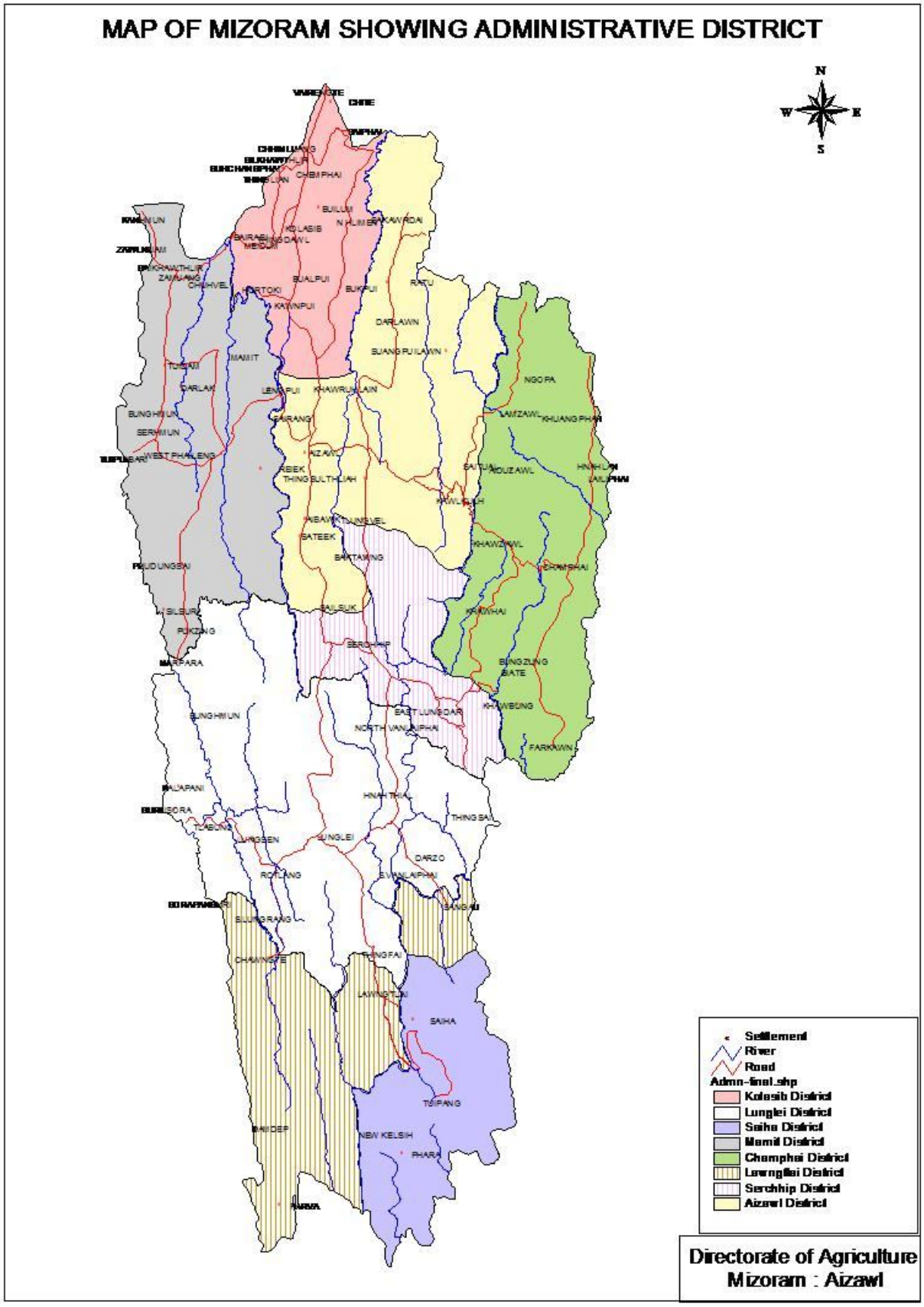
- Increase in vegetation/biomass in the district.
- More number of surface water bodies in district.
- Shift from annual crop to perennial.
- Increase in the extent of crop area.
- Improvement in the soil moisture availability.
- Reclamation of waste lands.
- Convergence of investments in irrigation at the field level.
- Enhance the physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet ko pani)
- Best use of water through appropriate technologies and practices.
- Improve on-farm water use efficiency.
- Enhance the adoption of precision-irrigation and other water saving technologies (More crops per drop).
- Enhance recharge of aquifers and introduce sustainable water conservation practices.
- Ensure the integrated development of rainfed areas.
- Promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries.

- Explore the feasibility of reusing treated municipal waste water for peri-urban agriculture,
- Attract greater private investments in irrigation.

The overreaching vision of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) will be to ensure access to some means of protective irrigation to all agricultural farms in the country (har khet ko paani) and to produce 'per drop more crop', thus bringing much desired rural prosperity.


Location Map of Mamit District, Mizoram
N
ARUNACHAL PRADESH
Itanagar
Gangtok
ASSAM
Dispur
Kohima
NAGALAND
Shillong
MEGHALAYA
Imphal
MANIPUR
Agartala
Aizwal
MIZORAM
Mamit
District
MIZORAM


Base Map of Mamit District, Mizoram
N
W
E
S
Directorate of Agriculture
Mizoram : Aizawl


MAP OF MIZORAM SHOWING ADMINISTRATIVE DISTRICT
N
W
E
S
Settlement
River
Road
Admn-final.shp
Kolasib District
Lunglei District
Saiha District
Mamit District
Champhai District
Lawngtlai District
Serchhip District
Aizawl District
Directorate of Agriculture
Mizoram : Aizawl

Chapter - I
PROFILE OF MAMIT DISTRICT

1.1 District Profile:

Mamit is a new district of Mizoram with an area of 3,025.75 Sq.Km. It is situated in between 23°15'22' - 24°15"16' N latitude and 92°15"45' - 92° 40"40' E longitude with an altitude ranging from 40 to 1,485 meter msl. The district is bounded on the north by Hailakandi district of Assam state, on the west by North Tripura district of Tripura state and Bangladesh, on the south by Lunglei district and on the east by Kolasib and Aizawl districts. The district is dissected by few mountain ranges which run parallel to each other in a north-south fashion. The area is characterized mainly by three main ridgelines and intervening valleys and less prominent ridges. In between these, there are plenty of small and short parallel ridges and are classified as linear ridges with places along the main rivers as subdued hillocks. The drainage system of Mamit as a whole is dendritic in nature and the streams are young with deep courses.

The word "Mizo" means highlander. It is believed that the Mizos, the Tibeto-Burmese race, migrated to this region hundreds of years ago. The Lushais are the most predominant tribe besides a few others like Paihte, Lakher, Chakma, Riang, etc. During the British period, Mizoram became a part of the territory of the British India in 1891. After independence of India, Mizoram became a district of Assam. On January 21, 1972 it got the status of union territory and ultimately in 1987 it became the 23rd full-fledged state of the country. Presently Mizoram has eight districts and Mamit is the fifth and it was established in 1998.

Table 1.1 District profile of Mamit District

Sl. No.	Name of District	District Code	Latitude	Longitude
1	Mamit	281	23°15'22' - 24°15"16' N	92°15"45' - 92° 40"40' E

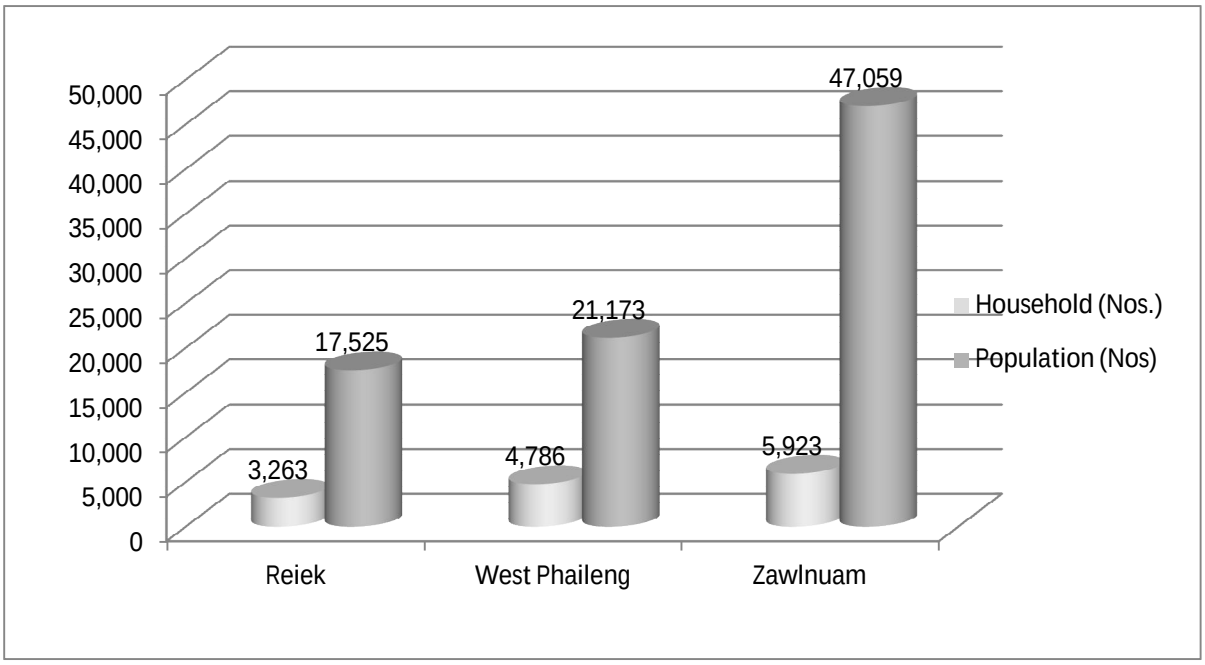
Administrative Set-up

Mamit town is the Headquarter of the district. The district has 3 R.D. Blocks, Reiek, West Phaileng and Zawlnuam. Out of 123 villages 93 is inhabited. Village Councils of Mizoram are very strong. The district has 72 Village Councils, out of 786 Village Councils of Mizoram. The district has 3 assembly constituencies and they are Hachhek, Dampa and Mamit.

Table 1.2 Set up of R.D. Blocks in Mamit District

R.D. Block	Villages (Nos.)	Household (Nos.)	Population (Nos)
Reiek	22	3,263	14544
West Phaileng	19	4,786	21542
Zawlnuam	50	5,923	45104
Total	**91**	**13,972**	81190

Source: Statistical Handbook, Mizoram-2011



Graph : Numbers of Households and Population (Block wise)

Table 1.2.1 Demography of Mamit District

General							Population (As per the 2011 Census)				
Sl. No	Rural Development Block	Villages		No. of Revenue Villages	No of Household	No. of GPs	Male	Fem-ale	Total	S.C.	S.T.
		In-habited	Un-inhabited								
1	Reiek	22	4	22	15665	20	7444	7100	14544	25	14519
2	West Phaileng	19	11	19	8045	16	11294	10248	21542	2586	18956.
3	Zawlnuam	52	15	52	3706	36	23527	21577	45104	6765	38338
Total		**93**	**30**	**93**	**32558**	**72**	42265	38925	81190	9376	71814

Source: Statistical Handbook, Mizoram-2012

Mamit district covers an area of 3025 sq. km, which is 14.35% of the total area of the state. The population density of the district is very less (21 nos. per sq. km.) in comparison to the population density of the state (42 nos. per sq. km.). It has 896 female against per 1000 thousand male population. The district ranks 7th position in literacy the state (88.8%)

1.3 Biomass and Livestock

Water plays an important role in livestock productivity. Livestock productivity in pastoral areas depends greatly on the availability of water. There are several factors, which determine water balance, water turnover and functions of the animal. Assessment of livestock and water requirement is helpful in modeling water and livestock relationships.

The demand for meat, dairy products and eggs rises faster than the demand for crops; thus both scenarios call for livestock production to increase relatively more rapidly than crops. The world livestock system is broadly divided into pastoral grazing, mixed farming and industrial system (Sere and Seinfeld, 1996). Estimate of the current demand of 1.7 billion tons of cereals and 206 million tons of meat in developing countries could rise by 2020 to 2.5 to 2.8 billion tons of cereals and to 310 million tons of meat (IFPRI, 2000). Water is used by the herbivore as a medium for physical and chemical energy transfer, namely for evaporative cooling and intermediary metabolism (Konandreas and Anderson; King 1983, Kirda and Riechardt, 1986). Livestock and poultry water consumption depend on a number of physiological and environmental conditions such as:

- Type and size of animal or bird
- Physiological state (lactating, pregnant or growing)
- Activity level
- Type of diet-dry hay, silage or lush pasture
- Temperature-hot summer days above 25°C can sometimes double the water consumption of animals.
- Water quality – palatability and salt content

In the below table the demand of water for large animals is shown and all the figures are taken from the Livestock Census of India.

Table 1.3 Livestock of Mamit District

Sl. No	Name of the block	Small Animals					Large Animals				Any other Milch or Meat animal	Draft Animal (Buffalo/ Yak/Bulls/Any other (Nos.)
		Poultry No.	Duck No.	Pig No.	Goat No.	Sheep No.	Indigenous Cow No.	Hybrid Cow No.	In-Descriptive buffalo No.	Hybrid Buffalo No.		
1	Reiek	15636	55	4706	657		370	116				
2	West Phaileng	23159	154	6971	974	50	547	172	35			
3	Zawlnuam	48490	363	14596	2039	118	1146	360	40			
Total		**87285**	**572**	**26273**	**3670**	**168**	**2063**	**648**	**75**			

Source: Livestock Census of India, 2011

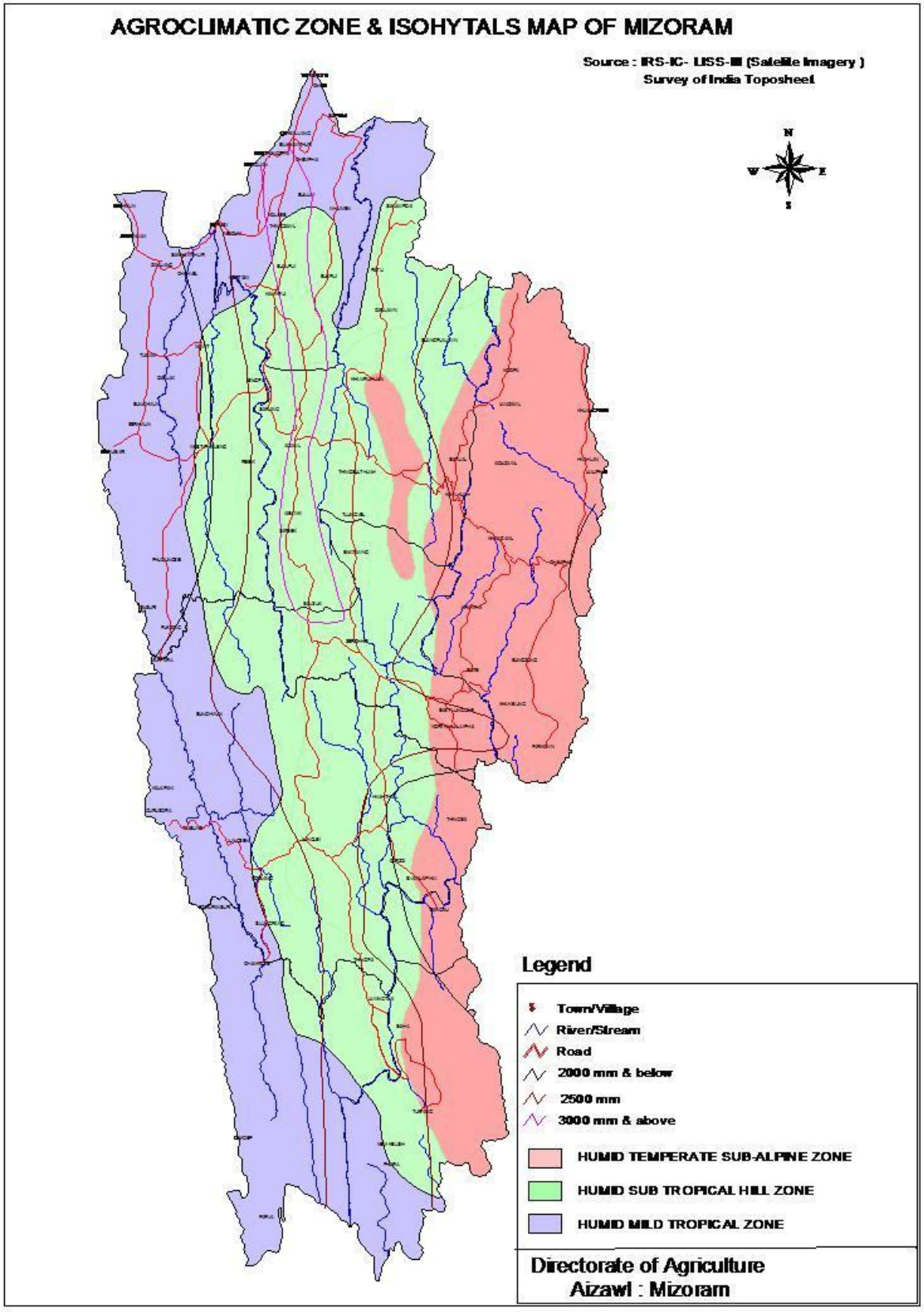
1.4 Agro-Ecology, Climate, Hydrology and Topography

Name of the state : Mizoram

Name of District : Mamit

Block	Agro-Ecological zone type	Type of Terrain	Block area (Ha)	Normal annual Rainfall (mm)	Average Monthly rainfall (mm)	No of Rainy days (no.)	Maximum Rainfall Intensity (mm)			Average weekly temperature (^{0}C)									Potential evapo-transpiration (PET)				Elevation		
										Period									Period						
										Summer (April-May)			Winter (Oct-Mar)			Rainy (June-Sept)									
							Upto 15min	Beyond 15 but upto 30min	Beyond 30 but upto 60min	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Summer	Winter	Rainy Season	Cumulative total	Min	Max	Mean
Reiek	II & III	hilly	93719	2526	114.33	147				14.4	30	22.2	12.67	24	24.67	20	32	26	9.45	6	16	31.94			
West Phaileng	I& II	hilly	99934	2427	140.53	149				15.3	36	25.65	13.68	29	28.18	22	36	29	9.47	6	16	31.92			
Zawlnuam	I& II	hilly	108853	2291	114.33	144				15.1	38	26.55	13.67	28	27.67	23	35	28	9.45	6	16	31.93			

Source: Agriculture Statistical Abstract 2013-14, Dept of Agriculture


AGROCLIMATIC ZONE & ISOHYTALS MAP OF MIZORAM
Source : IRS-IC- LISS-III (Satellite Imagery)
Survey of India Toposheet
N
W
E
S
Legend
Town/Village
River/Stream
Road
2000 mm & below
2500 mm
3000 mm & above
HUMID TEMPERATE SUB-ALPINE ZONE
HUMID SUB TROPICAL HILL ZONE
HUMID MILD TROPICAL ZONE
Directorate of Agriculture
Aizawl : Mizoram

A. AGRO-CLIMATIC ZONES:

Based on the rainfall, temperature, terrain and soil characteristics, the state of Mizoram has been delineated into the following three Agro-Climatic zones.

1) Humid mild tropical,
2) Humid – sub- tropical hill and
3) Humid Temperate Sub Alpine

Kolasib district has two distinct agro-climatic zones namely:- Humid mild tropical and Humid – Sub- Tropical hill zones. Three major soil types/taxonomy are found namely, Typic Hapludults, Humic Hapludults and Typic Udorthents (information from maps to be added).

The average annual rainfall is found to be marginally more in the soil type of Udorthents. The soil type Hapludults favours paddy cultivation while many fruits, maize and plantation crops like areca nut are growing in Udorthents soil type.

Table 1.4.1 Spread of ACZ and AES in Mamit District

Agro-climatic Zones	Agro-ecological Situation	Villages Covered	Approximate Area in Ha.	Percentage of Total Area
Humid Sub-Tropical Hill Zone	I	18	46739	15.45
	II	21	63959	21.14
Humid Mild Tropical Zone	III	28	103318	34.15
	IV	25	88559	29.27
Total		**93**	302575	**100**

B. CLIMATE

Climate is the aggregate of all atmospheric or meteorological influences such as moisture, wind pressure, temperature and evaporation. Climate is one of the most important factors of the geographical environment to which man is subjected and man's activities like agriculture, forestry, supply of water, industry, etc.

The climate of Mizoram is controlled by its location, physiographic, pressure regime in the North West India and Bay of Bengal, warm and moist maritime tropical air masses from the Bay of Bengal, localMountain and valley winds. Overall its climate is tropical monsoon type. As the Mamit district lies in the North Western part of the state, it enjoys a moderate climate owing to its tropical climate. It falls under the direct influence of the South West Monsoon. As such the area receives an adequate amount of rainfall which is responsible for a humid tropical climate characterized by short winter and long summer with heavy rainfall. In general the climate of the district is sub-tropical and humid type.

i) SEASON

Based on the variation in temperature, rainfall, humidity and other general weather conditions, four different types of seasons are observed for the district. They are as follows:

a) The cold or winter season (Thlasik)

Winter season starts from the month of December to first half of February. This is the coldest season of the year. During this period rainfall is much less as compare to other seasons, and whatever amount rainfall received is originated from North East Monsoon, generally known as the retreating monsoon. This season is very pleasant with clear blue sky in the absence covering and all the people of Mizoram are in festive mood since the most celebrated festival 'Christmas' occurs during this season.

b) Spring season (Thal)

Spring season is the shortest season of the year. It starts from the second half of the February to the first half of March. Temperature is mild during this period and the sky is clear and the Mizo people accustomed to build new houses during this season as there are no weather disturbances during the period.

c) Summer season/Rainy season (Nipui/Fur)

Summer season or rainy season is the longest season covering about seven months starting from the second half of March till the first half of October. The early part of this season i.e. from second half of March till First half of May is characterized by bright sunshine and clear sky with little or no cloud till it is disrupted by the coming of Monsoon showers. The warmest months, i.e. June and July, prevails during this period and maximum insolation is received during the early part of this season.

A study from the daily rainfall records reveals that the heavy outpour generally starts from the second quarter of May and this heavy outpour is usually subsides in the first quarter of October. Rainfall during May, June, July, August & September i.e. 5 months alone contributed 76% of the total annual rainfall. This is the season when the cyclonic rains are often felt. The temperature remains high, but is kept down to a considerable extent by the usual rains.

d) Autumn season (Favang)

Autumn season covers for a period generally starting from the second part of October to November. The season is very pleasant and the summer rain already diminished. This is the season the Mizos are longing for since they have no undone jobs in their jhum fields, just waiting for the ripening of their paddies. People are in festive moods. During this time one of Mizo festivals called 'Mim Kut' was used to be celebrated. But now what we called 'Thalfavang Kut' takes the name instead and is celebrated with joy.

ii) TEMPERATURE

Temperature of Mamit district does not fluctuate much. The average maximum and minimum temperature of the district is 35^{0}C and 5.3^{0}C, respectively. The highest temperature was recorded on 6th May 2004 and it was 35.6^{0}C. On an average July and August was recorded to be the warmest months with mean maximum temperature 27.5^{0}C and mean minimum temperature 20.4^{0}C.

Table 1.4.2 Temperature (^{0}C) of Mamit district from 2010-2013

Months	2010		2011		2012		2013	
	Min	Max	Max	Min	Max	Min	Max	Min
January	5.9	26.3	26.5	6	26.5	5.9	28.2	6.4
February	10.2	28.7	29.4	8.5	31.1	5.7	32.2	7.2
March	10.6	31.2	31.5	8.3	34.8	11.6	33.4	13.5
April	15.4	33.5	34.2	16.6	34.2	15	34.8	14.4
May	33.9	16.7	34.3	18.1	35.6	17.4	34.2	16.8
June	32.6	20.4	34	19.5	33.7	20	34.8	19.4
July	32.8	22	34.5	22	32.8	20.6	33.3	21.6
August	32.8	22	33.5	20.1	34.3	21.8	33.1	22
September	34	20.4	33.1	21.4	31.8	21	34.2	19.2
October	32.5	17	31.1	18.4	31.4	17.2	31.6	17.6
November	30.2	13	29.4	11.3	30.4	12.2	29.9	14.1
December	26.5	6.3	27.6	9	27.6	5.3	24.2	5.9

Statistical Abstract, 2012-2013, Dept. of Agriculture (Crop Husbandry), Govt. of Mizoram

The temperature starts falling from November and it falls far low during December and January. January was recorded to be the coldest month of the year with mean maximum temperature 27.1^{0}C and minimum temperature 5.9^{0}C. However, the coldest day was recorded to be 28th December 2011 with 5.3^{0}C.

iii) RAINFALL

Mamit district receives adequate amount of rainfall during the monsoon season as it comes under the direct influence of South West Monsoon and it received 2781 mm average rainfall during 2010. The rainfall data shows that the heavy rainfall starts from the second part of May to the first part of October. In the last five years, the highest rainfall was recorded for the month June of 2012 (683 mm). Intensive rainfall occurs in certain pockets of the district (Hmunpui, Saitlaw etc.). Often hailstorm occurs during April and May.

Table 1.4.3 Rainfall (mm) in Mamit district for thst 10 years

Year	Rainfall (mm)
2003	2627.00
2004	2913.00
2005	1968.50
2006	2964.90
2007	2506.60
2008	2239.80
2009	2106.30
2010	2781.30
2011	2343.70
2012	2255.20

Statistical Abstract, 2012-2013, Dept. of Agriculture (Crop Husbandry), Govt. of Mizoram

Table 1.4.4 Monthly rainfall record (mm) of three different centers under Agriculture Department-2012

Months	Mamit	Kawrtethawveng	Zawlnuam	Average
January	70.20	23.60	23	38.93
February	26	6.30	15	15.77
March	25	28.10	20	24.37
April	379	442	397	406.00
May	194	181	255	210.00
June	529	683	350	520.67
July	120	162	121	134.33
August	448.20	350.60	413	403.93
September	249	394	292	311.67
October	151	184	144	159.67
November	545.80	5.30	38	196.37
December	0	0	0	0.00
Total	**2,737.2**	**2,459.9**	**2,068**	**2,421.70**

Statistical Abstract, 2012-2013, Dept. of Agriculture (Crop Husbandry), Govt. of Mizoram

iv) Relative Humidity:

Relative humidity is the ratio of moisture content in the air to the moisture holding capacity of the same air and it is directly related to the rate of evaporation. Of the various components of atmosphere, moisture constitutes from nearly zero to about 4 percent by volume. Humidity plays a very important role in the heat budget as well as day to day weather changes. During these years the highest relative humidity (84.80%) was found for the month of June 2010.

Table 1.4.5 Average relative (%) humidity of Mamit district

Months	2010	2011	2012	Average
January	78.6	79.4	71.4	76.47
February	65.3	67.3	59.4	64.00
March	59.1	55.7	57.5	57.43
April	63.9	72.6	58.4	64.97
May	75.7	64.1	71.7	70.50
June	84.8	79.6	73.6	79.33
July	78.2	85.5	82.1	81.93
August	80.1	82.8	69.5	77.47
September	84.2	89.2	82.8	85.40
October	86.9	83.9	77.2	82.67
November	73.8	75.2	69.7	72.90
December	70.9	70.3	69.1	70.10
Average	**75.13**	**75.47**	**70.20**	**73.59**

Statistical Abstract, 2012-2013, Dept. of Agriculture (Crop Husbandry), Govt. of Mizoram

v) WIND

The monsoon wind is the most important wind that prevails in Mizoram. During summer, the sub-tropical high pressure belt and the thermal equator are displaced northward in response to the changing pattern of solar heating of the earth. From the ocean, particularly from the north Indian Ocean or Bay of Bengal, they move towards the land mass and blow over the Asian continent. This south-west monsoon reaches Mizoram during second half of May and prevails up to the first half of October. The summer monsoon is characterized by highly variable weather with frequent spells of drought and heavy rains. Besides this, winter monsoon also prevails which is a gentle drift of air in which the winds generally blow from the north east. This retreating monsoon cause sporadic rainfall especially in Mizoram and other north eastern states producing sometimes heavy cyclonic rains.

As evidence from the earlier records, Mizoram state is vulnerable to impact of tropical cyclone which develop in North Indian Ocean (Bay of Bengal), ang the cyclones of the Post Monsoon season (October to December) are more intense than those of Pre-Monsoon season (April & May). Cyclones are associated with strong winds, torrential rains and storm. Though the impact has not yet been devastating, it has often led to loss

of properties and even lives. The impact of cyclone has often led to damages to houses, power line cut-off, blockage of road, damages to crops and plantations, loss of live stocks, etc. Generally these winds come from the norh western part of the state as the winds originate from the Bay of Bengal. According to the statistical reports on Vulnerability Analysis of Mizoram conducted by State Remote Sensing Centre, Mizoram, out of the fifty two villages/wards, eleven (21.15%) villages/wards are classified under high vulnerable class, eighteen (34.62%) villages/wards under medium vulnerability class and twenty three (44.23%) villages/wards under low vulnerable class.

C. Hydrology (Drainage system)

Mamit district is drained by important rivers like Tlawng, Tut, Teirei, Langkaih, Khawthlangtuipui and Mar rivers. About three fourth of the area of the district is drained by the north flowing rivers such as Tlawng, Tut, Teirei and Langkaih rivers where as one fourth of the area is drained by the south flowing rivers of Khawthlangtuipui and Mar rivers. Besides these, there are a good number of streams and rivulets of various patterns and length. Most of these streams and rivulets are ephemeral in nature. Since the drainage system for a particular area is governed mainly by the natural drainage course and topography, therefore the drainage system of Mamit district has been studied with the help of satellite imageries and the survey of India topographical maps.

As mentioned above the drainage system can be divided into two parts according to the directions in which they flow viz. north flowing and south flowing drainage systems.

a) North Flowing Drainage System

Tlawng river is one of the most important rivers of Mizoram and it is the longest river in Mizoram and it passes through five districts of the state forming district boundary lines while running along its course. Here also it formed a district boundary line between Mamit and Kolasib district as well as with the Aizawl district in the eastern side of the study area. It is navigable by small boat throughout the year and hence it provides water transport route with neighboring state of Assam. A number of streams and rivulets join along this course and the important ones are Saiphal Lui, Dialdawk Lui, Tan Lui, Phun Lui, Reiek Lui, Tuisen Lui, Tuichhun Lui etc. Dendritic to Sub-Dendritic drainage patterns are common in the area.

Tut river originates from Thorang tlang near South Kawnpui village in Lunglei district. It flows northwards paralleling with Tlawng river until it confluents to the later in the west of Hortoki village. It is an important river for the district as well for the state of Mizoram since it is navigable by small boat during monsoon season for a considerable distance. Important perennial streams joining Tut river are Tlubing Lui, Tuidam Lui,

Bankalh Lui, Lungal Lui, Chhuanthum Lui, Kheldelh Lui etc. in the south. Uinak Lui, Bawngva Lui, Zawngek Lui, Chhundurh Lui, Mualkawi Lui in the middle part of the river and Raiseh Lui, Saitlan Lui, Vaak Lui in the northern part of the river. The drainage patterns found in this system is dendritic to sub-dendritic drainage patterns. Angulated drainage patterns are also seen in some places e.g. Uinak Lui etc.

Teirei Lui originates near Saithah village in the south western part of the district and flow northward parallel to Tut river and then it confluents to Tlawng river near Bairabi village in Kolasib district. The river is less voluminous in comparision with the above two rivers, yet it is the most important single river within the Mamit district from the agricultural point of view. It has a vast fluvial plain along its course giving a fertile agricultural land for the region and it has many incoming tributaries of which the important ones are Sengmatawk Lui, Kawrnu Lui, Pidari Lui, Hawrhpup Lui, Lotha Lui, Sihthiang Lui, Sakei Lui etc. These tributaries highlighted dendritic to sub-dendritic drainage patterns.

Langkaih Lui is another important river of the study area. It originates from Sabual tlang near Sabual village (of Tripura) where it is called Sailut Lui. From there on it flows northwards forming the state boundary line between Mizoram and Tripura states. The river provides a fertile flat land and the river valley can be developed for agricultural and horticultural aspects. But the local climate is worm and himid that only Bru and Chakma occupied the interior areas. Some of the important tributaries of Langkaih river within Mizoram are Dil Lui, Saduh Lui and Kawrtelian Lui in the upstream side. Tumpang Lui and Borai Lui in the middle part and Momchhara Lui and Gobai Chhara are the important ones in the northern part of the drainage system. The drainage system as a whole is elongated in south to north direction showing angulated, dendritic to sub-dendritic drainage patterns.

b) South Flowing Drainage System

Khawthlangtuipui river is originating from Sabual tlang near Sabual village (of Tripura) adjacent to the origin of Langkaih river in the western part of the district and thereby it is known as Tuilianpui or Sazai Lui. Only after entering Lunglei district. The name changes to Khawthlangtuipui meaning ‘a main river of the west’. It is one of the important rivers of Mizoram as it not only forms an International Boundary between India and Bangladesh for a certain distance. It also provides a water transport route with the neighbouring country of Bangladesh Republic. A number of streams and rivulet joined the main river along its course and the important ones are Thaidawr Lui, Belkhai Lui, Sakhi Lui, Saihliam Lui, Khuaichang Lui etc. in the northern part and Seling Lui and Keisalam Lui are the big streams joining in the middle part of the river. In the southern part Aivapui Lui, Hnahva Lui and Aiva Lui are the important ones. Dendritic drainage patterns are common in this system.

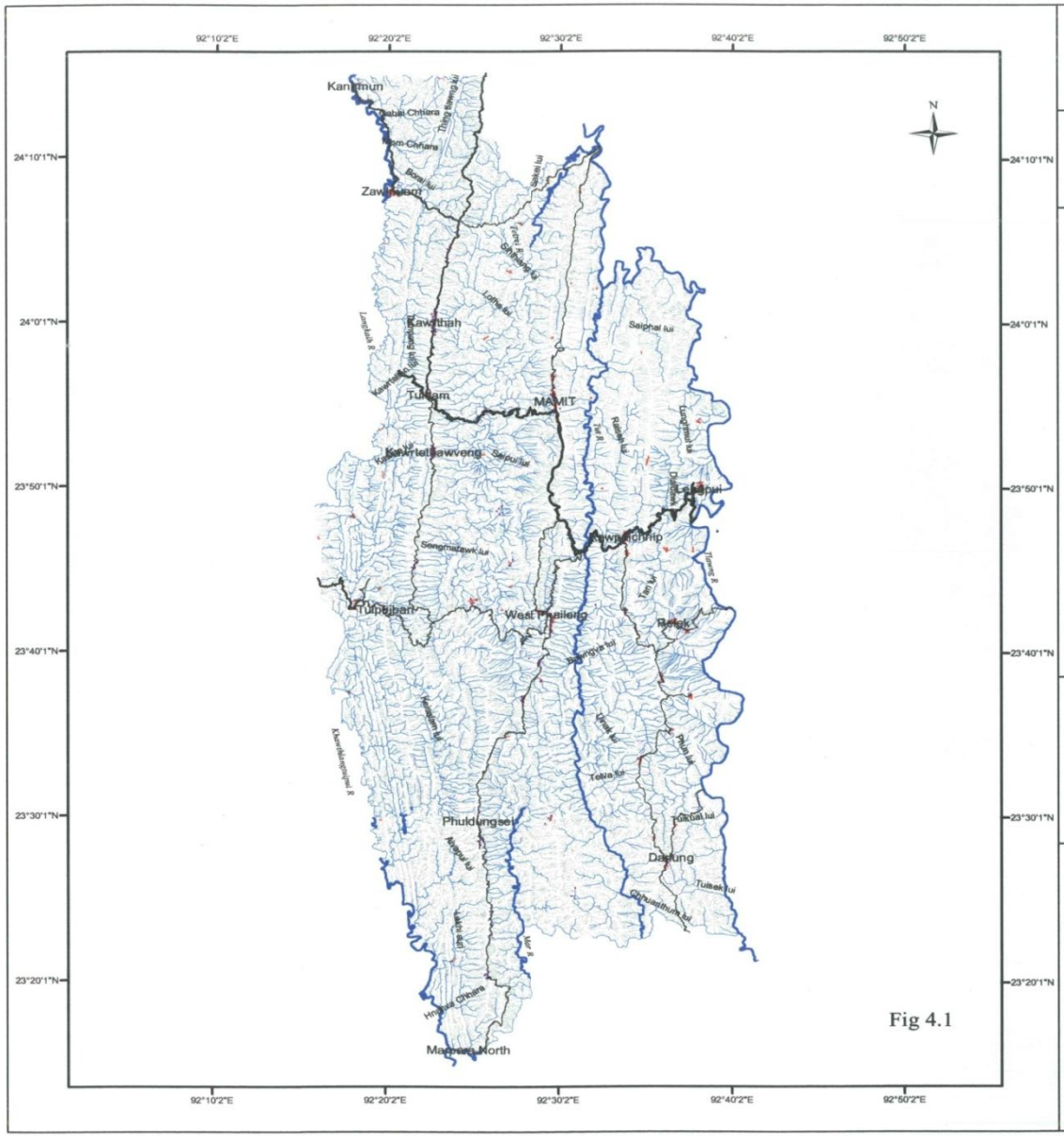
Mar Lui is another south flowing river in the study area which is originating from Saithah tlang near Saithah village. It flows southwards and before joining the Khawthlangtuipui river. It is joined by a number of streams such as Marte Lui, Tuivam Lui, Meidum Lui, Keisih Lui, Vawngzawl Lui, Zawlpui Lui and Tangkabo Lui etc. Mar Lui watershed is elongated in shape with north to south direction and it exhibits dendritic to sub-dendritic drainage patterns.

The drainage system of Mamit district as a whole is said to be dendritic in nature and the streams are youthful stage with deep courses. The topography is young and its soils do not show much diversity, they are highly erosional in character.

The drainage map of the study area is given in fig. 4.1 where the drainage patterns of the study area can be observed and the perennial and non-perennial streams are also shown. The total length of perennial streams and non-perennial streams are 3,985.64 Km. and 8,704.11 Km. respectively.

D. SPRINGS/TUIKHUR

A good number of springs/waterholes are identified at various places of the district especially near the settlements. The location of these springs/waterholes are studied aspect-wise and it is identified that the eastern aspects yield more springs as compare to the western flanks for the whole hill ranges. This is due to the fact that eastern aspects are generally deep slopes of the hill ranges. Generally the springs located within or near the periphery of settlement area are utilized for tapping drinking water. The total number of springs/tuikhur in the district is found to be as many as 162 in numbers and the total number of hand pumps found during the field visits is found to be as many as 32 numbers.



FOR OFFICIAL USE ONLY

NATURAL RESOURCES MAPPING OF MIZORAM

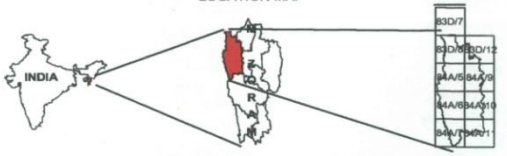
MAMIT DISTRICT

DRAINAGE MAP

LEGEND

- Non- Perennial Stream / River
- Perennial Stream / River
- Spring/ Tuikhur
- Settlement
- National Highway
- State Highway
- District Road
- Railway line

LOCATION MAP



Scale

1:450,000

PREPARED BY:

STATE REMOTE SENSING CENTRE
SCIENCE, TECHNOLOGY & ENVIRONMENT
PLANNING DEPARTMENT
GOVERNMENT OF MIZORAM

SPONSORED BY:

NORTH EASTERN COUNCIL
SHILLONG

E. WATERSHED CLASSIFICATION

A watershed is a drainage area on earth's surface from which run-off, resulting from precipitation flows past a single point into a larger stream, a lake or the ocean. In other words, it is a land surface (body of soil) bounded by a divide which contributes run-off to a common point. The size of the watershed is governed by the order of the stream and the point of interception of the stream.

The concept of watershed as planning unit for development of land and water resources has gained importance since 1974 when the Ministry of Agriculture, Government of India initiated various development programmes like Hill Area Development Programmes (HADP); Drought Prone Area Programmes (DPAP); Desert Development Programmes (DDP) etc. It is therefore, necessary to delineate watershed boundaries of various levels of hierarchy to identify development activities under various schemes in each watershed. Drainage networks help in delineation of watershed and for suggesting various water harvesting structures and soil conservation measures.

All India Soil and Land Use Survey (AIS&LUS) of the Ministry of Agriculture has developed a hierarchical system of watershed delineation like water resources region, basin, catchments, sub-catchments and watershed. Beyond this, the following three levels of watershed delineation had been carried out. viz.

1) Sub-Watershed (30 – 50 Sq. Km.)
2) Mini-Watershed (10 – 30 Sq. Km.)
3) Micro-Watershed (5 – 10 Sq. Km.)

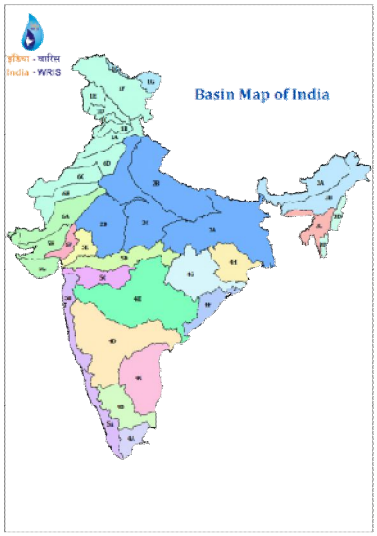
Here, Survey of India topographical maps have been utilized for delineation of drainage lines and watershed maps up to Micro-Watershed levels.

According to Watershed Atlas of India of All India Soil and Land Use Survey Organization, the Mizoram state falls into region 3 (Brahmaputra & Northeastern state river) comprising the basins of 3C (Brahmaputra tributaries that flow upto Bangladesh, Kalni Myanmar) and 3D (Eastern part of Manipur & Mizoram draining into Chindwin, Myanmar). These two basins have three catchments which fall under Mizoram state – 3C2 (Mostly Barak), 3C3 (Partial drainage of Tripura & Mizoram flowing into Bangladesh) and 3D1 (Eastern part of Mizoram and Ngengpui Lui). These are sub-divided into 6 sub-catchments and 34 watersheds. These watersheds are further sub-divided into sub-watersheds, Mini-watersheds and Micro-watersheds units as shown in figure 4.2. The whole district of Mamit falls into sub-catchments of 3C2A and 3C3B and the watershed statistics of mamit district is given in table 4.1a, 4.1b, 4.1c, 4.1d, 4.1e, 4.1f, 4.1g and 4.1h and the watershed classification for the district of Mamit

i) Watershed Management:

Proper watershed management is based upon the efficient utilization of natural resources for the welfare of the people as a whole. As discussed earlier, most of the cultivable areas have been degraded mainly due to improper land use pattern, shifting cultivation and unlimited and irregular felling of trees. Land use classification may be important to identify each and every watershed for proper management. Accordingly, plans should be made for each watershed to obtain efficient utilization in a sustained manner.

a) Watershed: Recognizing the importance of management of soil and water resources in the country following the natural system, the department of Agriculture and Cooperation developed the delineation and codification system and ***"Watershed Atlas of India"*** has been published (Anon, 1990). The atlas has been devised based on the drainage map on 1:1 million scale following stream hierarchy where the whole country has been divided into six River Resource Region, 35 Basin, 112 Catchments, 550 Sub catchments and 3257 Watersheds. The codification has been made in a simplistic manner following alphanumeric system.



A watershed can be symbolized as 1A2B3 where "1" stands for River Resource Region, "A" designates the Basin in that river resource region, "2" indicates the Catchment within the basin, "B" indicates Sub catchment and "3" stands for the watershed number in the sequence of stream hierarchy.

The watershed approach has been accepted as a major theme for development of rainfed areas with a view to conserving natural resources of water, soil and vegetation by mobilizing social capital. It is in this context, the watersheds of the state have been identified.

b) Definition of Watershed:

- The term 'Watershed' strictly refers to divide/separating one drainage basin from another.
- The land area from which water drains to a given point is a watershed.

- It is a self-defended area, which does not allow any water from outside the catchments to enter into it, and allows its water to discharge to a common point in a stream, rivulet or river. In other words, a watershed or catchments must have a ridge outer area of the watershed around it and also from the inner area of the watershed itself.

- A watershed is a natural hydrological entity in its technical sense. Hydrologically, a watershed could be defined as an area the runoff from which drains through a particular point on the drainage system. It is an aerial expanse of land surface from which the run-off flows through a defined drain, channel, stream or river. On reaching the land, a part of the rain water that does not evaporate or percolate into the soil, drains into ditches, streams or lakes.

  The AISLUS organization of the departments of agriculture and co-operation has been engaged in conducting rapid reconnaissance surveys for prioritization of smaller Hydrologic units within catchment areas of river valley projects and flood prone rivers.it has developed a system for delineating and codifying the catchment areas into smaller Hydrologic units i.e. sub watersheds following the 4 stage delineation. through the methodology developed has been serving the requirement of prioritization , a need for national level framework of watersheds, was always felt by the user agencies. The present bulletin on watershed atlas of India is an endeavor in that direction wherein the entire country has been divided into Watershed is a natural hydrologic entity governed by the terrain topography from where runoff is drained to a point. The term watershed is a general phenomenon thus its size and area depends on the scale of the base map used for delineation and codification.

Table 1.4.6 Basin of India

- 6 Major Water Resources Region,
- 35 River Basin,
- 112 Catchments,
- 500 Sub-catchments,
- 3237 Watersheds following a 5 stage delineation approach.

Sl. No.	Basin Code	Basin Name	Area (sq.km)
1	1A	Sutlej	53,108
2	1B	Beas	20,187
3	1C	Ravi	13,626
4	1D	Chenab	29,945
5	1E	Jhelum	29,513
6	1F	Indus	1,38,613
7	1G	Ephemeral incipient drainge not flowing into Indus	28,676
8	2A	Lower Ganges	2,96,614
9	2B	Upper Ganges above confluence with Ghaghra	2,07,557
10	2C	Yamuna	2,12,829
11	2D	Chambal	1,36,593
12	3A	Brahmaputra right bank upto Lohit confluence	1,05,416
13	3B	Left bank ok of Brahmaputra	1,07,133
14	**3C**	**Brahmaputra tributaries that flow into Bangladesh**	**56,093**
15	**3D**	**Eastern parts Manipur and Mizoram draining into Chidwim(Burma)**	**28,320**
16	4A	Cape Comorin to Cauvery	37,564
17	4B	Cauvery	84,654
18	4C	Between Cauvey and Krishna	1,43,845
19	4D	Krishna	2,71,444
20	4E	Godavari	3,15,076
21	4F	Between Godavari and Mahanadi	53,949
22	4G	Mahanadi	1,41,875
23	4H	Mahanadi to Ganges water resource region	84,326
24	5A	Cape Comorin to Sheravati	54,771
25	5B	Sharavati to Tapi	58,146
26	5C	Tapi	66,652

Various steps involved in delineation of watersheds at micro level are illustrated and is given below:-

Table 1.4.7 Classification of Watershed

Sl. No.	Category of Hydrologic Units	Example of Code	Size Range (ha)
1	Region	2	270,00,000 - 1130,00,000
2	Basins	A	30,00,000 - 300,00,000
3	Catchments	1	10,00,000 - 50,00,000
4	Sub catchments	A	200,000 - 10,00,000
5	Watersheds	2	20,000 - 300,000
6	Sub watersheds	a	3,000 - 5,000
7	Mini Watershed	2	1000 - 3000
8	Micro watersheds	a	500 - 1000

Table 1.4.8 Classification According to Watershed Atlas of India of All India Soil & Land use Survey, Mizoram.

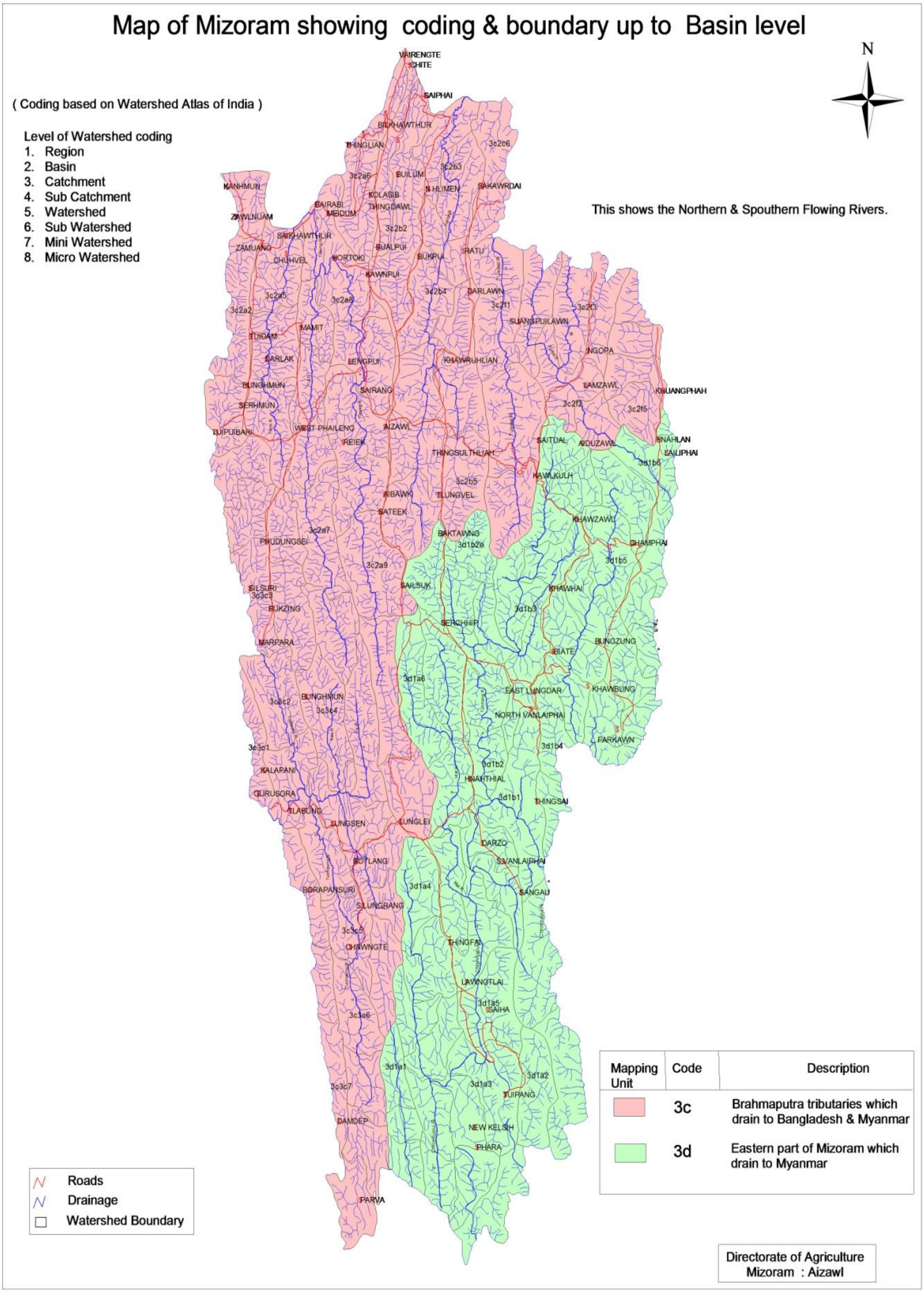
Sl. No.	Name	Code	Numbers
1	Region	3	1
2	Basin	3C	2
3	Catchment	3C2	3
4	Sub Catchment	3d1b	7
5	Watershed	3c2b4	34
6	Sub – Watershed	3c2b2a	128
7	Mini Watershed	3c2b2a1	936
8	Micro Watershed	3c2b2a1a	3440

Table 1.4.9 District wise Number of Micro Watershed and Area in Mizoram.

Sl. No.	District	Nos of Micro Watershed	Area in Ha.
1	Aizawl	580	3,57,631
2	Lunglei	769	4,53,800
3	Saiha	221	1,39,990
4	Champhai	553	3,16,583
5	Kolasib	283	1,38,251
6	Serchhip	317	1,42,160
7	Lawngtlai	319	2,55,710
8	Mamit	398	3,02,575
Total		**3440**	**21,08,700**

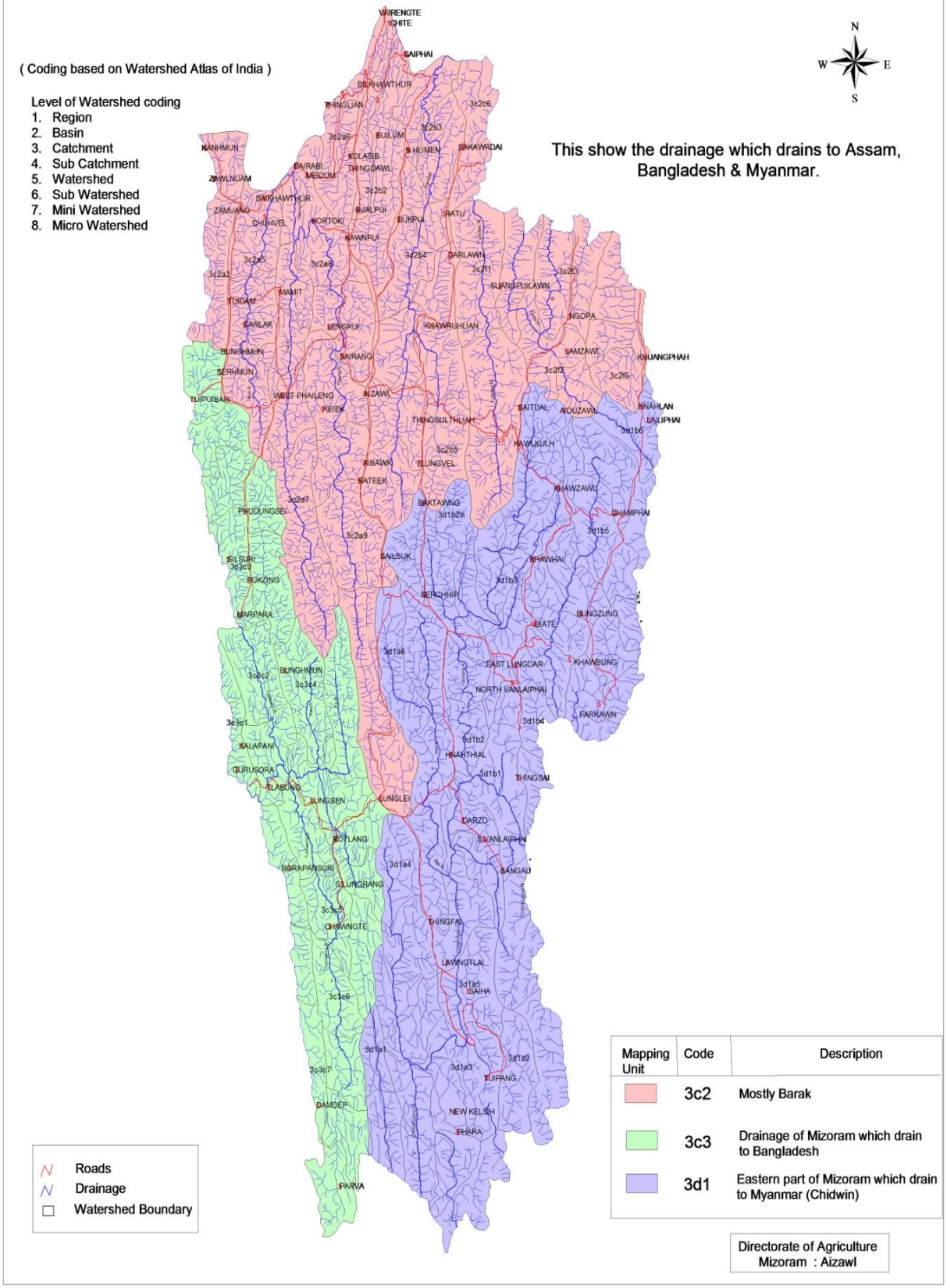
F. Topography

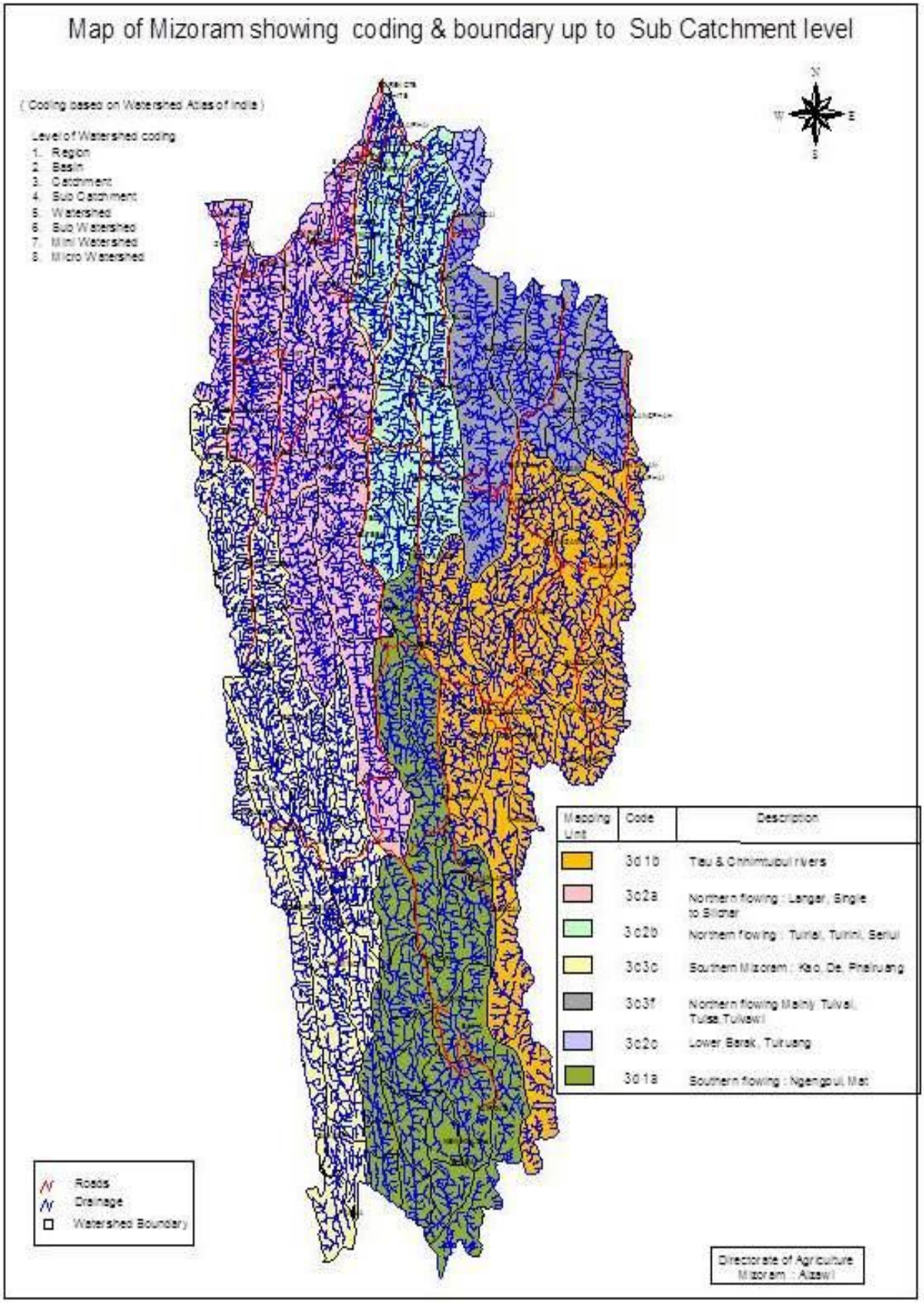
Mamit District is characterized by many hill ridges running parallel to each other, most of which roughly runs from north to south. Hill ridges in the study area include many hill tops, several of which occupy prominent locations. It can be assumed that a main hill ridge that runs north to south from the more or less middle of the district divides the study area into a roughly hill eastern side and a rather smooth flat western plain. The middle hill ridge gently stars its descent from the mid-section and tappers gradually towards the north while in abruptly joins with the other hill ridges in the south forming many other minor small ridges and valleys. The eastern side of the district consists of a rather rugged hill ridges running almost parallel to each other and they sandwiches many narrow valleys and small streams. Narrow valleys separate some of the hill ridges and few of which have gentle to steep slopes. The hill side slopes are mostly gentle to steep and escarpment are also visible in innumerable places of the area.



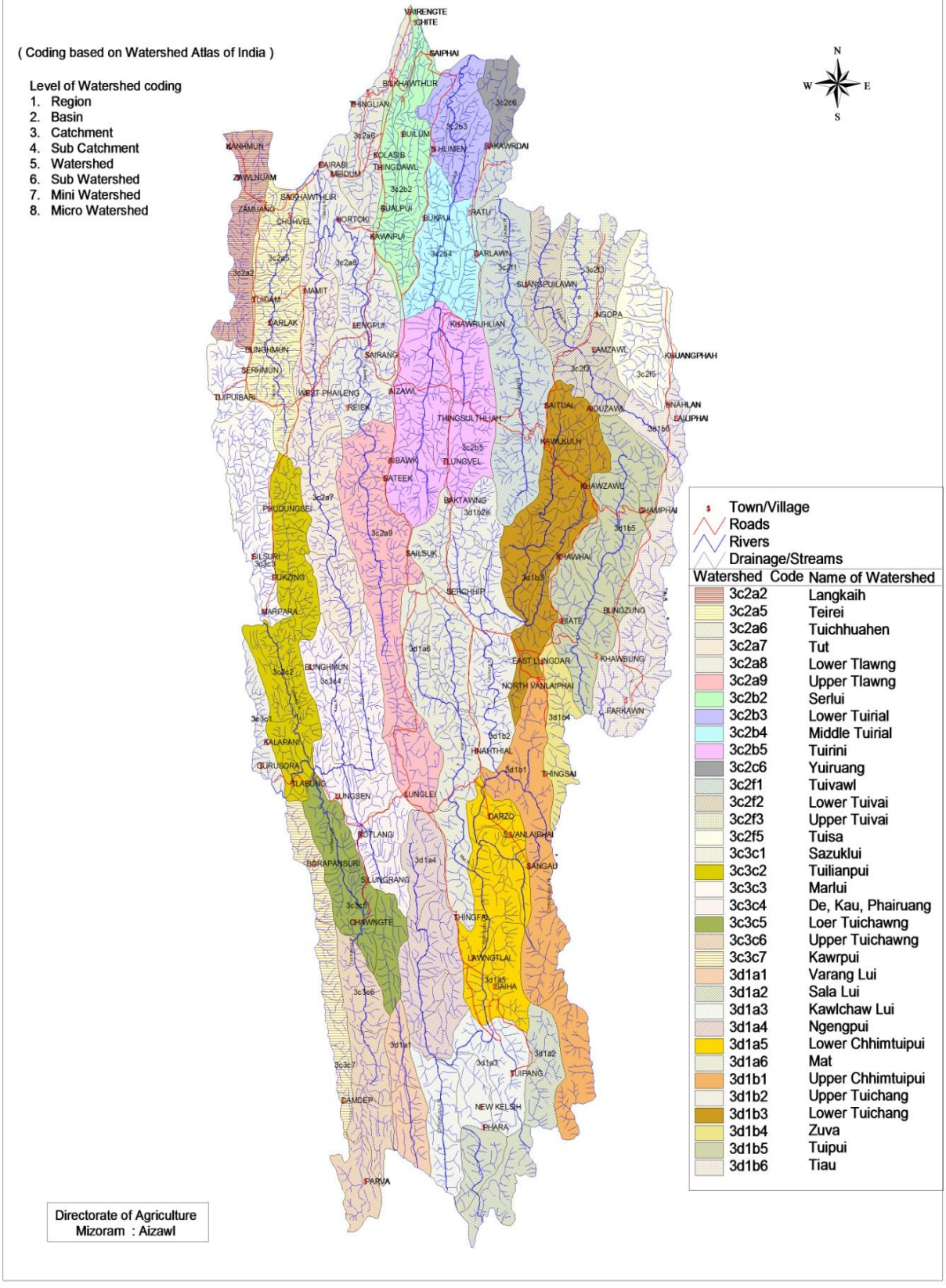
Map of Mizoram showing coding & boundary up to Basin level
N
(Coding based on Watershed Atlas of India)
Level of Watershed coding
1. Region
2. Basin
3. Catchment
4. Sub Catchment
5. Watershed
6. Sub Watershed
7. Mini Watershed
8. Micro Watershed
This shows the Northern & Spouthern Flowing Rivers.
Mapping Unit
Code
Description
3c
Brahmaputra tributaries which drain to Bangladesh & Myanmar
3d
Eastern part of Mizoram which drain to Myanmar
Roads
Drainage
Watershed Boundary
Directorate of Agriculture Mizoram : Aizawl

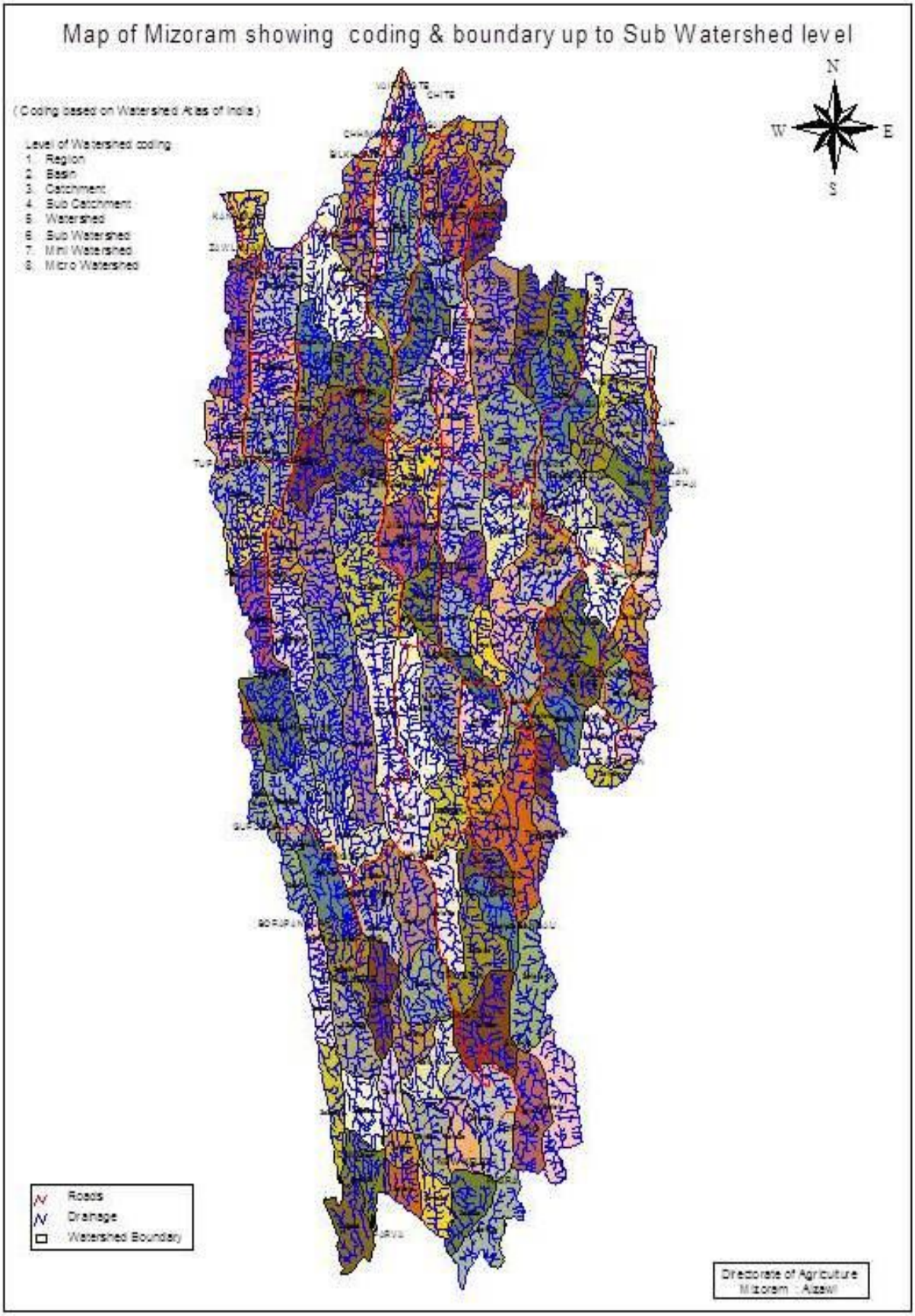
Map of Mizoram showing coding & boundary up to Catchment level

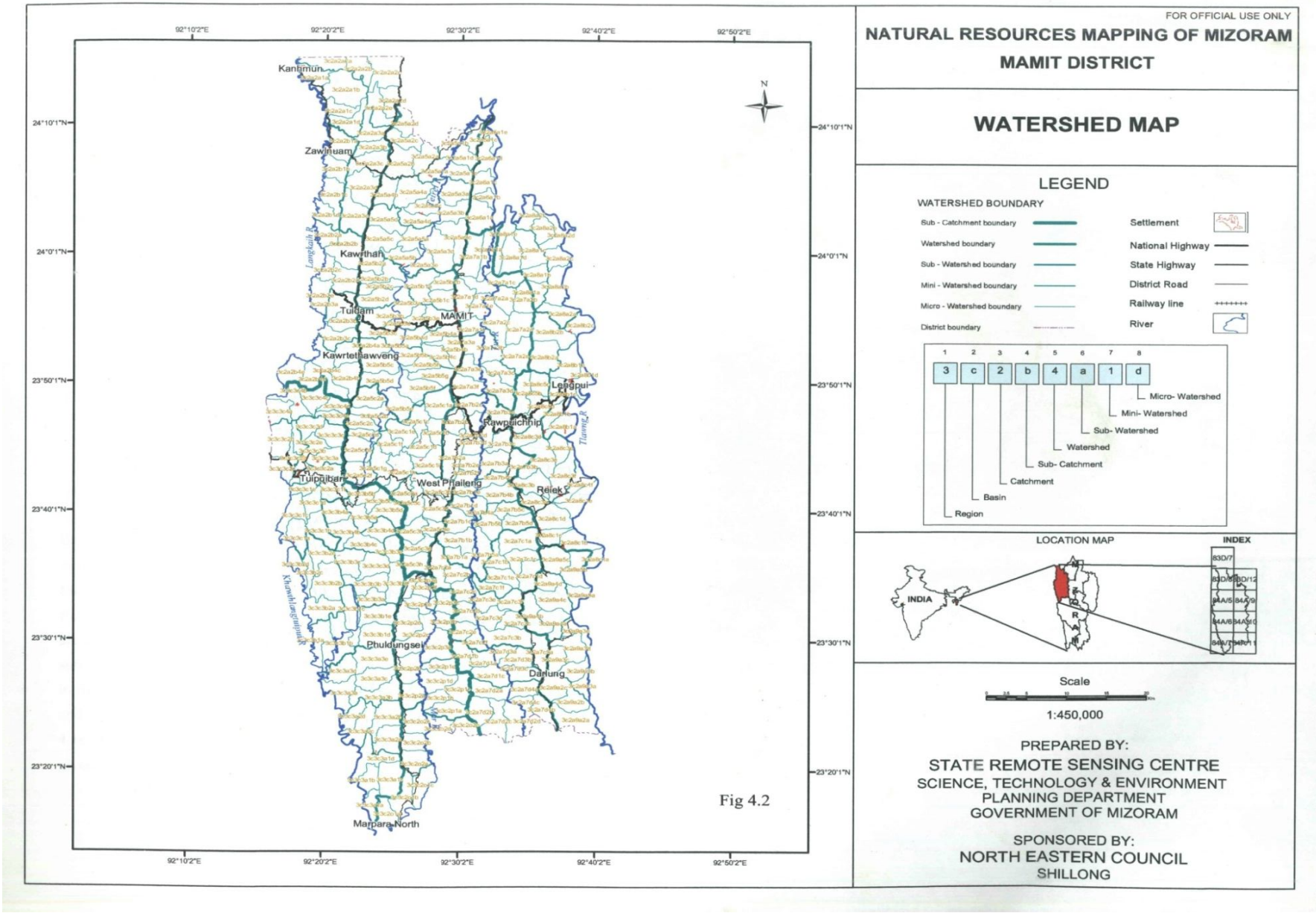



Map of Mizoram showing coding & boundary up to Sub Catchment level
(Coding based on Watershed Atlas of India)
Level of Watershed coding
1. Region
2. Basin
3. Catchment
4. Sub Catchment
5. Watershed
6. Sub Watershed
7. Mini Watershed
8. Micro Watershed
N
W
E
S
Mapping Unit
Code
Description
3d1b
Tlau & Chhimtuipui rivers
3c2a
Northern flowing : Langar, Engte to Silchar
3c2b
Northern flowing : Turial, Tuirini, Sonai
3c3c
Southern Mizoram : Kau, De, Phairuang
3c3f
Northern flowing Mainly Tuivai, Tuisa,Tuiveiv
3c2c
Lower Barak, Turuang
3d1a
Southern flowing : Ngengpui, Mat
Roads
Drainage
Watershed Boundary
Directorate of Agriculture
Mizoram : Aizawl

Map of Mizoram showing coding & boundary up to Watershed level




Map of Mizoram showing coding & boundary up to Sub Watershed level
(Coding based on Watershed Atlas of India)
Level of Watershed coding
1. Region
2. Basin
3. Catchment
4. Sub Catchment
5. Watershed
6. Sub Watershed
7. Mini Watershed
8. Micro Watershed
N
W
E
S
Roads
Drainage
Watershed Boundary
Directorate of Agriculture
Mizoram : Aizawl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NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
WATERSHED MAP
LEGEND
WATERSHED BOUNDARY
Sub - Catchment boundary
Watershed boundary
Sub - Watershed boundary
Mini - Watershed boundary
Micro - Watershed boundary
District boundary
Settlement
National Highway
State Highway
District Road
Railway line
River
3 c 2 b 4 a 1 d
Region
Basin
Catchment
Sub- Catchment
Watershed
Sub- Watershed
Mini- Watershed
Micro- Watershed
LOCATION MAP
INDEX
INDIA
Scale
1:450,000
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PLANNING DEPARTMENT
GOVERNMENT OF MIZORAM
SPONSORED BY:
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SHILLONG
Kanhmun
Zawlnuam
Kawrthah
Tuidam
MAMIT
Kawrtethawveng
Lengpui
Rawpuichhip
Tuipuibari
West Phaileng
Reiek
Phuldungsei
Darlung
Marpara North
Lawngtlai R.
Tlawng R.
Khawthlangtuipui R.
92°10'2"E
92°20'2"E
92°30'2"E
92°40'2"E
92°50'2"E
24°10'1"N
24°0'1"N
23°50'1"N
23°40'1"N
23°30'1"N
23°20'1"N
N

Fig 4.2

1.5 SOIL PROFILE

Soil is the product of interaction between parent materials, climate and biotic factors as modified by the terrain conditions and the duration over which the interaction has been going on. Any variation in the intensity of any of these influencing factors results into different kinds of soils.

The rocks of area are generally sandstone and shale, the derived soils are mostly red and yellow loamy. The soil is acidic in nature due to heavy rainfall. It contains a high amount of organic carbon and is high in available nitrogen, low in phosphorus and potassium content. The area experiences warm humid sub-tropical climate. It is under the direct influence of monsoon. The average annual rainfall from 1999 to 2004 is 2587.8mm. On the basis of rainfall and humidity, the soil moisture regime is classified as Udic. It is observed that the mean summer temperature (July to August) is 23.95°C and mean winter temperature (November to January) is 16.6°C and their difference is 7.35°C which exceeds 5°C and the soil quality for Hyperthermic temperature class to be used as family modifiers.

a) Soil Classification

Classifications of soils of the area have been done according to soil taxonomy (USDA 1994) on the basis of their physic-chemical and morphological properties. The soils found at order level are:-

1) Entisols
2) Inceptisols and
3) Ultisols

Table 1.5.1 The legend-wise description of the soil series of Mamit District are given below:-

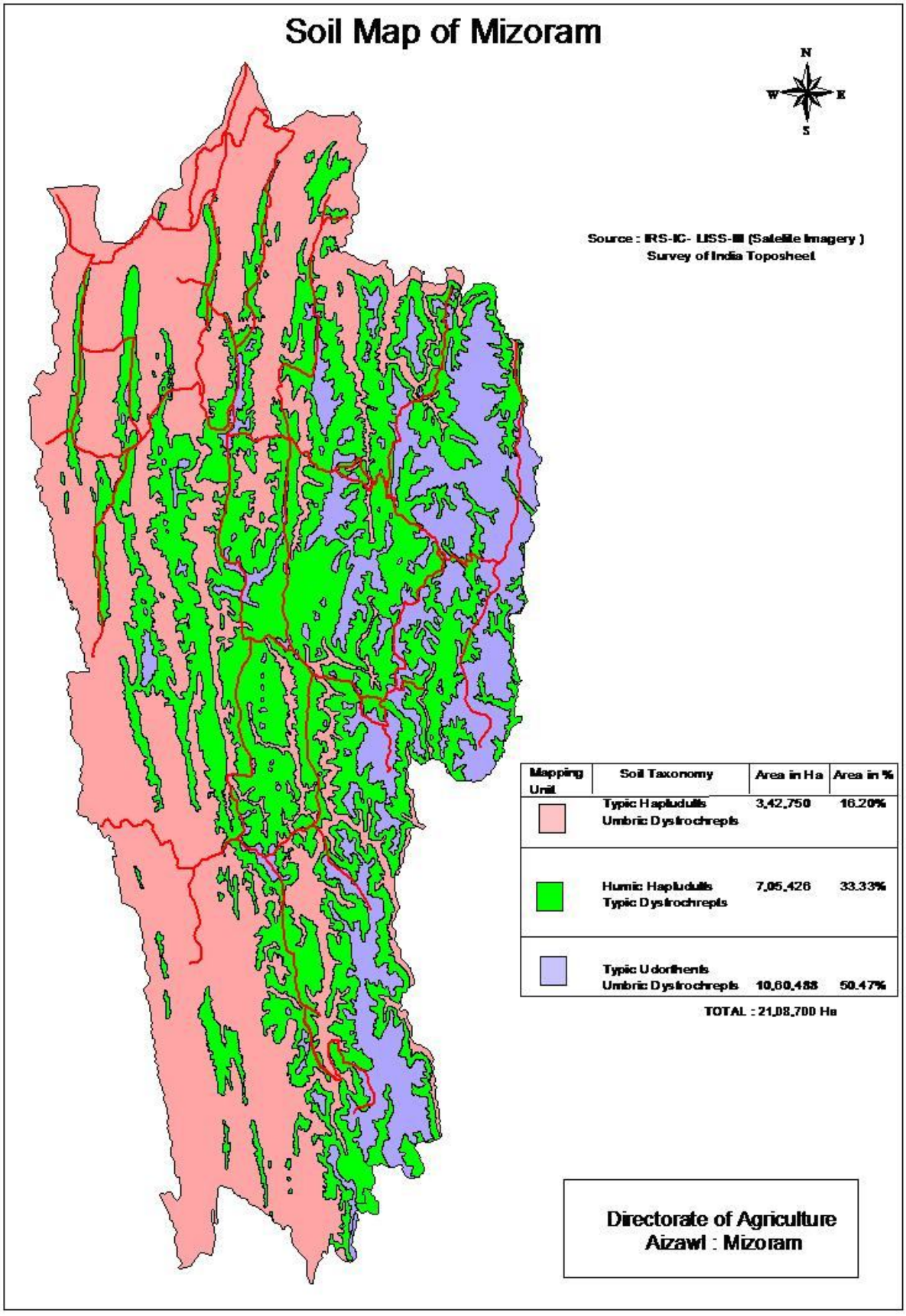
Sl. No.	Soil Series/ Association	Description
1	Mamit	Deep to very deep, dark yellowish brown, sandy clay, well drained, strongly acidic, hill side slope and hill top/crest, moderate to severe erosion. Loamy skeletal, mixed, Hyperthermic, Typic Dystrochrepts.
	Reiek	Deep, dark yellowish brown to yellowish brown, clay loam, well drained, strongly acidic, hill top/crest, moderate to severe erosion. Loamy skeletal, mixed, Hyperthermic, Typic Udorthents.
	West Phaileng	Very deep, dark yellowish brown to yellowish brown, strongly acidic, sandy clay loam surface and sandy clay sub-surface, well-drained, hill side sloped and hill crest/top, moderate to severe erosion. Fine loamy, mixed, Hyperthermic, Typic Dystrochrepts.
2	Kawrthah	Very deep, dark yellowish brown to yellowish brown, sandy clay to clay, strongly acidic, well drained, hill side slopes, moderate to severe erosion, cutans are formed. Fine loamy, mixed, Hyperthermic, Typic Hapludults.
	Rengdil	Very deep, very dark greyish brown to dark yellowish brown, sandy clay loam surface and clay sub-surface, strongly acidic, well drained, hill side slopes, moderate to severe erosion, cutans are formed. Clayey, mixed, Hyperthermic, Typic Haplohumults.
	Rawpuichhip	Very deep, dark brown to dark yellowish brown, medium to strongly acidic horizons, sandy clay to clay sub-surface, well drained, hill side slopes and hill crest/top, moderate erosion. Loamy skeletal, mixed, Hyperthermic, Umbric Dystrochrepts.
3	Marpara	Very deep, dark brown to yellowish brown, clay loam to sandy clay, well drained, hill side slopes, moderate to severe erosion, cutans are formed. Loamy skeletal, mixed, Hyperthermic, Typic Hapludults.
	Dampui	Very deep, dark brown to yellowish brown, sandy clay loam to clay, strongly acidic horizons, well drained, hill side slope, moderate to severe erosion, cutans are formed. Fine loamy, mixed, Hyperthermic, Humic Hapludults.
	Mamit	As described in Serial No. 1
4	Rengdil	As described in Serial No. 2
	Kawrthah	As described in Serial No. 2
	Dampa	Very deep, dark brown to yellowish brown, sandy clay to clay, well drained, strongly acidic horizons, hill side slopes, moderate severe erosion, cutans are formed. Loamy skeletal, mixed, Hyperthermic, Humic Hapludults.
5	Dampui	As described in Serial No. 3
	Phuldungsei	Very deep, dark brown to yellowish brown, sandy clay loam to sandy clay strongly acidichorizons, hill side slope, moderate to severe erosion. Find Loamy, mixed, Hyperthermic, Umbric Dystrochrepts.
	Rawpuichhip	As described in Serial No. 2
6	West Phaileng	As described in Serial No. 1
	Dampa	As described in Serial No. 4
	Phuldungsei	As described in Serial No. 5

Sl. No.	Soil Series/ Association	Description
7	Darlung	Very deep, dark brown to dark yellowish brown, clay loam, well drained, strongly acidic horizons, hill side slope, moderate to severe erosion. Loamy skeletal, mixed, Hyperthermic, Typic Haplohumults.
	Marpara	As described in Serial No. 3
	West Phaileng	As described in Serial No. 1
8	Phuldungsei	As described in Serial No. 5
	Dampui	As described in Serial No. 3
	Marpara	As described in Serial No. 3
9	Dampui	As described in Serial No. 3
	Rawpuichhip	As described in Serial No. 2
	Darlung	As described in Serial No. 7
10	West Phaileng	As described in Serial No. 1
	Dampa	As described in Serial No. 4
	Rawpuichhip	As described in Serial No. 2
11	Rawpuichhip	As described in Serial No. 2
	Dampa	As described in Serial No. 4
	West Phaileng	As described in Serial No. 1
12	Phuldungsei	As described in Serial No. 5
	Marpara	As described in Serial No. 3
	Dampa	As described in Serial No. 4
13	Dampa	As described in Serial No. 4
	Rawpuichhip	As described in Serial No. 2
	Kawrthah	As described in Serial No. 2
14	Zawlnuam	Very deep, dark brown to dark yellowish brown, mottles of low chroma, clay, strongly acidic, narrow and broad valley, poorly drained, slight erosion. Clayey, mixedm Hyperthermic, Aquic Dystrochrepts.
	Saithah	Very deep, dark brown to dark yellowish brown, sandy clay surface and clay sub-surface, medium to strongly acidic, poorly drained, Broad and narrow valley, slight erosion. Fine loamy, mixed, Hyperthermic, Aquic Dystrochrepts.
	Darlak	Deep to very deep, dark brown to yellowish brown, sandy clay surface and clay sub-surface, poorly drained, strongly acidic horizons, narrow valleys, slight erosion. Fine loamy, mixed, Hyperthermic, Fluventic Distrochrepts.

Table 1.5.2 Soil Classification of Mamit District

Sl. No.	Order	Sub-Order	Great soil group	Sub-group	Family	Proposed Soil series
1	Entisols	Orthents	Udorthents	Typic Udorthents	Loamy skeletal, mixed, Hyperthermic	Reiek
2	Inceptisols	Ochrepts	Dystrochrepts	Aquic Dystrochrepts	Clayey, mixed, Hyperthermic	Zawlnuam
				Aquic Dystrochrepts	Fine loamy, mixed, Hyperthermic	Saithah
				Fluventic Dysthrochrepts	Fine loamy, mixed, Hyperthermic	Darlak
				Typic Dystrochrepts	Fine loamy, mixed, Hyperthermic	West Phaileng
					Loamy skeletal, mixed, Hyperthermic	Mamit
				Umbric Dystrochrepts	Fine loamy, mixed, Hyperthermic	Phuldungsei
					Loamy skeletal, mixed, Hyperthermic	Rawpuichhip
3	Utisols	Humults	Haplohumults	Typic Haplohumults	Clayey, mixed, Hyperthermic	Rengdil
					Loamy skeletal, mixed, Hyperthermic	Darlung
		Udults	Hapludults	Humic Hapludults	Fine loamy, mixed, Hyperthermic	Dampui
					Loamy skeletal, mixed, Hyperthermic	Dampa
				Typic Hapludults	Fine loamy, mixed, Hyperthermic	Kawrthah
					Loamy skeletal, mixed, Hyperthermic	Marpara

The description of the morphology and the analytical results of the physical and chemical properties of the soil series are given below.


Soil Map of Mizoram
N
W
E
S
Source : IRS-IC- LISS-III (Satellite Imagery)
Survey of India Toposheet
Mapping Unit
Soil Taxonomy
Area in Ha
Area in %
Typic Hapludults
Umbric Dystrochrepts
3,42,750
16.20%
Humic Hapludults
Typic Dystrochrepts
7,05,426
33.33%
Typic Udorthents
Umbric Dystrochrepts
10,60,488
50.47%
TOTAL : 21,08,700 Ha
Directorate of Agriculture
Aizawl : Mizoram

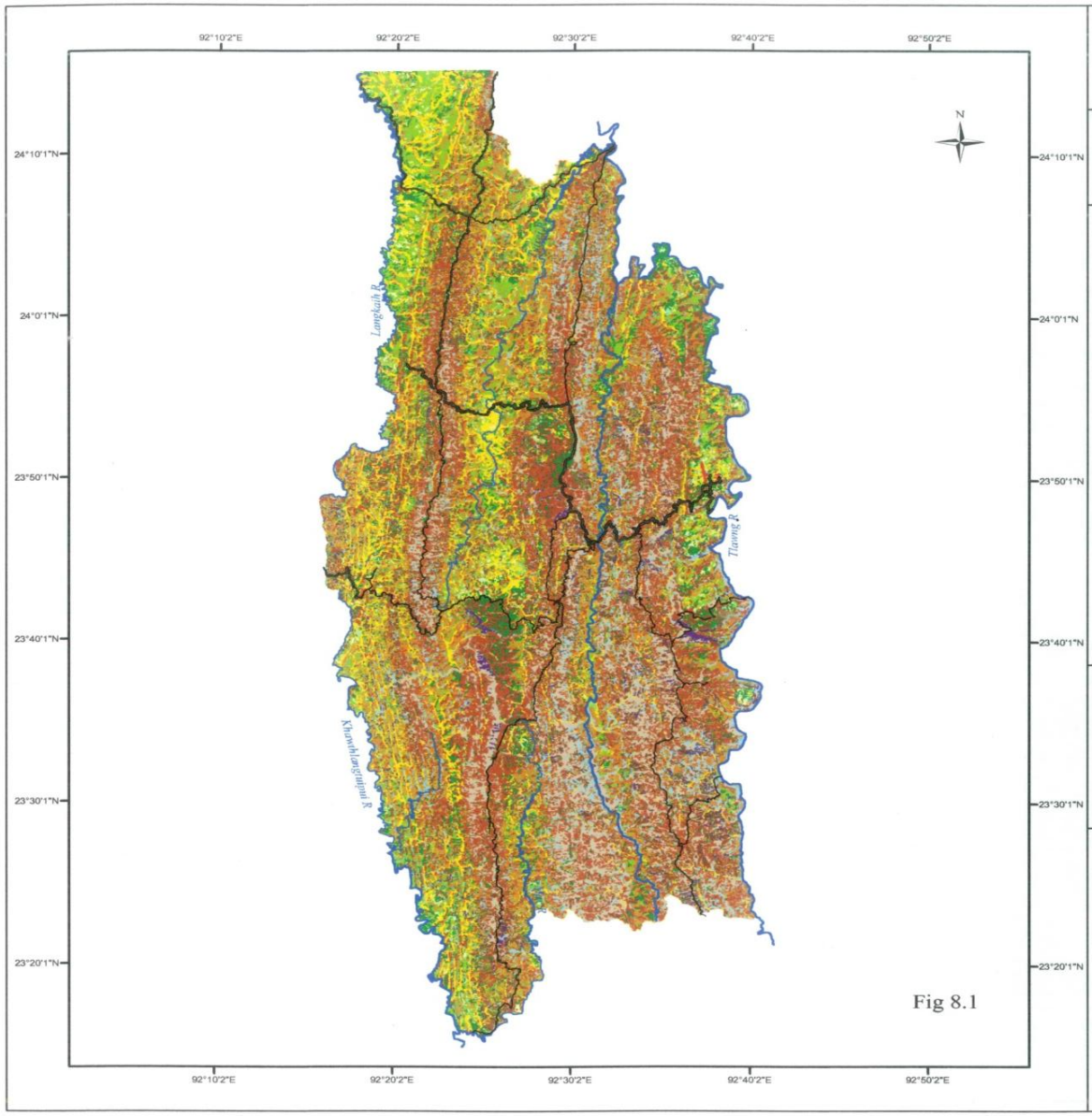


Fig 8.1

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NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT

SOIL MAP

LEGEND

- Hill top/ hill crest
- Hill side 0-25% slope with current jhum and scrubland
- Hill side 0-25% slope with abandoned jhum and horticulture
- Hill side 0-25% slope with bamboo forest
- Hill side 0-25% slope with forest and forest plantation
- Hill side 25-50% slope with current jhum and scrubland
- Hill side 25-50% slope with abandoned jhum and horticulture
- Hill side 25-50% slope with bamboo forest
- Hill side 25-50% slope with forest and forest plantation
- Hill side >50% slope with current jhum and scrubland
- Hill side >50% slope with abandoned jhum and horticulture
- Hill side >50% slope with bamboo forest
- Hill side >50% slope with forest and forest plantation
- Valley / WRC
- Built up land
- National Highway
- State Highway
- District Road
- Railway line
- River

LOCATION MAP

Scale

1:450,000

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b) Land Capability Classification

Land capability classes placed soils into general order of suitability or unsuitability for cultivation, forestry, grassland or other uses for sustained production. The soils that have the least limitations or hazard and respond best to management are placed in the highest category. This classification system also evaluate soils with respect to their susceptibility to erosion, soil depth, drainage problem and other soil characteristics that would effect to sustained production of agricultural crops. Land capability map is shown below.

c) Land capability classes

There are eight land capability classes designated by Roman numbers I to VIII. The hazards and limitations of land increases progressively from lands of class II to class VIII. Soil of class I land do not have limitations or hazards that limit their use for sustained productivity of most of the arable crops.

Soil grouped in class I to IV are cultivable and crop can be grown under proper and specific soil management. Class V to VIII are not sustainable for crops but are suited to permanent vegetation. Soils under class VIII are neither suited to crop husbandry and forestry but are to be left for wildlife preservation and recreational uses.

The district has been classified into land capability class II, III, IV, VI and VII. The statistics of land capability classes are given in Table .

d) Land capability sub-class

Land capability sub-classes are soil groups within one class that are designated by small letters e, w, s or c suffixed to the class number, for example, IIIe, IVe etc. The kinds of limitations recognized at sub-class level are –

e = risk of erosion,	w = wetness, drainage or overflow
s =root zone limitation or soil,	c = climatic limitations

Sub-class ‘e’ shows that erosion susceptibility and past erosion are the major limiting factors. Sub-class ‘w’ is put where excess water is dominant factor to limit their use on account of poor drainage wetness, high water table and overflow. Soils of sub-class ‘s’ have their major limitations due to shallow depth, extreme of texture, stoniness, low moisture holding capacity, low fertility. Sub-class ‘c’ is put where the limitations are due to climate like snowfall, frost, prolonged dryness etc. Climate too dry or too cold.

CLASS IIe:

These are very deep, medium to moderately fine textured soils, poorly drained and are subject to water logging during rains. It occurs on gently sloping valley land with slight erosion hazards.

Recommendation :

1) Proper bunding and levelling.
2) Flood protection and drainage improvement.
3) Improvement of irrigation facilities.
4) Application of manures.
5) Introduction of suitable crops varieties.

CLASS IIIe:

These are very deep, moderate to fine textured soils and well drained. They occur on strongly sloping to steep slope with moderate erosion hazards. This soils possess good water holding capacity.

Recommendation :

1) Proper bunding and Terracing.
2) Contour trench farming.
3) Construction of check dams at suitable sites.
4) Application of manures.
5) Introduction of high yielding varieties of crops.

CLASS IVe:

These soils are deep to very deep; moderate to fine textured soils and well drained. They occur on steep to very steep hill side slope and hill ridge with severe erosion hazards.

Recommendation:

1) Proper bunding and Terracing.
2) Contour trench farming.
3) Introduction of Sericulture and Silvipasture in the hill ridge.
4) Agro-horticulture development.
5) Application of manures.
6) Provisions of check dams at suitable sites.

Table 1.5.3 Soil Statistics of Mamit District

Sl. No.	Description	Soil Composition	Area	%
1	Hill top/Hill crest	Loamy Skeletal Typic Dystrochrepts	23.29	0.77
		Loamy Skeletal Typic Udorthents		
		Fine Loamy Typic Dystrochrepts		
2	0-25% slope with current shifting cultivation and scrubland	Fine Loamy Typic Hapludults	32.18	1.06
		Clayey Typic Haplohumults		
		Loamy Skeletal Umbric Dystrochrepts		
3	0-25% slope with abandoned shifting cultivation and agricultural plantations	Loamy Skeletal Typic Hapludults	73.55	2.43
		Fine Loamy Humic Hapludults		
		Loamy Skeletal Typic Dystrochrepts		
4	0-25% slope with bamboo	Clayey Typic Haplohumults	206.36	6.82
		Fine Loamy Typic Hapludults		
		Loamy Skeletal Humic Hapludults		
5	0-25% slope with evergreen/semi-evergreen and forest plantations	Fine Loamy Humic Hapludults	164.97	5.45
		Fine Loamy Umbric Dystrochrepts		
		Loamy Skeletal Umbric Dystrochrepts		
6	25-50% slope with current shifting cultivation and scrubland	Fine Loamy Typic Dystrochrepts	83.83	2.77
		Loamy Skeletal Humic Hapludults		
		Fine Loamy Umbric Dystrochrepts		
7	25-50% slope with abandoned shifting cultivation and agricultural plantations	Loamy Skeletal Typic Haplohumults	181.37	5.99
		Loamy Skeletal Typic Hapludults		
		Fine Loamy Typic Dystrochrepts		
8	25-50% slope with bamboo	Fine Loamy Umbric Dystrochrepts	444.66	14.70
		Fine Loamy Humic Hapludults		
		Loamy Skeletal Typic Hapludults		
9	25-50% slope with evergreen/semi-evergreen forest and forest plantations	Fine Loamy Humic Hapludults	595.77	19.69
		Loamy Skeletal Umbric Dystrochrepts		
		Loamy Skeletal Typic Haplohumults		
10	More than 50% slope with current shifting cultivation and scrubland	Fine Loamy Typic Dystrochrepts	47.48	1.57
		Loamy Skeletal Humic Hapludults		
		Loamy Skeletal Umbric Dystrochrepts		
11	More than 50% slope with abandoned shifting cultivation and agricultural plantations	Loamy Skeletal Umbric Dystrochrepts	129.34	4.27
		Loamy Skeletal Humic Hapludults		
		Loamy Skeletal Typic Dystrochrepts		
12	More than 50% slope with bamboo	Fine Loamy Umbric Dystrochrepts	204.64	6.76
		Loamy Skeletal Typic Hapludults		
		Loamy Skeletal Humic Hapludults		
13	More than 50% slope with evergreen/semi-evergreen forest and forest plantations	Loamy Skeletal Humic Hapludults	490.43	16.21
		Loamy Skeletal Umbric Dystrochrepts		
		Fine Loamy Typic Hapludults		
14	Valley/WRC	Clayey Aquic Dystrochrepts	321.29	10.63
		Fine Loamy Aquic Dystrochrepts		
		Fine Loamy Fluventic		
15	Water body		12.86	0.43
16	Built-up land		13.43	0.44
	Total		**3025.75**	**100.0**

Table 1.5.4 Land capability Statistics of Mamit District

Sl. No.	Class	Brief Description	Area (sq km)	%
1	IIe	Good arable land on gentle slopes, susceptible to slight water erosion, very deep soil, suitable for agricultural development.	321.59	10.63
2.	IIIe	Moderately good land on strongly sloping to steep, susceptible to severe water erosion, deep to very deep soil, suitable for agricultural and horticultural development.	477.06	15.77
3	IVe	Fairly good land on steep to very steep slopes and hill ridge, highly susceptible to water erosion, deep to very deep soil, suitable for Agro-horticultural, sericulture and silvi-pastoral development	1,328.91	43.92
4	VIe	Land with moderate limitations on very very steep, highly susceptible to water erosion, deep to very deep soil, suitable for horticultural plantation and forestry.	695.07	22.97
5	VIIes	Land with severe limitations on very very steep slopes, subject to severe erosion. Unsuitable for cultivation but suitable for social forestry and grazing.	176.82	5.84
6	Water body	Moderately good land on strongly sloping to steep, susceptible to severe water erosion, deep to very deep soil, suitable for agricultural and horticultural development.	12.86	0.43
7	Built-up land	Fairly good land on steep to very steep slopes and hill ridge, highly susceptible to water erosion, deep to very deep soil, suitable for Agro-horticultural, sericulture and silvi-pastotal development	13.43	0.44
Total			**3,025.75**	**100.00**

Table 8.3 Land capability Statistics of Mamit District

CLASS Vie:

These are deep to very deep, moderately fine textured soils and well drained. They occur on very very steep with very severe erosion hazards.

Recommendation

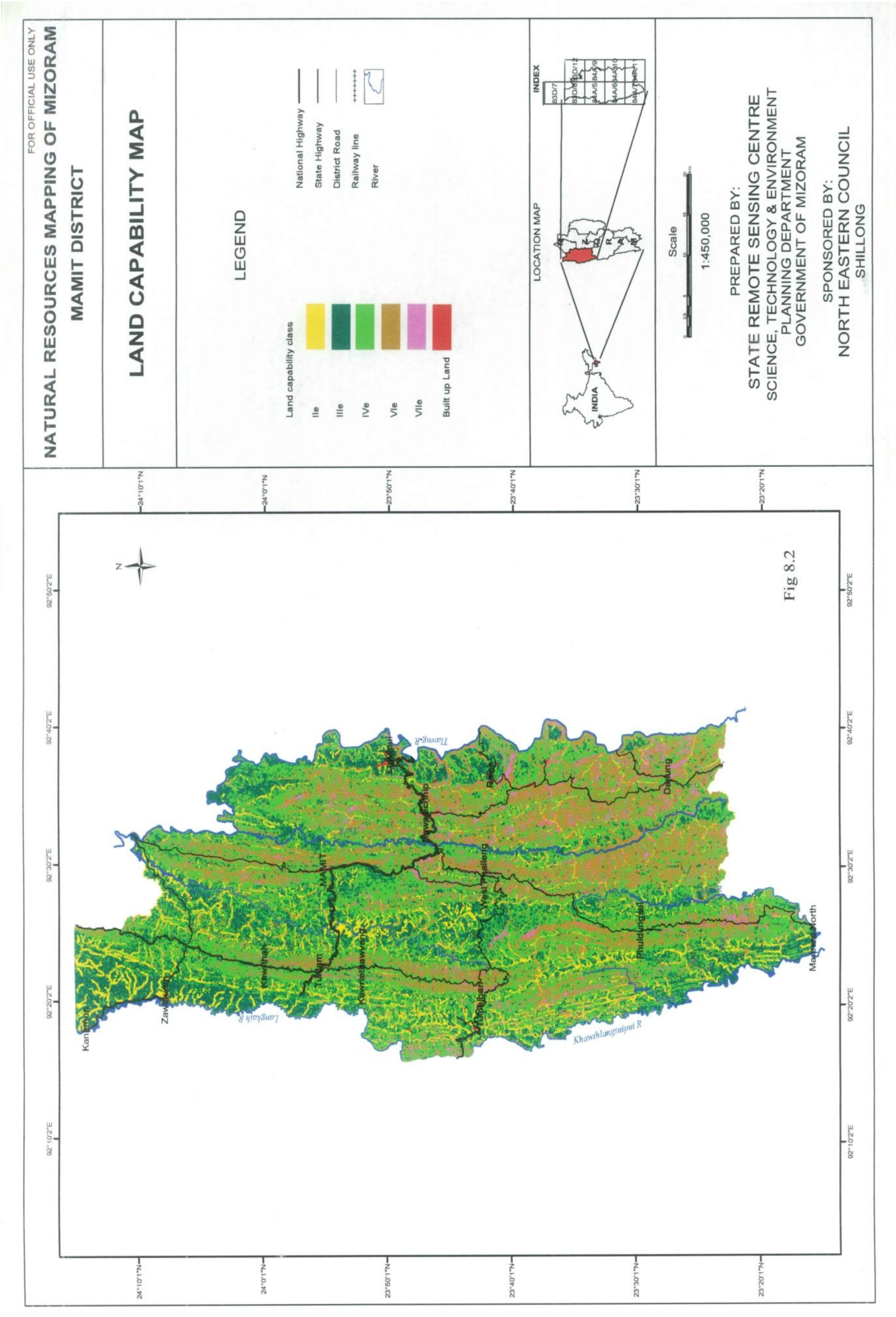
1) Horticultural plantation along the contour.
2) The vegetation cover should not be removed for soil and water conservation.
3) Social forestry.
4) Prohibition of over grazing.

CLASS VIIe:

These are deep, moderately fine textured soils and well drained. They occur on very very steep with very severe erosion hazards.

Recommendation

1) Horticulture and forest plantation along the contour.
2) Introduction of economical and commercial species of plant for afforestation.
3) Prohibition of over grazing.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NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
LAND CAPABILITY MAP
LEGEND
Land capability class
IIe
IIIe
IVe
VIe
VIIe
Built up Land
National Highway
State Highway
District Road
Railway line
River
LOCATION MAP
INDIA
INDEX
Scale
1:450,000
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N
Fig 8.2
Tlawng R
Langkaih R
Khawthlangtuipui R
MAMIT
West Phaileng
Phuldungsei
Dapung
Zawlnuam
Kawrthah
Kawrtethawveng
Tuidam
92°10'2"E
92°20'2"E
92°30'2"E
92°40'2"E
92°50'2"E
24°10'1"N
24°0'1"N
23°50'1"N
23°40'1"N
23°30'1"N
23°20'1"N

1.6 Soil Erosion and Runoff status

Soil erosion is a naturally occurring process that affects all landforms. In agriculture, soil erosion refers to the wearing away of a field's topsoil by the natural physical forces of water and wind or through forces associated with farming activities such as tillage.

Erosion, whether it is by water, wind or tillage, involves three distinct actions – soil detachment, movement and deposition. Topsoil, which is high in organic matter, fertility and soil life, is relocated elsewhere "on-site" where it builds up over time or is carried "off-site" where it fills in drainage channels. Soil erosion reduces cropland productivity and contributes to the pollution of adjacent watercourses, wetlands and lakes.

Soil erosion can be a slow process that continues relatively unnoticed or can occur at an alarming rate, causing serious loss of topsoil. Soil compaction, low organic matter, loss of soil structure, poor internal drainage, salinisation and soil acidity problems are other serious soil degradation conditions that can accelerate the soil erosion process.

One of the main causes of soil erosion is water erosion, which is the loss of topsoil due to water. Raindrops fall directly on topsoil. The impact of the raindrops loosens the material bonding it together, allowing small fragments to detach. If the rainfall continues, water gathers on the ground, causing water flow on the land surface, known as surface water runoff. This runoff carries the detached soil materials away and deposits them elsewhere.

There are some conditions that can accentuate surface water runoff and therefore soil erosion. For example, if the land is sloped, there is a greater potential for soil erosion due to the simple fact that gravity pulls the water and soil materials down the slope. Also, water will have an easier time running across the surface, carrying topsoil with it, if the ground is already saturated due to heavy rains or the soil lacks vegetation to keep the soil in place.

HYDRO-SOILS

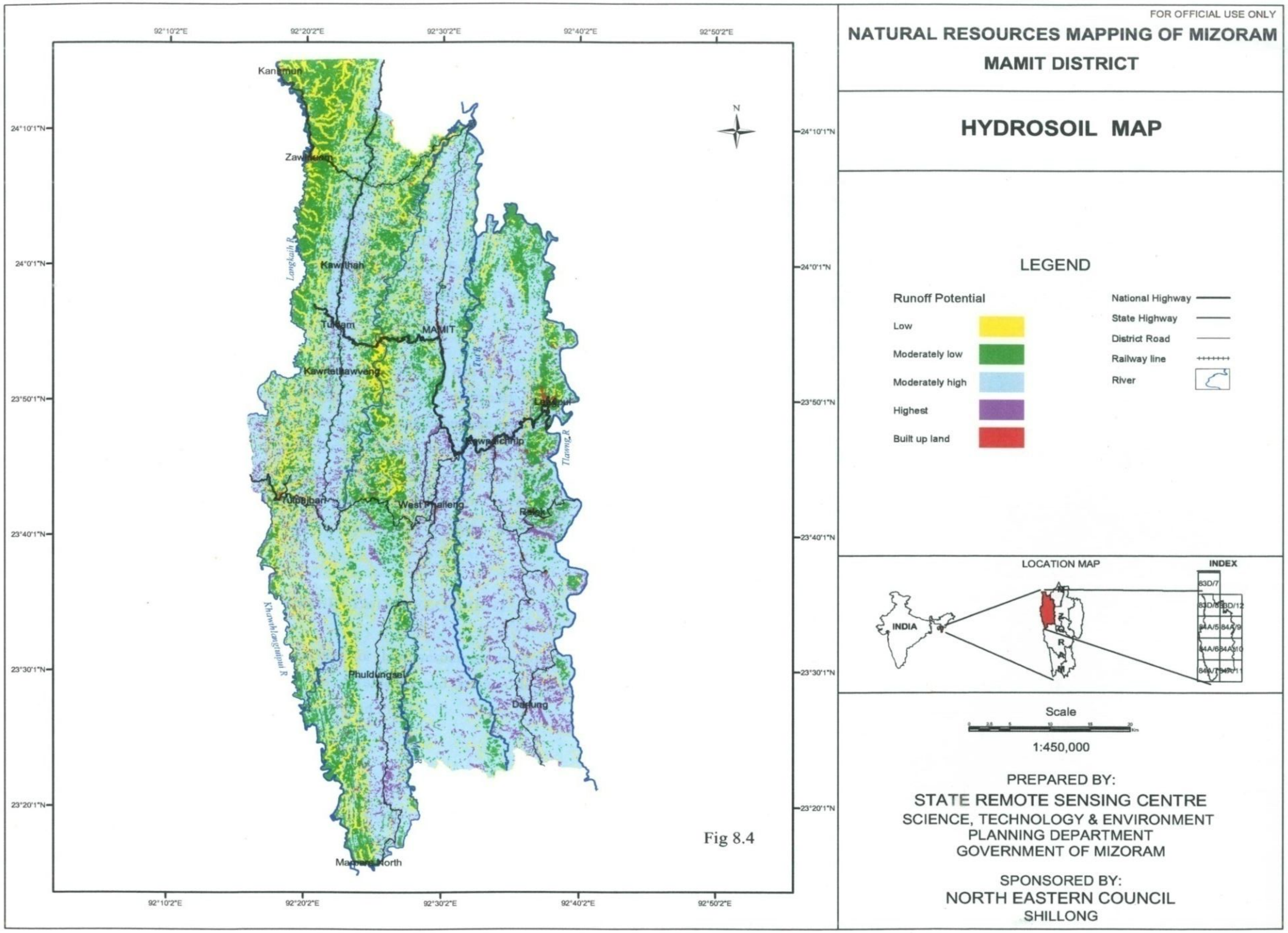
Hydro-soils deals with run-off potential derived from soil layer using infiltration and physiography. The following four classes of Hydro-soils have been established.

Class I – Low	*Land with nearly level to moderately sloping areas with medium to heavy texture of soils.*
Class II – Moderately Low	*Land with strongly sloping to steep with medium texture of soils.*

Class III – Moderate High	*Land with steep to very steep with medium texture of soils.*
Class IV – High	*Land with very very steep with medium and coarse texture of soils.*

Table 1.6 Hydro-soils Statistics of Mamit District

Sl. No.	Description	Area (in Sq.Km.)	Area in %
1	Low	321.59	10.63
2	Moderately Low	477.06	15.77
3	Moderately High	2,023.98	66.89
4	High	176.82	5.84
5	Water body	12.86	0.43
6	Built-up land	13.43	0.44
Total		**3,025.75**	**100.00**


FOR OFFICIAL USE ONLY
NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
HYDROSOIL MAP
LEGEND
Runoff Potential
Low
Moderately low
Moderately high
Highest
Built up land
National Highway
State Highway
District Road
Railway line
River
LOCATION MAP
INDIA
INDEX
Scale
1:450,000
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GOVERNMENT OF MIZORAM
SPONSORED BY:
NORTH EASTERN COUNCIL
SHILLONG
MAMIT
Kawrthah
Phuldungsei
West Phaileng
Tlawng R
Khawthlangtuipui R
Langkaih R
N
Fig 8.4

1.7. Land use Pattern

Table 1.7 Landuse pattern

Sl. No.	District	Total Geographical Area	Area under Agriculture				Area under Forest	Area under Wasteland	Area under other uses
			Gross Crop Area	Net Crop Area	Area sown more than once	Cropping Intensity			
1	Reiek	93719	7945	7823	122	102	77372	664	7860
2	West Phaileng	99934	8472	8342	130	102	82503	708	8381
3	Zawlnuam	108853	9228	9086	142	102	89867	771	9129

The major Land Use/Land Cover classes within the district can be broadly categorised into built-up land, agricultural land/horticultural land, forest, bamboo forest, forest plantations, shifting cultivation, scrubland and river/water body. The land use/land cover statistics is given in table below and corresponding map is shown below.

a) BUILT-UP LAND

Built-up land includes settlement, recreational, commercial areas airport etc. The study area includes 3 towns namely Mamit, Zawlnuam, Lengpui and 84 villages. Mamit town is the headquarters of Mamit district and also the headquarters for all Government Departments and Educational Institutions. Zawlnuam, located to the north-west of the district is an important commercial town owing to its proximity to the neighbouring state, Tripura. Lengpui town is also another fast developing town ever since the existence of Lengpui Airport within the vicinity of the town. Built-up land covers an area of 13.37 Sq.Km. which accounts for 0.44% of the total area of the district. The urban region covers an area of 3.53 Sq.Km. that accounts for 0.12% and the rural region covers an area of 9.84 Sq.Km. which accounts for 0.33% of the total area of the district.

b) AGRICULTURE LAND

Agriculture land comprises those areas which are permanently used for crop cultivation. This class of land has been divided into Kharif crop land and Agricultural/Horticultural Plantation. Though Rabi crops are also grown in small areas in a scattered manner they are not given separate class because they are not mappable due to scale factor.

i) Kharif Crop Land

Kharif Crop Land refers mainly to the wet land rice cultivation areas located in the low lying plains. The terrain features greatly predict the practice of this form of farming. A bulk of the Kharif crop lands is found in the northern part of the district. The

wet land rice cultivation areas are usually located at the banks of rivers, streams and sometimes close to settlement areas, where soil and water supply is suitable for its establishment and growth. Prominent wet land rice cultivation areas are found in Lushaicherra, Moraicherra, Bungthuam, Zawlnuam (North western part of the district), and tapering towards the center of the district at Bawngva, Darlak, Nalzawl and Tuirum respectively. From the studies and field verifications, it can be said that most of the wet land rice cultivation areas are found at the banks of the north flowing R. Teirei and R. Langkaih (flowing at the border of Mizoram and Tripura), which eventually irrigates the paddy fields either directly or through its tributaries. It covers an area of 12.99 Sq.Km. which accounts for 0.43% of the total area of the district. There are also small pockets of wet land rice cultivation in other parts of the district, but are too small to be mapped.

ii) Agricultural/Horticultural Plantation

This class includes areas, which is being utilised for plantation of cash crops. The district also houses a variety of agricultural/horticultural plantations of which the prominent ones includes Arecanut, Citrus Woodlands and Banana plantation.

iii) Arecanut

Arecanut *(Areca Catechu)* plantations are found in abundance to the northern part of the district, near villages like Bawngva, Tuidam, Kawrthah, Rengdil, Zamuang and Zawlnuam. These areas with low altitudinal range and warm climate favours the cultivation of the crop, especially in and around Rengdil and Zamuang villages where majority of the plantations are found. Few patches of the plantations are also found near Rawpuichhip and Tutphai (Dapchhuah) village. The plantation covers an area of 0.72 Sq.Km. which accounts for 0.02% of the total area of the district.

iv) Citrus Woodland

Citrus Woodland includes Orange *(Citrus reticulate)* plantation and Hatkora *(Citrus macroptera)* plantation. Citrus plantations are found in abundance to the eastern and south-central part of the district. The occurrence however diminishes towards the northern part where they are found only in few patches. Majority of the cultivated Citrus species are of the variety *Citrus reticulate*. Such plantations are more concentrated near Saithah, Lallen, N. Chhippui, Kawnmawi, West Phaileng, Rulpuihlim, Tuahzawl, Tutphai (Dapchhuah), Rawpuichhip and Tuidam villages. Few scattered patches of the plantations are also found along roadside and settlement areas of Dampui, Bawngva, Mamit, darlak, Kawrthah, Rengdil and Moraicherra. The other variety known as *Hatkora (Citrus Macroptera)* is found between Kawrthah and Zamuang villages, where the environment is a bit warmer. It covers an area of 2.28 Sq.Km. which accounts for 0.08% of the total area of the district.

v) Banana

Banana *(Musa paradisiacal)* plantations are commonly found as secondary cash crops cultivated along with other field crops. In some cases, they are intercropped with other cash crops. Pure banana plantations are found near Tuidam, Bawngva, Mamit, Dampui, Rawpuichhip, Tutphai (Dapchhuah), Ailawng (near R. Tlawng) etc. They are found in abundance on the way to Dampui, starting from Tutphai (Dapchhuah). Most of the plantations found near Bawngva and its environs are undertaken by local farmers, which were initiated by the Horticulture Department. Banana plantation covers an area of 0.46 Sq.Km. accounting for 0.02% of the total district area.

c) FOREST

The forest cover type of Mamit district is mainly tropical wet evergreen forest associated with moist deciduous forest and semi-evergreen forest. Semi-evergreen forests are found in small pockets on the hill slopes. The vegetation consists of a mixture of several species. Depending on the density of the Canopy cover, the forests have been divided into dense, medium dense and less dense forests.

i) Dense

This class includes natural forest, which are not disturbed by any biotic factors like shifting cultivation and other human activities. The crown density of this class is very thick. Evergreen and semi-evergreen forest covers major portion of this area. It covers an area of 273.16 Sq.Km. which accounts for 9.03% of the total area of the district. Vast dense forests are found near Kawrtethawveng, W. Bunghmun, Serhmun, Phuldungsei, West Phulpui, Saithah, Lallen, N. Chhippui, Damparengpui, Dampui, N. Sabual, Saitlaw, Hmunpui, Rulpuihlim, Chungtlang, Reiek, Ailawng, West Lungdar, Hreichuk, Lungphun, N. Kanghmun, Parvatui and Zopui villages. The well-noted Dampa Tiger reserve is located within the district and constitutes most of the dense forest of the district. The district is also endowed with another well known reserve forest, *Zongaw*. It is home to a variety of plant species and wild life. The forest department has also taken up a part of the forest for cultivation and conservation of medicinal plants.

The dominant species in the upper storey are *Macaranga indica, Anthocephalus chinensis, Quercus dealbata, Phoebe lanceolata, Leea indica, Miniltoa polyandra, Dillenia indica, Leea compactiflora, Callicarpa arborea, Colona floribunda, Deris robusta, Scheffelera venulosa, Sterculia versicolor, Syzygium claviflorum, Baccaurea ramiflora, Syzygium kurzii, Macropanax dispermus, Mitragyna diversifolia, Magnifera sylvatica, Terminalia chebula, Dysoxylum binectariferum, Flacourtia jangomas, Castanopsis indica, Callophyllum polyanthum, Artocarpus chama, Spondias pinnata, Carallia brachiata, Vitex penducularis, Acer laevigatum, Diospyros stricta, Sapium baccatum, Diospyros toposia, Premna bengalensis, Heritiera acuminate, Dysoxylum alliaria, Castanopsis tribuloides,*

Olea salicifolia, Magnolia hodgsonii, Glochidion arborescens, Drymycarpus racemosus, Stereospermum chelonoides etc. In the middle storey, the dominant species are *Alpina bracterata, Lepionurus sylvestris, Oroxylum indicum, Murraya koenigii, Croton roxburghii, Trema orientalis, Ostodes paniculate, Garcinia anomala, Ziziphus incurve, Phrynum capitatum, calamus erectus, Tinospora cordifolia, Acacia pennata, Arenga nana, Calamus acanthospathus, Tabernaemontana divaricata, Ulmus lancifolia, Macropanax dispermus, Clerodendrum viscosum, Pygeum glaberrimum, Daemonoropsis jenkinsianus, Pandanas fascicularis, Milletia pachycarpa, Aglaia hiernii, Randia wallichii, Ficus rigida, Borassus flabellifer, Pterospermum acerifolium, Arenga pinnata, Ficus fistulosa, Prunus undulate, Calamus guruba, Picrasma javanica, Diospyros stricta, Knema linifolia, Saurauia napaulensis, Terminalia tomentosa, Caryota urens, Micromelum minitum, Merremia umbellate, Garcinia sopsopia, Chukrasia velutina, Macaranga identiculate, Oreocnide integriafolia, Lepisanthes senegalensis etc. And in the undergrowth, Heydichium ellipticum, Heydychium VILLOSUM, Amomum dealbatum, Homalomena aromatic, Oroxylum indicum, Nyssa javanica, Caesalpinia cucullata, Calamus spp, Cissampelos pareita, Microlepia strigosa, Entada pursaetha, Psychotria calocarpa, Premnacoriacea, Lonicera Japonica, Milletia pchycarpa, Lithocarpus elegans, Vitex heterophylla, Eupatorium odoratum, Antidesma acidium, Raphidophora decursiva, Leucas mollissima, Bauhinia scandens, Ferns spp.* Are the dominant species.

ii) Medium Dense Forest

The forest that have a crown cover neither too thick nor too thin are classed under this category. It covers an area of 428.28 Sq.Km. which accounts for 14.15% of the total area of the district. It is distributed throughout the district and found in close association with dense forests. The vegetation of this forest is more or less similar with those species found in dense forests. The only difference lies in the crown density of these forests.

iii) Less Dense Forest

As the name of this class implies, the forest under this category has a thin crown cover. This type of forest includes forest, which were once disturbed and affected by biotic factors like shifting cultivation and human activities. These forests are characterised by those lands where shifting cultivation had been practice and then left fallow for over a year; the resultant new vegetation of which, regenerated to form new forests. It covers an area of 670.04 Sq.Km. which accounts for 22.14% of the total area of the district. Forest of this class is distributed throughout the district in small patches usually associated with bamboo forests and adjoining abandoned jhum lands. However, notable large patches are found near Zawlnuam, Pukzing, Kanhmun, Lushaicherra, Kawrthah, Saikhawthlir, West Phaileng, Rawpuichhip, Khawrihnim, Darlung, S. Sabual, Bawngthah, Hruiduk and Marpara villages. The dominant species in the upper storey are *Croton Hookeri, Phoebe hainesiana, Terminalia myriocarpa, Erythrina variegate,*

Mesua ferrae, Ficus religiosa, Macaranga indica, Albizzia procera, Leea indica, Schima wallichii, Bischofia javanica, Michelia oblonga, Macropanax dispermus, Artocarpus lacucha, Cinnamomum tamala, Amoora chittagonga, Tetramelesnudiflora, Glochidion khasicum, Castanopsis tribuloides, Sterculia alata, Lagerstroemia speciosa, Gmelina arborea, Saurauia punduana, Terminalia tomentosa, Albizzia chinensis, Castanopsis lanceaefolia, Anogeisus acuminate, Duabanga grandiflora, Ficus semicordate, Ficusprostrata, Emblica officinalis, Protium serratum etc. In the middle storey, the dominant species are *Alpinia bracteata, Heydychium coccinium, Amomum dealbatum, Aegle marmelos, Pilea symeria, Musa paradisiacal, var sylvestris, Garcinia lanceaefolia, Aporusa octandra, Syzigium cumini, Thysanolaena maxima, Cissampelos maxima, Phrymum capitatum, Albizzia procera, Trevesia palmate, Hodgsonia macrocarpa, Hydnocarpus kurzii, Pilea symeria, Caryota mitis, Saraca asoca, Bombax insigna, Clerodendrum viscosum, Anacardium occidentale, Cassia timoriensis, Toona ciliate, Dendronite sinuate, Cinnamomum vermum, Ficus fistulosa, Syzigium fructicosum, Camellia sinensis, Aquilaria malaccensis, Premna racemosa, Leucas mollissima, Polyanthia jenkinsii, Polyanthia simiarum, Alphonsea ventricosa, Pandanas minor, Macaranga identiculate, Oreocnide integrifolia, etc.* and in the under growth, *Hedychium ellipticum, Hedychium villosum, Maesa Montana, Conyza stricta, Osbeckia sikkimensis, Caesalpinia cucullata, Mimosa pudica, Mikania micrantha, Microlepia strigosa, Tabernaemontana divaricata, Premna coriacea, Lonicera japonica, Lantana camara, Litsea monopetala, Ficus hipsida, Curculigo crassifolia, Macropanax dispermus, Clerodendrum glandulosa, Clerodendrum viscosum, Buettneria pilosa, Carallia brachiata, Tacca integrefolia, Calamus tenuis, Scleria levis, Vitex heterophylla, Eupatorium odoratum, Garcinia xanthochymus, Raphidophora decursiva, Ageratum conyzoides, Bidens biternata, Ipomea spp., Polygonum spp. etc.*

iv) Bamboo

Moist deciduous bamboo forests are found to be distributed throughout Mamit district. It is mostly found in low-lying areas near streams and rivers. It constitutes the largest cover among the land use classes. In some places it is also found on hill slopes. The bamboo forests found near and within Dampa Tiger Reserved are mostly primary bamboo forest i.e. which are not disturbed by any biotic factors. They are densely populated and even when intermingled with other tree species, they dominate the vegetation community. It covers an area of 987.76 Sq.Km. which accounts for 32.64% of the total area of the district. The dominant bamboo species found in this area are *Dendrocalamus hamiltonii, Bambusa tulda, D. Longispathus, D. Sikkimensis, D. Strictus, Meloccana bamboosoides (syn. M. Baccifera) and Dinochloa compactiflora (syn. Melocalamus compactiflora).*

v) Forest Plantation

Forest plantations are distributed throughout the diatrict. Some has large coverage while most of them have area below the minimum mappable unit. The prominent forest plantations are given below:-

vi) Teak *(Tectona grandis)*

Teak plantation is the most predominant forest plantation found in the district. It has replaced primary forest in many places. They are usually planted along the roadside and are found abundantly near Moraicherra, Bungthuam, Zawlnuam, Zamuang, Bawngva, Darlak, Tutphai (Dapchhuah), Rawpuichhip, Marpara etc. The largest coverage of Teak plantations is found extending from Zamuang to Zawlnuam. The low-lying valley of Tutphai (Dapchhuah) is also a home to vast Teak plantations. Teak plantation covers an area of 5.20 Sq.Km. which accounts for 0.17% of the total area of the district.

vii) Miscellaneous plantation

Miscellaneous plantation includes any other forest plantations other than Teak eg. Michelia *(Michelia champaca)*, Gamari *(Gmelina arborea)*, Toona *(Cedrela toona)*, etc. Michelia plantation is found near Saithah village in small patches. A mixed plantation of Michelia, Gamari and Toona (among the dominant species) is found along the hill ranges of Tutphai (Dapchhuah). This plantation named as "VFDC Dapchhuah Plantation" covering an area of 100 Ha. was initiated during the year 2003-04 by the Forest Department under the scheme of *Jhum Project*. Tha plantation area is bounded by Dap lui to the south, R. Tut to the east, Saituk lui to the north and Khamrang lui to the west. These miscellaneous plantations cover an area of 0.17 Sq.Km, which accounts for 0.01% of the total area of the district.

d) SHIFTING CULTIVATION

Shifting Cultivation area can be classified into current shifting cultivation and abandoned shifting cultivation.

i) Current Shifting Cultivation

Shifting Cultivation commonly known as *Jhuming* is still a prominent farming system practiced by farmers in the study area, mostly in small patches/land holdings near forests and settlements. The jhum plots are small in size and irregular in shape. The current jhums are always associated with young abandoned jhum and secondary forests. The location of jhum is related both to altitude and slope. Sites above 1,200 meters are thus seldom jhumed. The percentage of jhum is found to be highest on the

gentler slopes and progressively decreases on steeper slopes. It covers an area of 170.71 Sq.Km. which accounts for 5.64% of the total area of the district.

ii) Abandoned Shifting Cultivation

In the present study, young abandoned jhums of approximately up to three years are considered. It covers an area of 434.23 Sq.Km. which accounts for 14.35% of the total area of the district.

Patches of young abandoned jhums are found to be distributed all over the district, closely associated with current jhums, settlement areas and forest blanks. Depending on how long the land is left fallow and phytogeography, there can be vegetative variations among young abandoned jhums consisting of young bamboo shoots, tree seedlings and saplings. However, in general, the dominant species in young abandoned jhum areas are *Eupatorium odoratum, Thysonalaena maxima, Erianthus longisetosus, Cyperus kylinga, Cynodon dactylon, Plantago major, Osbeckia chinensis, Imperata cylindrical, Mikania micrantha, Ageratum conyzoides etc.*

iii) SCRUB LAND

Scrub lands are those lands that are frequently disturbed by biotic factors and other human activities; as such vegetation cannot grow properly. It also includes those areas and a rocky terrain where soil deposits are very less. These areas are mostly dominated by grass species like *Saccharum longisetosum, Imperata cylindrical, Eupatorium odoratum, Mikania micrantha, Ageratum spp. etc.* They are found along roadsides and on high altitude rugged/rocky terrains. Large patches of scrub land are found near Saitlaw, Lengpui, Reiek, Dampui, Pukzing and to the western part of *Dampa Tiger Reserve*. It covers an area of 13.54 Sq.Km. which accounts for 0.45% of the total area of the district.

e) WATER BODY

This class includes big rivers, lakes and ponds within the study area. It covers an area of 12.83 Sq.Km. which accounts for 0.42% of the total area of the district. Four important rivers namely R. Tlawng, R. Tut, R. Teirei and R. Langkaih drains Mamit district. River Tlawng in the eastern part creates a boundary line with Aizawl district. River Tut flows in the middle of the district, River Langkaih forms a state boundary with Tripura and Bangladesh. An important and well-known lake, Rengdil is also found to the north of the district from which the village Rengdil was literally named after.

Table 1.7.1 Land Use/Land Cover Statistics of Mamit District 2012-13

Sl. No.	Category	Area (in Sq.Km.)	%
1	**Built-up land**	3.53	0.12
	Town	9.84	0.33
	Village		
2	**Agriculture Land**		
	2.1 Crop land		
	Kharif	13.30	0.44
	2.2 Plantation		
	Arecanut	0.72	0.02
	Citrus Woodland	2.28	0.08
	Banana	0.46	0.02
3	**Forest**		
	3.1 Dense	273.16	9.03
	3.2 Medium Dense	428.28	14.15
	3.3 Less Dense	670.04	22.14
	3.4 Bamboo	987.76	32.64
	3.5 Forest Plantation		
	Teak	5.20	0.17
	Miscellaneous	0.17	0.01
4	**Shifting Cultivation**		
	4.1 Current Shifting Cultivation	170.55	5.63
	4.2 Abandoned Shifting Cultivation	434.09	14.35
5	**Scrub land**	13.54	0.45
6	**Water body**	12.83	0.42
Total		**3,025.75**	**100.00**

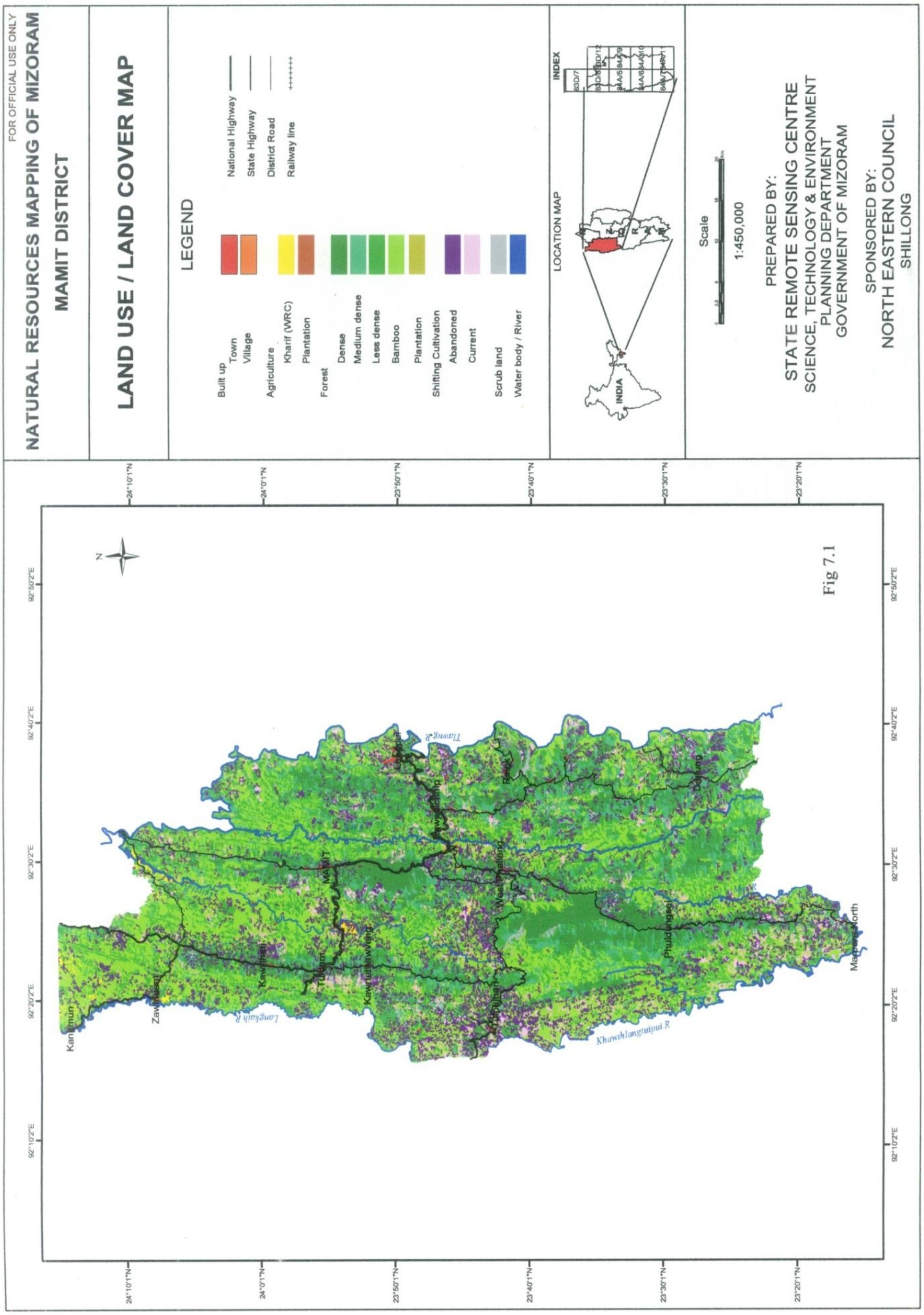
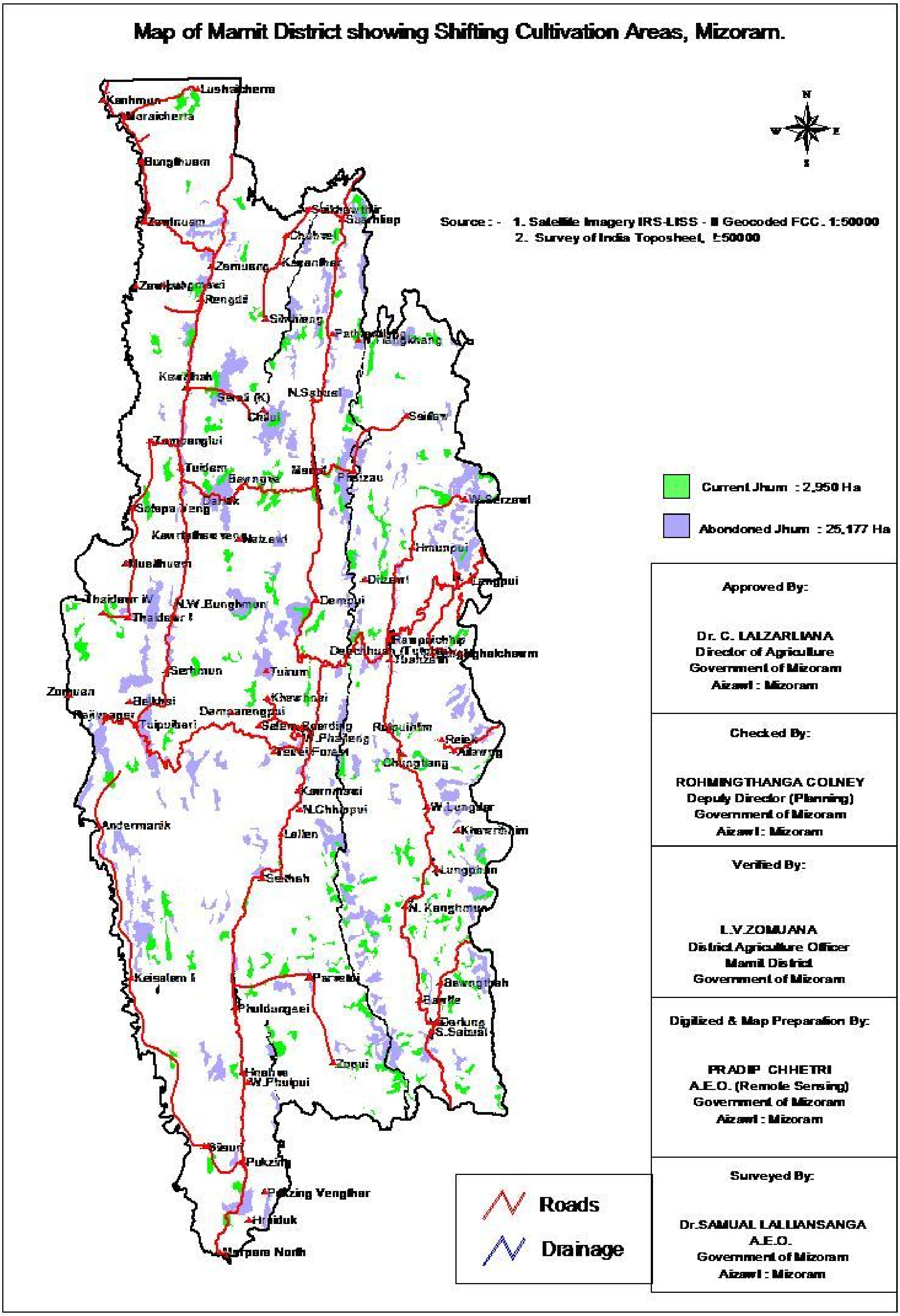

FOR OFFICIAL USE ONLY
NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
LAND USE / LAND COVER MAP
LEGEND
Built up
Town
Village
Agriculture
Kharif (WRC)
Plantation
Forest
Dense
Medium dense
Less dense
Bamboo
Plantation
Shifting Cultivation
Abandoned
Current
Scrub land
Water body / River
National Highway
State Highway
District Road
Railway line
LOCATION MAP
INDIA
INDEX
Scale
1:450,000
PREPARED BY:
STATE REMOTE SENSING CENTRE
SCIENCE, TECHNOLOGY & ENVIRONMENT
PLANNING DEPARTMENT
GOVERNMENT OF MIZORAM
SPONSORED BY:
NORTH EASTERN COUNCIL
SHILLONG
MAMIT
Phuldungsei
Tlawng R
Khawthlangtuipui R
Langkaih R

Fig 7.1


Map of Mamit District showing Shifting Cultivation Areas, Mizoram.
Source : - 1. Satellite Imagery IRS-LISS - II Geocoded FCC. 1:50000
2. Survey of India Toposheet, 1:50000
Current Jhum : 2,950 Ha
Abondoned Jhum : 25,177 Ha
Approved By:
Dr. C. LALZARLIANA
Director of Agriculture
Government of Mizoram
Aizawl : Mizoram
Checked By:
ROHMINGTHANGA COLNEY
Deputy Director (Planning)
Government of Mizoram
Aizawl : Mizoram
Verified By:
L.V.ZOMUANA
District Agriculture Officer
Mamit District
Government of Mizoram
Digitized & Map Preparation By:
PRADIP CHHETRI
A.E.O. (Remote Sensing)
Government of Mizoram
Aizawl : Mizoram
Surveyed By:
Dr.SAMUAL LALLIANSANGA
A.E.O.
Government of Mizoram
Aizawl : Mizoram
Roads
Drainage
Kanhmun
Bungthuam
Zamuang
Rengdil
N.Sabual
Chhuhlui
Tuidam
Saithah
Phaizau
W.Serzawl
Hmunpui
Lengpui
Demagiri
Tuirum
Belkhai
Tuipuibari
Dampuirengpui
W.Phaileng
Chungtlang
N.Chhimpui
Lallen
Andermanik
W.Lungdar
Lunglphun
N. Kanghmun
Keisalam
Phuldungsei
Zopui
W.Phulpui
Pukzing
Pukzing Vengthar
Marpara North

1.8 Land Slope Classification:

Mamit district is uniquely characterized by few prominent hill ridges running parallel to each other, most of which roughly runs from north to south. Hill ridges in the study area include many hill tops, several of which occupy prominent locations. Two main hill ridges *viz.* Kawrthah/Rengdil hill ridge and Mamit hill ridge runs from north to south. A more or less plain area exists between the Kawrthah/Rengdil hill ridge and Mamit hill ridge which is known as the Teirei river plain. Another hill ridge known as the Reiek hill ridge runs on the eastern periphery of the district with Tlawng river plain on the eastern side and Tut river plain on the western side which ascends gradually in the westward direction to form the Mamit hill ridge. The western part of the district is also characterized by narrow river valleys with more or less plain areas in many parts alongside the Langkaih river valley which ascends gradually in the eastward direction to form the Kawrthah/Rengdil hill ridges. The south-eastern part of the district consists of a rather rugged hilly ridges consisting of many narrow valleys and small streams. Narrow valleys separate sine the hill rides and few of which have gentle to steep slopes. Narrow valleys separate some the hill ridges and few of which have gentle to steep slopes. Some of these steep slopes rises abruptly in few places and occupies spectacular places within the district. The hillside slopes are mostly gentle to steep and escarpments are also visible in innumerable places of the study area. It may be roughly summarized that the eastern part of the district are steeper as compared with the western parts. The slope of the area has been conveniently divided into nine (9) slope facets as per given in Table below and slope map shown below.

Slope having 0 to 3% slope covers a total area of 60.52 Sq.Km constituting to 2.00% slope of the total area. Slope having 3 to 10% slopes covers a total area of 544.65 Sq.Km constituting to 18.00% slope of the total area. Slope having 10 to 15% slopes covers a total area of 13.22 Sq.Km constituting to 0.44% slope of the total area. Slope having15 to 25% slope covers a total area of 206.74 Sq.Km constituting to 6.83% slope of the total area. Slope having 25 to 35% slopes covers a total area of 369.43 Sq.Km constituting to 12.2% slope of the total area. Slope having 35 to 50% slopes covers a large area of 949.22 Sq.Km constituting to 31.37% slope of the total area. Slope designated as 50 to 70% slope covers a large area of 564.02 Sq.Km constituting to 18.64% slope of the total area. Slope having 70 to 100% slopes covers an area of 242.35 Sq.Km constituting to 8.01% slope of the total area. Slope having more than 100% slopes covers a rather small area of 75.60 Sq.Km which constitutes to 2.5% slope of the total area. Slope having 35-50% slope covers the largest area followed by slope having 50-70% slope. Slope having 10-15% slope has the smallest area followed by 0-3% slope and >100% slope respectively.

There are numerous low lying valleys which are predominantly occupies for Wetland Rice Cultivation (WRC) including many other minor unmappable scattering narrow valleys identified as potential area for WRD which constitutes to about 19.57%

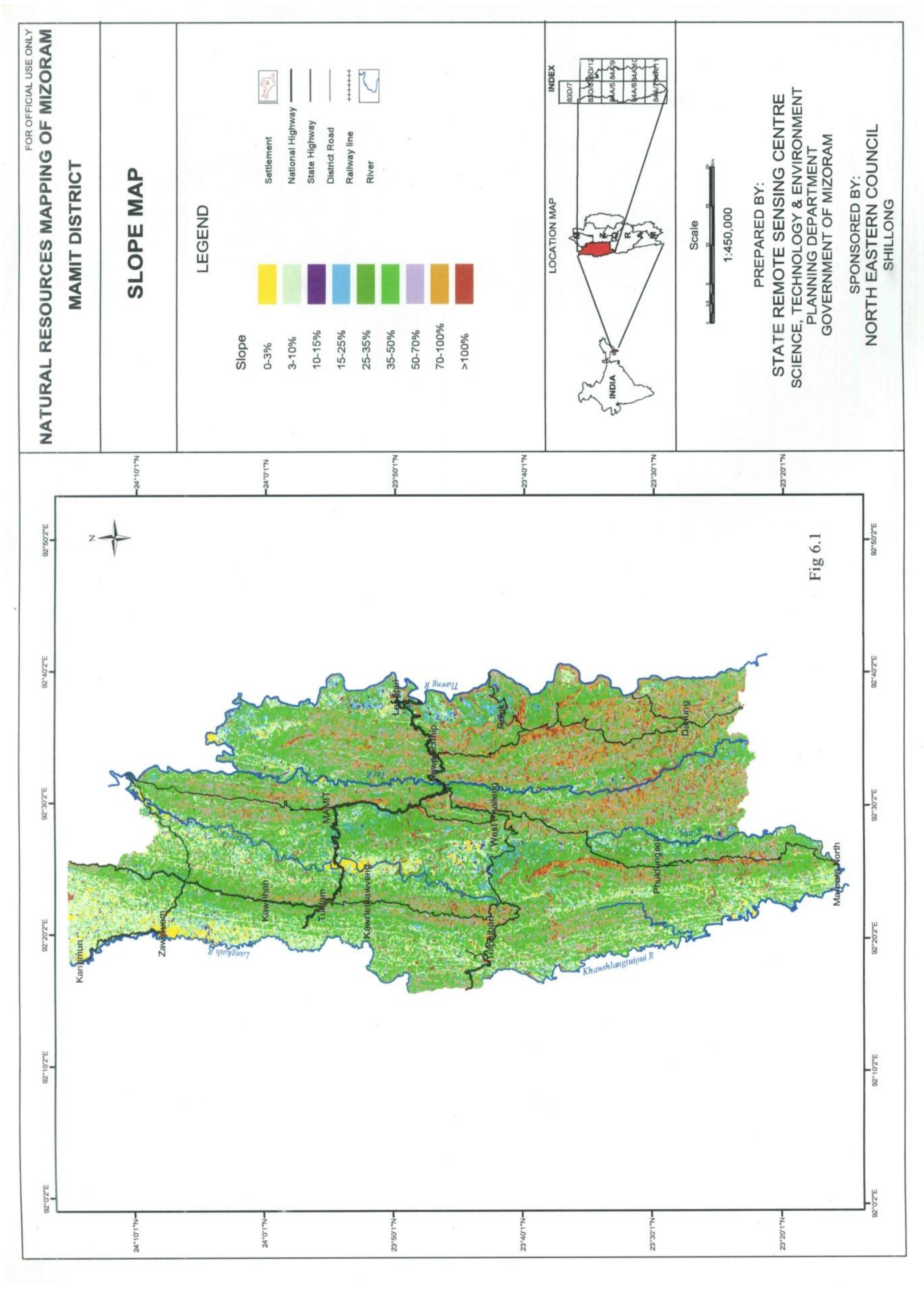
of the total area. Many of these are forested areas and in few of these places the natural resources are not being tapped still now as they are inaccessible.

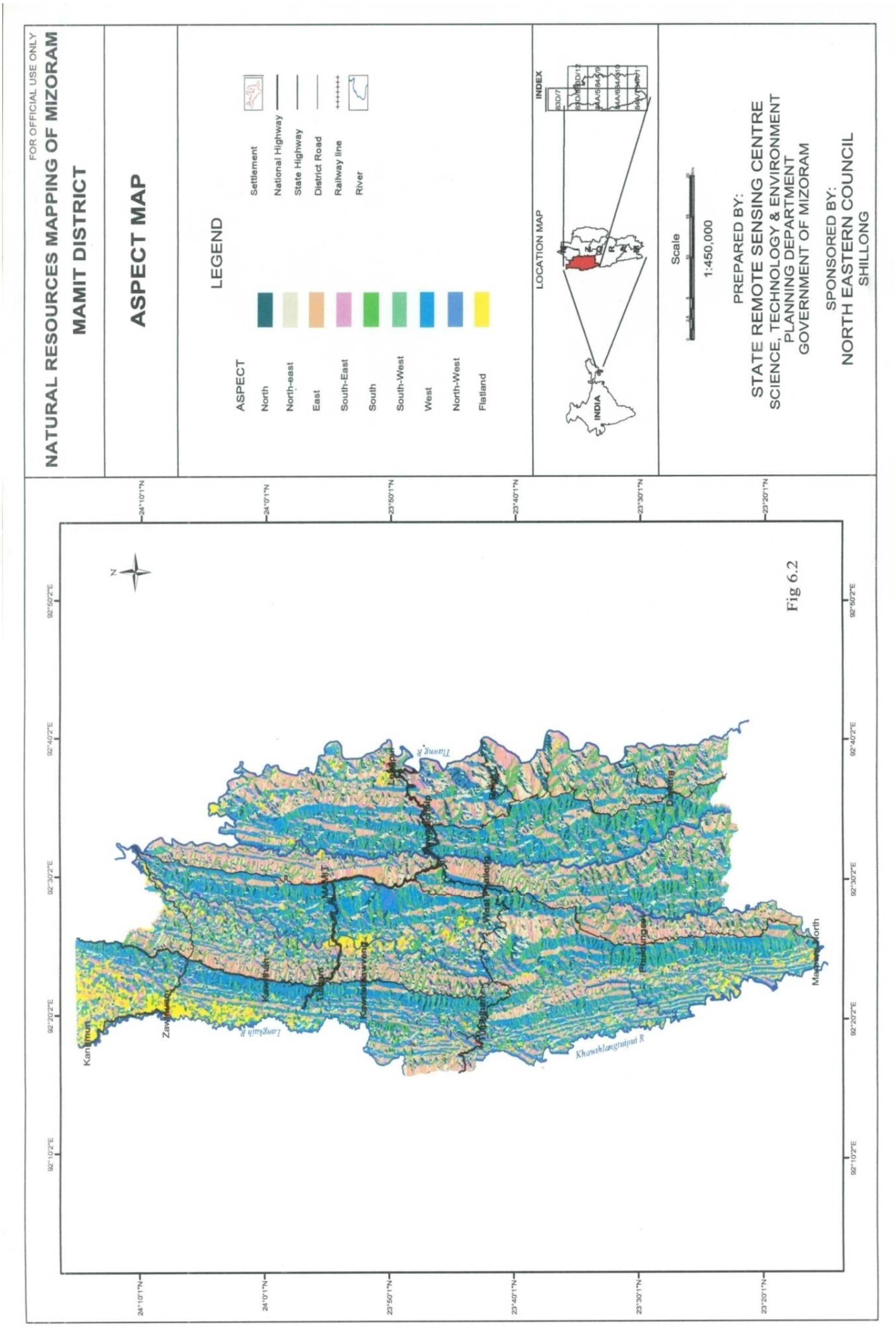
a) Aspect

The slope aspects of the hills within the study area are more or less evenly distributed. Areas within the study area having no aspect or relatively flatland occupy an area of 138.51 Sq.Km constituting to 4.58% of the total study area. The aspect of the area has been conveniently divided into nine (9) slope facets as per the table given below and aspect map shown below.

The statistics of the aspect data reveals that the total area having North aspect is 171.86 Sq.Km constituting to 5.68% of the total area. The total area having Northeast aspect is 396.30 Sq.Km constituting to 13.10% of the total area. The total area having East aspect is 487.70 Sq.Km constituting to 16.12% of the total area. The total area having Southeast aspect is 355.67 Sq.Km constituting to 11.75 % of the total area. The total area having South aspect is 250.92 Sq.Km constituting to 8.29% of the total area. The total area having Southwest aspect is 341.84 Sq.Km constituting to 11.30% of the total area. The total area having West aspect is 484.40 Sq.Km constituting to 11.30% of the total area. The total area having West aspect is 484.10 Sq.Km constituting to 16.00% of the total area. The total area having Northwest aspect is 398.85 Sq.Km constituting to 13.18% of the total area. Aspect less areas or areas having no aspect comprises of 138.51 Sq.Km constituting to 4.58% of the total area.

Aspect having the largest area is the Eastern aspect followed by western aspects. This can be accounted duly because of the fact that the hill ridges mainly run from north to south in their formation trend. Northeast aspect is often considered most suitable for agriculture development, establishing orchards, farms and other residential areas. Few places in within the area would not be utilized for cultivation as it has already used for built up land, populated for other purposes and as majority of the area is reserved to be under forest which is to be left untouched as such. The vast remaining areas could be however utilized effectively according to the need and constraints prevalent within their respective areas. Aspects covering the least area are north followed by south. Few major river *viz.* River Mar, River Khawthlangtuipui, River Teirei, River Tlawng, River Tut and River Langkaih have influenced the topography of the study area to some extent especially in the formation of flatland in areas which falls nearby these river beds.


FOR OFFICIAL USE ONLY
NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
SLOPE MAP
LEGEND
Slope
0-3%
3-10%
10-15%
15-25%
25-35%
35-50%
50-70%
70-100%
>100%
Settlement
National Highway
State Highway
District Road
Railway line
River
LOCATION MAP
INDIA
INDEX
Scale
1:450,000
PREPARED BY:
STATE REMOTE SENSING CENTRE
SCIENCE, TECHNOLOGY & ENVIRONMENT
PLANNING DEPARTMENT
GOVERNMENT OF MIZORAM
SPONSORED BY:
NORTH EASTERN COUNCIL
SHILLONG
MAMIT
Kawrthah
Zawlnuam
Kanhmun
Tuipuibari
Phuldungsei
Darlung
Reiek
Lengpui
Sairang
West Phaileng
Khawihlangtuipui R
Tlawng R
Fig 6.1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NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
ASPECT MAP
LEGEND
ASPECT
North
North-east
East
South-East
South
South-West
West
North-West
Flatland
Settlement
National Highway
State Highway
District Road
Railway line
River
LOCATION MAP
INDEX
INDIA
Scale
1:450,000
PREPARED BY:
STATE REMOTE SENSING CENTRE
SCIENCE, TECHNOLOGY & ENVIRONMENT
PLANNING DEPARTMENT
GOVERNMENT OF MIZORAM
SPONSORED BY:
NORTH EASTERN COUNCIL
SHILLONG
N
Kanhmun
Zawlnuam
Kawrthah
MAMIT
West Phaileng
Phuldungsei
Dampa
Langkaih R
Tlawng R
Khawthlangtuipui R
92°10'2"E
92°20'2"E
92°30'2"E
92°40'2"E
92°50'2"E
24°10'1"N
24°0'1"N
23°50'1"N
23°40'1"N
23°30'1"N
23°20'1"N

Fig 6.2

b) Altitude

The altitude of Mamit district can be described to have uncommon features in their existence. While many places include high altitudes, several areas fall under very low altitude area. The prominent elevations mentionable in the district are Reiek tlang (1485 metres above msl), Sentet (1365 metres msl), Murau tlang (1025 metres above msl), Pukzing tlang (990 metres above msl),Mutelen tlang (986 metres above msl), Hnahva tlang (841 metres above msl), Vaisam tlang (1023 metres above msl), Ramri tlang (1000 metres above msl), Saithah tlangpui (1077 metres above msl), Pathlawi lunglen tlang (886 metres above msl), Rawte tlang (884 metres above msl), Bedo tlang (982 metres above msl), Zo tlang (1253 metres above msl), Darlung tlang (1148 metres above msl), Belkhai tlang (921 metres above msl), Zopui tlang (1054 metres above msl), Khawhlui tlang (1151 metres above msl), Vawmlam tlang (1169 metres above msl), Kawkpui tlang (1015 metres above msl), Nhomphia tlang (1052 metres above msl), Phulthawveng tlang (1175 metres above msl), Chhippui tlang (852 metres above msl), Lunglian tlang (903 metres above msl), Mulea tlang (914 metres above msl), Rallen tlang (1123 metres above msl), Milluphum tlang (1044 metres above msl), Chumte tlang (980 metres above msl). The highest elevation in within the area is Reiek tlang (1485 metres above msl) followed by Sentet tlang (1365 metres above msl). The lowest areas in the district is recorded to be around 40 metres above msl which are located at different places at the river banks of River Tut, River Teirei, River Tlawng and Sakei lui and occur mostly at the down streams of these rivers.

Table 1.8.1 Slope Statistics of Mamit District

Slope (%)	Area (Sq km)	Area in %
0 – 3	60.52	2.00
3 – 10	544.65	18.00
10 – 15	13.22	0.44
15 – 25	206.74	6.83
25 – 35	369.43	12.21
35 – 50	949.22	31.37
50 – 70	564.02	18.64
70 – 100	242.35	8.01
> 100	75.60	2.50
Total	**3,025.75**	**100.00**

Table 1.8.2 Aspect Statistics of Mamit District

Aspect	Area (sq Km)	Area in %
North	171.86	5.68
North East	396.30	13.10
East	487.70	16.12
South East	355.67	11.75
South	250.92	8.29
South West	341.84	11.30
West	484.10	16.00
North West	398.85	13.18
Flat Land	138.51	4.58
Total	**3,025.75**	**100.00**

1.9 OIL PALM IN MIZORAM

Government of Mizoram is deeply committed to the economic development of farmers. The Government of India, Ministry of Agriculture and Co-operation issued Administrative approval of Oil Palm cultivation under ISOPOM (Integrated Scheme of Oil Seeds, Pulses, Oil Palm & Maize) for the year 2004 – 2005 and the programme is implemented in Mizoram since 2004-2005 sharing of 75:25 between Central and State Government. The Department of Agriculture and Co-operation, Govt. of India launched special programme on **Oil Palm Area Expansion (OPAE)** under RKVY during 2011-12 and National Mission on Oilseeds and Oil Palm (NMOOP) from the year 2014-2015.

The Mizoram Oil Palm (Regulation of Production & Processing) Act, 2004 was passed in Mizoram Legislative Assembly on 2nd December, 2004. The Act contain 26 sections.

- The Government of Mizoram appointed Secretary, Agriculture Department as **Oil Palm Officer** to exercise the power and perform the function for implementation of Oil Palm Act.

- The Government of Mizoram appointed the concerned District Agriculture Officers as **Oil Palm Inspector** in their respective jurisdiction as required under Oil Palm Act, 2004.

- As required under Oil Palm Act, 2004, the following Committee is constituted for successful implementation of Oil Palm cultivation in Mizoram –

1) State Level Oil Palm Advisory Committee.
2) State Level Standing Committee on National Mission on Oilseeds and Oil Palm (NMOOP)
3) Project Management Committee.
4) Price fixation Committee on Oil Palm.
5) District Level Oil Palm Zonal Committee.
6) Village Level Oil Palm Growers Association

The Government of Mizoram signed M.O.U with reliable Companies for Oil Palm Development. The implementing partner Companies with the areas allotted are:-

Name of Companies	**Areas allotted**	**MOU signed on (date)**
1. Godrej Agrovet Ltd.	Kolasib & Mamit District	14th Sept, 2005
2. Ruchi Soya Industries Ltd.	Lunglei & Lawngtlai District	3rd October, 2006
3. 3F Oil Palm Agrotech Pvt. Ltd.	Aizawl, Serchhip & Saiha District	7th March, 2006

The implementing partner Companies have established their own Nurseries in the allotted District with the supervision of the Department. The companies purchased the FFBs produces by the farmers directly at the farmer's field. The companies are to establish Oil Palm Processing Mill of their own in their allotted Districts.

The Government of Mizoram, Agriculture Department have selected Oil Palm as one of the crops to be cultivated under the New Land use Policy (NLUP) which is a Flagship Programme of the state Government. It is expected that the cultivation of Oil Palm will enhance the income of Farm families and will ultimately result in economic upliftment of the rural poor.

i) Status of Oil Palm cultivation in Mizoram

Potential area for Oil Palm cultivation in Mizoram is identified as 1,01,000 Ha. (61,000 Ha. identified by Dr. K.L Chadha Committee + 40,000 Ha. identified by Dr. P. Rathinam Committee)

ii) Physical achievement under Oil Palm during 2015-2016

- The total area covered under Oil Palm is 2,981 Ha. spreading in Lunglei, Mamit, Serchhip, Kolasib, Lawngtlai, Saiha & Aizawl District.
- Nos. of farmers involved under Oil Palm: 3,200 Nos. of farmers.
- Nos. of Village covered under Oil Palm : 224 Nos. of villages.

- Production of Oil Palm Fresh Fruit Bunches (FFBs) : **3686.77 MT**
- Rate of FFBs is Rs. 5.50 per Kg fixed by Price Fixation Committee.
- Rate per seedling: Rs.85/- for Exotic seedling & Rs. 65/- for Indigenous seedling.

Oil Palm in PPP Mode:

1) Government
2) Company
3) Farmers.

Table 1.9.1 Area covered under Oil palm in Mizoram (year-wise)

Year	Name of District							Area (in Ha)
	Kolasib	Lunglei	Mamit	Serchhip	Lawngtlai	Aizawl	Saiha	
2005 – 2006	82	28	**-**	-	-	-	**-**	**110**
2006 – 2007	24	-	**-**	-	-	-	**-**	**24**
2007 – 2008	543	15	**267**	-	-	-	**-**	**825**
2008 – 2009	964	218	**476**	42	-	-	**-**	**1,700**
2009 – 2010	997	806	**697**	342	-	-	**-**	**2,842**
2010 – 2011	489	500	**474**	310	105	-	**-**	**1,878**
2011 – 2012	478	562	**350**	250	300	26	**-**	**1,966**
2012 – 2013	1,039	750	**928**	327	617	50	**-**	**3,711**
2013 – 2014	711	852	**1,300**	381	957	331	**-**	**4,532**
2014 – 2015	694	927	**238**	216	570	102	42	**2,789**
2015 – 2016	437	631	**402**	201	980	286	44	**2,981**
TOTAL	**6,458**	**5,289**	**5,132**	**2,069**	**3,529**	**795**	**86**	**23,358**

Table 1.9.2 District-wise Target for the coming years (in Ha.)

Sl. No.	Name of District	Target area (in Ha.)	
		2016-2017	2017-2018
1	Kolasib	840	740
2	Mamit	900	700
3	Lunglei	1150	1150
4	Lawngtlai	1000	900
5	Aizawl	280	328
6	Serchhip	400	400
7	Saiha	205	307
Total		**4,775**	**4,525**

iii) Establishment of Oil Palm Seed Garden in Mizoram

The Department of Agriculture with the consent of Hon'ble Minister of the Agriculture, Government of Mizoram proposed establishment of Seed Garden in Mizoram and with the active participation of DOPR (Directorate of Oil Palm Research Pedavegi), Andhra Pradesh select Chuanchung Ram, West Serzawl, (Mamit District) 17 Km from Lengpui Airport covering more than 50 Ha. of free land for seed garden.

Rising of Dura and Pisifera as mother and father palm respectively is started which is expected ready for transplanting in the main field for Hybridization programme in future. Dr. P. Murugesan, Principal Scientist, Hybrid Seed Production Farm Palode, Kerala came to Mizoram on 8th October, 2013 and brought germinated seeds for evaluation purpose and sown 2000 sprouts in the Primary Nursery.

The seed garden is meant to supply quality seed sprout of Oil Palm to various North East states, and also to earn good revenue to the Government of Mizoram by sale of harvested FFB from the plantation.

iv) Revision of rate of Fresh Fruit Bunch (FFB):

As per provision made under Section-13 of Mizoram Oil Palm (Regulation of Production and Processing) Act, 2004 and as decided in the 4th Meeting of Price Fixation Committee held on 27th May, 2014 at Agriculture Committee Room, Aizawl, the rate of Oil Palm FFB is fixed at Rs.5.50/- (Rupees five and fifty paise) per Kg at Collection Centers. This new rate will take effect from 1st June, 2014, till further order.

Table 1.9.3 Total FFB purchased upto March, 2016

Godrej Agrovet Pvt. Ltd.

Sl. No.	Name of District	Quantity (MT)
1	Kolasib	4,575.507
2	Mamit	4,449.918
TOTAL		**9,025.425**

Ruchi Soya Industries Ltd

Sl. No.	Name of District	Quantity (MT)
1	Lunglei	205.142
2	Lawngtlai	18.635
	TOTAL	**223.777**

3F Oil Palm Agrotech Pvt. Ltd:

Sl. No.	Name of District	Quantity (MT)
1	Serchhip	29.562

v) OIL PALM PROCESSING UNIT IN MIZORAM

The Government of India has provided support in the form of subsidy to the private entrepreneurs for setting up of Oil Palm processing unit @Rs.250.00 lakh per processing unit for 3 (three) Mills totaling Rs.750.00 lakhs under OPAE (RKVY) during 2011 – 2012. Which were allotted to each partner Company at the rate of Rs.2.5 crore per Mill. Operational Guidelines have been worked out and circulated to each partner company for setting up of Oil Palm Mill in their respective areas.

Table 1.9.4 Proposed location of Oil Palm Mill

Sl. No.	Selected Location	District	Responsible Partner Company
1.	Bukvannei Village	Kolasib	Godrej Agrovet Ltd.
2.	Mat Valley	Serchhip	3F Oil Palm Agrotech Pvt. Ltd.
3.	Rotlang Agril. farm	Lunglei	Ruchi Soya Industries Ltd.

1.10 Geomorphology of Mizoram

i) Regional Morphology

The general physiography of Mizoram is characterized by a very immature first order topography comprising north-south trending anticlinal ridges and synclinal valleys, steep slopes and narrow gorges associated with complex drainage basins. Regionally, the area can be divided into the mountainous terrain province covering the eastern parts and the ridge valley province of the central and western parts (NRSA, 1979). The mountainous terrain province comprising the eastern hill ranges vary in altitude from 400 m to 2,150m with an average elevation of 1,500m and relief of 200m

to 600m. On the other hand, the ridge and valley province has almost unbroken parallel ranges with altitudes varying from 400m to 1,500m with an average elevation of 700m. The relief varies from 100m to 200m. In both the provinces, the width of the valleys generally increases to north and south. There is a great increase in the altitude of the hills from west to east.

ii) Geomorphological classification

In the present study a genetical classification of the geomorphic units is adapted. The units have been broadly divided into structural and denudational classes which are further sub-divided on the basis of variations in elevation into high (> 1,000m) medium (500-1,000m) and low (< 500m) categories. Associated with these classes are other geomorphological and landform units such as plateaus, broad valleys, structural valleys fracture controlled valleys, river terraces, alluvial plains and valley fills which have been delineated using satellite images. Also marked in the geomorphological map are escarpments, ridge lines, landslides and lineaments. Geomorphological map of Mizoram state prepared on 1:250000 scale is presented,

iii) Description of Geomorphological units

a) Denudational Hills (DSH): Denudational Hills are formed due to differential erosion and weathering of the underlying formations so that more resistant formations stands out as hills and less resistant ones form as slopes and valleys. The overall topography still reflects the structural trends of the underlying rocks to some extent. The ridges are mostly serrated and dissected and are traversed by fractures and fracture controlled valleys. The formational dips vary greatly from almost flat to steep, as a result of which landforms such as hammocky hills, cuesta, mesa and plateaus are developed. The denudational hills are further divided into three categories on the basis of altitudinal variations. They are as follows:

i) Denudational Hills – High (DSH-H) (> 1,000m): This unit comprises the high hills of the eastern region that are underlain mainly by the comparatively hard and compact sandstones and shales of the Barail group of rocks. These hills are oriented in various directions with altitudes reaching upto 2,150m and an average elevation of 1,500m. Local relief varies from 200m to 600m. The highly varying dips of the formations have resulted in a complex topography, consisting of linear ridges where the dips are relatively steeper, plateau or mesa surfaces where the dips are gentler and flat, and cuesta and dip facets where the dips are moderate. The ridges are highly dissected and serrated and have steep slopes and deep valleys. The valleys are both parallel to the general trend (NS) as well as transverse to it. Fracture controlled valleys are common along NW-SE

directions. Dissected plateaus or mesas have gently sloping tops and steep slopes.

ii) Denudational Hills – Medium (DSH-M) (500- 1,000m): These hills include the irregular hills of the moderate altitude (500-1,000m) in the west and north-west of Aizawl on either side of Tlawng river where the underlying Bhuban formations show varying dips resulting in irregular hills and dissected plateaus. The north flowing Tlawng river takes a sinuous course in this region. Deep weathering and predominance of clayey lithology has resulted not only in thick vegetation cover but also landslides wherever the slopes are disturbed by human activities.

iii) Denudational Hills – Low (DSH-L) (<500m): This unit forms the wide zones of low hills and mounds along the northerly flowing Langkaih and Tut river in the north-western part of Mizoram. The average heights of the hills are less than 300m. The underlying rocks include the sandstones and shales of Boka Bil Sub-Group. The slopes are gentler and thickly vegetated. A number of low altitude dissected mesa and plateau are developed here.

b) Structural Hills (SH)

A large part of Mizoram comprises of north-south trending continuous linear hills with intervening narrow valleys which strongly reflect the structural trends of the underlying rocks. These hills are grouped under structural hills. They are formed over the folded sedimentary sequence of the surma group of rocks as anticlinal ridges and synclinal valleys. The altitude of these hills increase from west to east. The western slopes of the hills are generally steeper and more dissected than the eastern slopes. The crest lines are normally straight but serrated at places where they are traversed by fractures and joints. The continuity of the ridges are often broken by faults and lineaments, most of which are NW-SE trending. On the basis of altitudinal variations, the structural hills are further sub-divided into three groups viz. high, medium and low.

i) Structural Hills – High (SH-H) (More than 1,000m): The unit comprises the high linear ridges forming the central hill ranges of Mizoram and includes the hills of Aizawl, Lunglei and Tuipang. The underlying lithology consists mainly of sandstones and shales of Bhuban sub-group. The steep formational dips are reflected in the sharp ridges with steep slopes and narrow valleys. There is a tendency of the valleys becoming wider towards north and south due to the plunging folds. The drainages are generally parallel and trellis pattern.

ii) Structural Hills – Medium (SH-M) (500- 1,000m): The unit occupies a large area along the western belt and northern parts and consists of moderately high linear ridges with the intervening broader valleys. The ridges are mostly serrate in nature with highly dissected slopes. The underlying rocks constitute mainly the Bhuban formations. The streams occupying the broad valleys show sinuous nature. Landforms features such as cuesta and dip facets are common. Most part of this unit is densely vegetated.

iii) Structural Hills – Low (SH-L) (< 500m): The broad belt of sub-dued topograpgy with low, irregular hills and parallel ridges and intervening flat valleys occupying the western parts of the area are included in this unit. The hills are of low altitudes, generally around 100-200m. The rivers flowing in the intervening broad valleys show meandering nature. The underlying rocks are predominantly shales and sandstone of Bokabil and Bhuban formations.

c) Broad Linear Valley (BLV)

Flat, broad valleys are formed along Tuichawng, Kawrpui and Karnphuli rivers in the western and south-western parts of the state. The underluing lithology is mainly of Bhuban and Bokabil sub-groups. Presently the river-borne alluvium, silt and clay cover these plains which are intensely cultivated. The rivers meander in these flat valleys.

d) Dissected Plateau and mesa

The complex folded nature of the underlying rocks with highly varying dips has resulted in the complex topography. Where the formations show flat dips, plateau and mesa landforms have been developed. The tops of these landforms show gently sloping surfaces while the side slopes are steep and highly dissected. They are mostly under thick vegetation cover.

e) Fracture Controlled Valleys (FV)

These linear or curvilinear narrow valleys controlled by transverse fractures cutting across the general trend of the topography. These are filled by alluvial and colluvial materials and occur mostly in the north-east and eastern parts of Mizoram. These valleys are generally thickly vegetated or cultivated.

f) Structural Valleys (SV)

These are narrow inter-ridge valleys parallel to the structural trend of the terrain. Though the entire terrain is characterized by ridge-valley topography, those valleys which are wider and more conspicuous are demarcated and included under this unit. These are either thickly vegetated or cultivated.

g) Valley Fills (In-filled valleys) (VF)

These are flat intermontane valleys and basins which are irregular in shape and filled by fluvial or laccustrine deposits. One typical example is the irregular, intermontane basin of Champhai in the eastern part. Similar valleys and basins are also present in the southern parts. These are intensely cultivated.

h) Alluvial Plains (AP)

Alluvial Plains are flat surfaces formed by the deposition of alluvium by the major river systems. In Mizoram, alluvial plains are found along the major rivers, especially along Langkaih river in the NW part. These units are under cultivation.

i) River Terraces (RT)

River Terraces have been found along the major streams in the mountainous region and are comprised of sand, silt and gravel. These are mostly under agriculture or forest.

j) Other Landforms

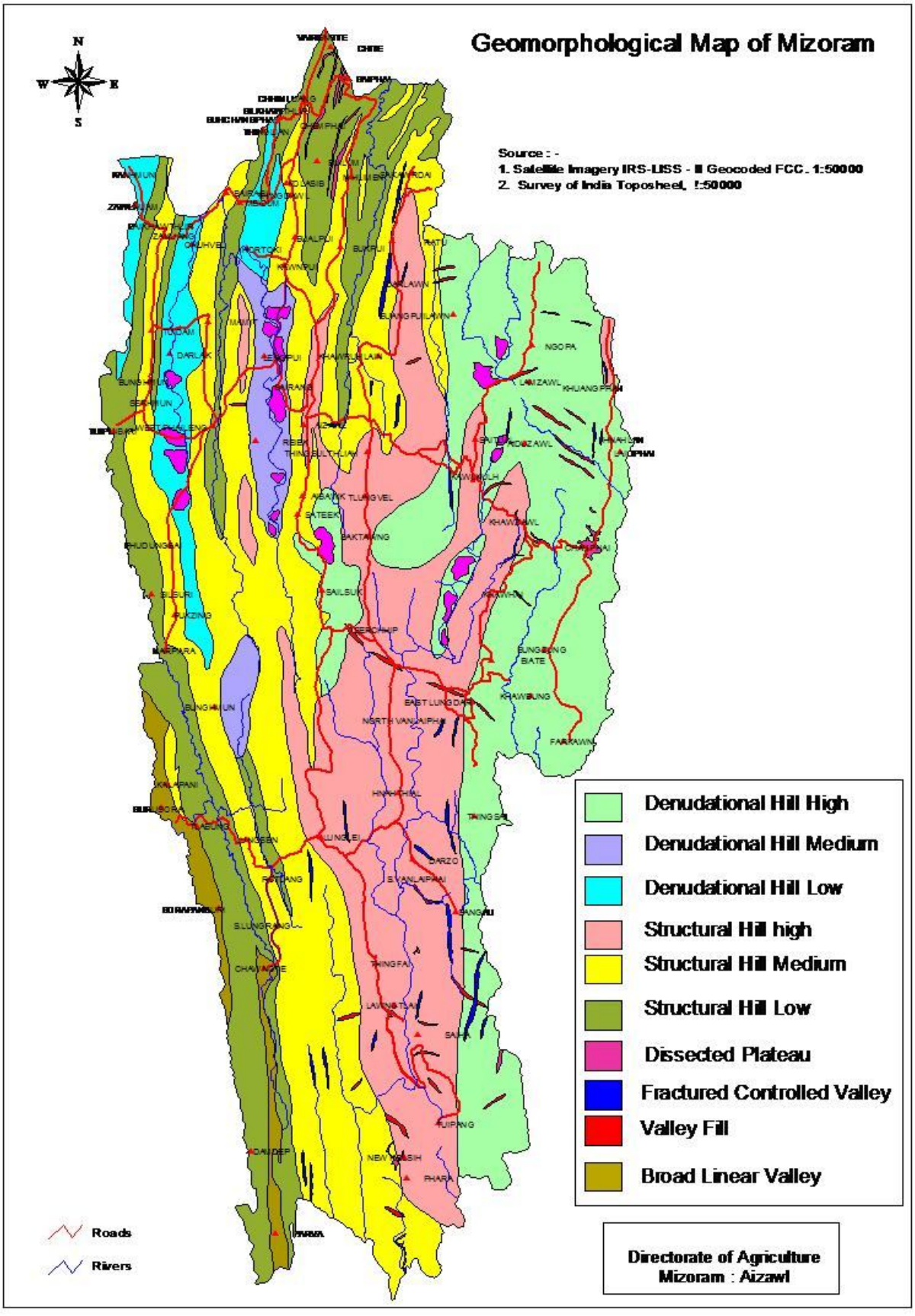
i) **Escarpment -** They are cliffs or steep slopes and are formed either along or across the ridges due to differential erosion along fractures or faults.

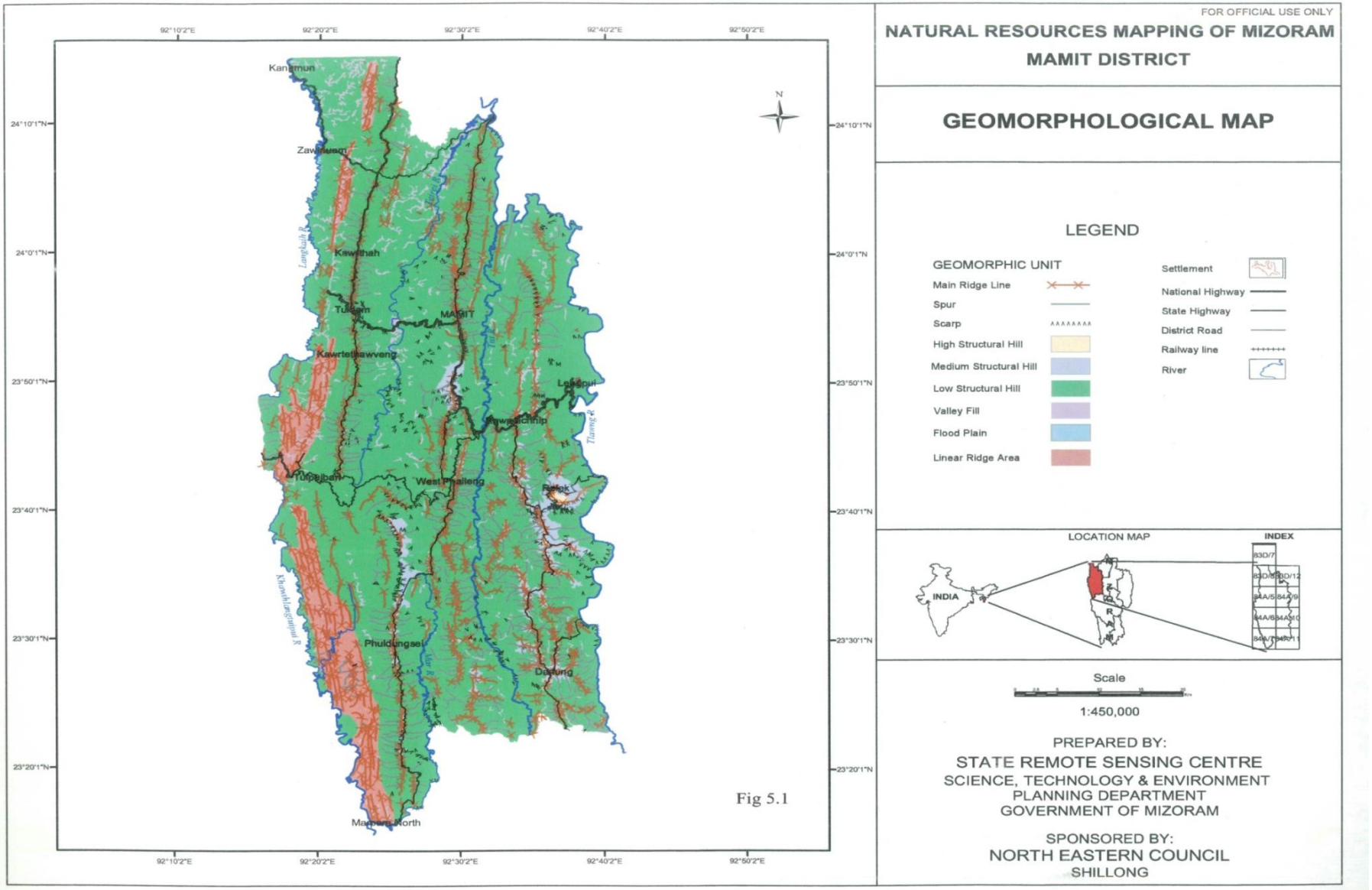
ii) **Ridge Lines -** The ridge crests are continuous and parallel in the structural Hills while they are irregular and disoriented in the denudostrutural hills. Many of the ridges are serrate having notched or toothed crest lines with saw-edge profile due to erosion.

iii) **Cuesta and Dip Facets -** Cuesta landforms occur mainly in the flat or gently dipping formations while the dip facets are seen where the dips are moderate to steep. These features are distinct in the satellite images.

Table1.10 Area under Geomorphic unit

Sl. No.	Geomorphic Unit	Area (in Sq.Km.)	Area in %
1	High Structural Hill	152.50	5.04
2	Medium Structural Hill	702.58	23.22
3	Low Structural Hill	2,141.32	70.77
4	Valley Fill	27.84	0.92
5	Flood Plain	1.51	0.05
TOTAL		**3,025.75**	**100.00**


Geomorphological Map of Mizoram
N
W
E
S
Source : -
1. Satellite Imagery IRS-LISS - II Geocoded FCC. 1:50000
2. Survey of India Toposheet, 1:50000
Denudational Hill High
Denudational Hill Medium
Denudational Hill Low
Structural Hill high
Structural Hill Medium
Structural Hill Low
Dissected Plateau
Fractured Controlled Valley
Valley Fill
Broad Linear Valley
Roads
Rivers
Directorate of Agriculture
Mizoram : Aizawl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NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
GEOMORPHOLOGICAL MAP
LEGEND
GEOMORPHIC UNIT
Main Ridge Line
Spur
Scarp
High Structural Hill
Medium Structural Hill
Low Structural Hill
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Lengpui
Tuipuibari
West Phallang
Reiek
Phuldungsei
Darzing
Mamit North
Fig 5.1

1.11 Hydro geomorphology and Groundwater Prospects of Mizoram

The occurrence and movements of groundwater in an area is controlled by the morphology of the land surface (slope and landform) and the underlying lithology and structure (hydrogeology). High relief and steep slopes accentuate surface run off thus preventing large scale infiltration of rain water into the ground. On the other hand, topographical depressions, valleys and undulating plains help more infiltration and storage of groundwater, which in turn depends to a great extent by the hydrogeological characteristics of the underlying lithology.

In the highly rugged mountainous terrain such as Mizoram, the problem is more complex. Here, the steeply sloping surfaces carry down a major part of the rain water to the valleys and streams. Small amount of water may infiltrate into fractures, joints and bedding planes of rocks and reappear elsewhere as seepages and springs. A part of the surface run off and spring water flows down to the streams and rivers.

With the rapid urbanization and growth of population, the demand for water supply increases. Sometimes, surface water resource is often inadequate to meet the ever-increasing demand of water supply. Therefore, ground water resources have been developed on a large scale and have been tapped and harnessed to a considerable extent. For an area experiencing constant drought and which faces water scarcity problem, ground water resources have been an alternative solution to the problem. Ground water resources have been exploited not only for domestic purposes, but also for irrigation and agricultural purposes.

Preparation of ground water potential zonation map is one of the first steps in exploring and exploiting the ground water resources. Ground water potential zonation map divides an area into zones of varying degrees of ground water potentiality based on an estimated significance of various geo-environmental factors operated and observed on the surface which are responsible for inducing the potentiality of an area. Ground water potential zonation map helps to choose and identify the potential zones, selecting viable sites for carrying out exploration and provides the basic data of the different potential zones of ground water resources for the study area.

To locate the occurrence and potential zones of ground water within the study area, thematic maps of lithology, geomorphology, geological structure and slope are prepared. These maps are combined together by using ARC/INFO GIS package to generate the final map from which different ground water potential zones will be derived. Besides, the existing hand pumps and spring inventory data are added to the final map. Since geological structure is one of the major factors controlling the occurrence of ground water, areas within 50m on both sides of the lineaments and faults are included. Similarly, areas proximity to spring and hand pumps are manually selected and delineated with the help of Digital Elevation Model of the study area.

The different units of these thematic parameters are taken into consideration by giving different weightage values according to their respective hydrological properties. This form the main criterion by which different potential zonation is done. Since hand pumps and springs are direct expression of the ground water condition below the ground surface. They are given the highest weightage value. The final map is then prepared and the study area is classified into very good, good, moderate and poor zones. The ground water potential zones are shown in map and the area statistics is given in table below and described below:

Table 1.11 Statistics of Ground Water Potential Zones of Mamit District

Sl. No.	Potential Zone	Area (in Sq. Km)	Area in Percentage
1	Very good	287.93	9.52
2	Good	611.96	20.22
3	Moderate	983.92	32.52
4	Poor	1,141.95	37.74
Grand Total		**3,025.75**	**100.00**

i) Very Good

This zone generally covers valley fill, flood plain and low lying areas which are located within the proximity of water bodies, where there will be continual recharge. Besides, it includes the intersection of the structural units, such as lineaments and faults, with valley fill and flood plains. These geological structures offer channels for the sub-surface flow of water. Ground water can easily move through these fractures and are found to be very suitable sites for ground water occurrence. Lithologically, this zone comprises areas where unconsolidated sediments, such as gravel, sand, silt and clayey sand are deposited. These have high potentiality of retaining water since they allow maximum percolation due to their maximum pore spaces between the grains. Locally, this zone covers the flood plains of Langkaih river. Settlement areas such as Lokicherra, Momchhara and Zawlpui are included within this. This zone covers the plains of Tlawng, Teirei and Tut rivers. Settlement areas located within the synclines of these rivers such as Darlak, Bawngva, Thinghmun, Phaizau and Vaak fall within the very good zone. All the spring and hand pumps located within the settlement area also fall in this zone. The very good zone extends over an area of 287.93 Sq. Km. which is 9.52% of the total study area.

ii) Good

All the remaining geological structures fall under the good potential zone. The low lying areas including parts of flood plains and valley fills are also included in this zone. This is because low and gentle relief areas have much better opportunities for infiltration and subsequent yield of ground water. Among the rock types exposed in the

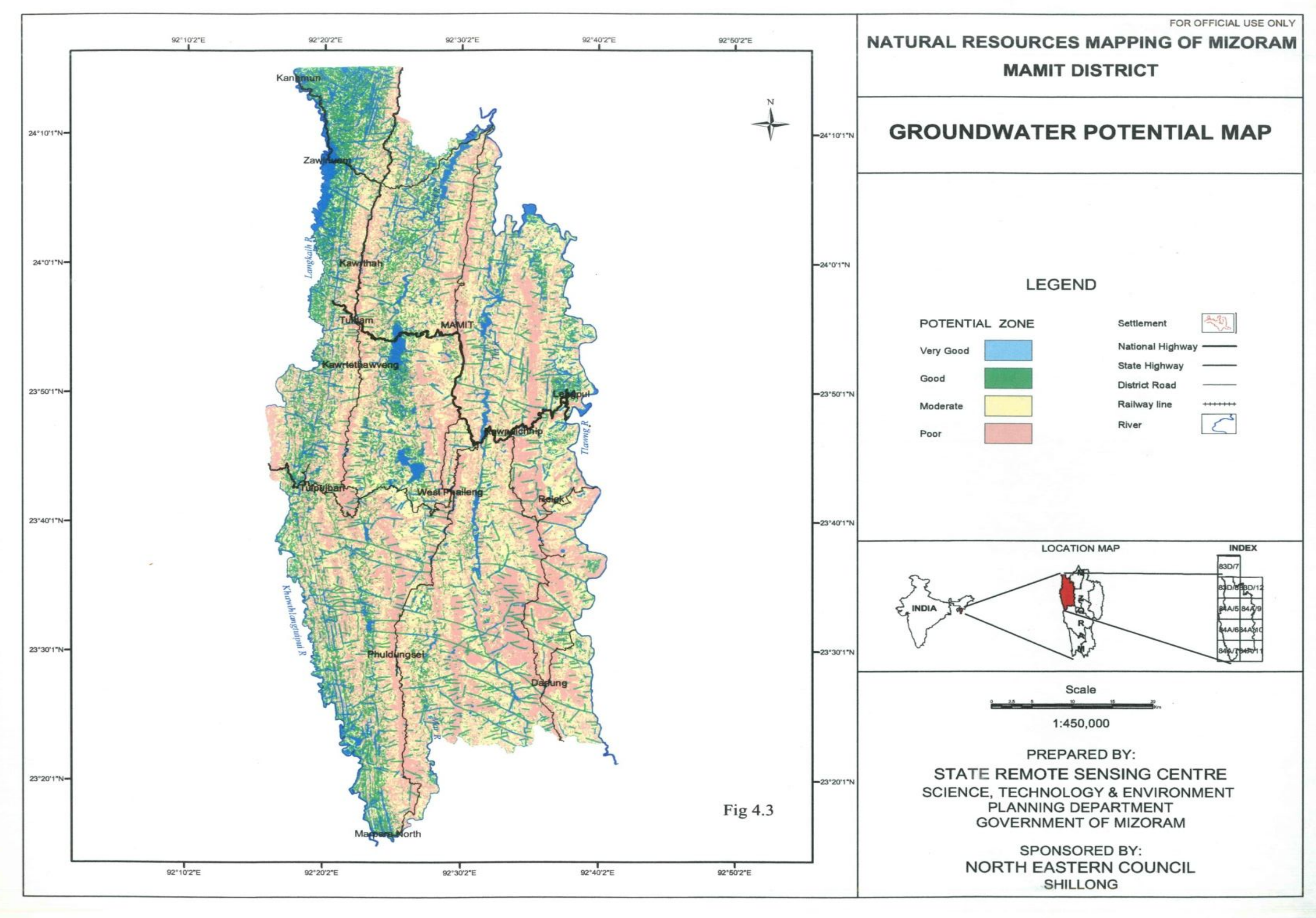
study area, sandstones are generally capable of storing and transmitting water through their interstices and pore spaces present in between the grains and are considered to be suitable aquifer. Hence, parts of area where sandstones are exposed also come under this zone. It mainly covers the plains of Teirei Lui, parts of Tut syncline, Tuipuibari, Chuhvel and Marpara plains. The good zone is also mainly confined to the northern tip of the study area where it is characterized by several valleys and low lying plains. This zone spreads over an area of about 611.96 Sq.Km. and forms 20.22% of the study area.

iii) Moderate

This zone mainly comprises areas where the recharge condition and the water-yielding capacity of the underlying materials are neither suitable nor poor. Topographically, it covers gently sloping smooth surface of the hill. Although the lithology may comprise good water-bearing rock formation such as sandstone, the potentiality is minimized by the sloping nature of the topography where run-off is maximum. In general, the moderate zone falls within the poor water-bearing rock formation such as silty shale that is in turn, characterized by the presence of secondary structures in them. The moderate zone is evenly distributed within the study area and covers an area of 983.92 Sq.Km. and occupies 32.52% of the total study area.

iv) Poor

This zone is mainly distributed in the elevated areas. In the area of high relief, a greater part of precipitation flows out as surface run-off, which is a poor condition for infiltration beneath the ground surface. Hence, the ground water yield is generally assumed to be low. Unless the elevated areas are traversed by geological structures and posses high drainage density and suitable water-bearing rock formation, their ground water yield is generally low. The poor zone is mainly distributed along the ridges such as Hmunpui – Saitlaw ridge, Rawkhmun, Pukzing, Hnahva, Reiek, Lungdar and Mamit ridges. This zone occupies an area of about 1,141.95 Sq.Km. which is 37.74% of the total area.


FOR OFFICIAL USE ONLY
NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
GROUNDWATER POTENTIAL MAP
LEGEND
POTENTIAL ZONE
Very Good
Good
Moderate
Poor
Settlement
National Highway
State Highway
District Road
Railway line
River
LOCATION MAP
INDIA
INDEX
Scale
1:450,000
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SPONSORED BY:
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SHILLONG
MAMIT
Kawrthah
Tuidam
Kawrtethawveng
West Phaileng
Phuldungsei
N
Fig 4.3

1.12 Geology of Mizoram

i) Regional Geology and Stratigraphy

Mizoram forms part of the Indo-Burma hill ranges characterized by a very immature first order topography comprising parallel, N-S trending anticlinal ridges and synclinal valleys with steep slopes. Geologically theyb are composed of arenaceous and argillaceous sediments of Tertiary age (Oligocene to Pliocene). The Lithostratigraphy is composed of a sequence of marine and fluvial sediments belonging to Barail, Surma and Tipam groups and consisting of shales, siltstones and sandstones which are folded into a series of north-south trending and plunging anticlines and synclines. The major structural trends coincide with the tectonic elements of the region. The general stratigraphy succession of Mizoram is shown below (Kumar, 1997) and geological map is annexed.

Table 1.12 General Stratigraphy of Mizoram

Quaternary	Alluvium		Sand, silt, clay etc.
Surma Group (Miocene)	Bokabil Sub-Group		Felspathic sandstone with siltstone, sandy silt and shale.
	Bhuban Sub-Group	Upper Bh.	Well bedded sandstone with intercalations of shale.
		Middle Bh.	Thick zone of shale and mud with intercalation of sandstone and silty shale.
		Lower Bh.	Bedded and massive sandstone with siltstone and silty shale.
Barail Group (Oligocene)	-	-	Shale and siltstone with bands of greywackes

ii) Description of Litho-units

a) Barail Group

The rocks of the Barail Group are the oldest formations in Mizoram and are confined to the eastern parts of the state. They consists of a thick pile of argillaceous and arenaceous sediments predominantly shale, siltstone and greywacke. Though the Barails have been sub-divided into the lower, middle and upper Barails with dominant lithilogies of hard and compact sandstones, banded fine grained shales and massive sandstones (Vimal Kumar, 1997), these could not be separated out in the image. The Barails are characterized in the image by coarse texture, coarse drainages, sharp crested and broken ridges and dense vegetation cover.

b) Surma Group:

The Surma Group of rocks is divided into Bhuban and Bokabil sub-groups and they cover the rest of the area. The Bhuban formations which overlay unconformable over the Barails is sub-divided into Lower, Middle and Upper Bhubans. The Lower and Upper Bhubans ate predominantly arenaceous with well-bedded and massive sandstones and siltstones and intercalations of shales, while the Middle Bhuban is mainly argillaceous consisting of thick zones of shale and mud with bedded sandstones and silts shales. The Bhuban formations form parallel ridge-valley topography with drainage density.

In the geological map prepared using satellite images, the three sub-divisions of the Bhuban formations could not be differentiated. Instead, on the basis of the topography, drainage density and texture, they have been delineated into hard and soft formations, the former representing broadly the upper Bhubans forming ridges and the latter representing the Middle Bhuban exposed in the synclinal valleys.

The rocks of the Bokabil sub-group consisting of shale-siltstone sequence with friable felspathic sandstones form hogbacks and low-lying ridges and occupy the anticlinal ridges and cores of synclinal valleys, mostly in the western parts.

c) Alluvium:

Alluvial deposits of quaternary period are found along stream courses as terraces, valley fills and alluvial plains. They consist predominantly of clay, silt and sound derived from the surrounding terrains. These areas are mostly under cultivation.

iii) Structure and Tectonics:

Structurally, Mizoram forms part of the Mizo fold Belt. The entire formations are folded into nearly north trending, longitudinal folds by E-W compressive forces which have resulted in a series of parallel anticlines and synclines. These folds are often dislocated and segmented by transverse and oblique faults.

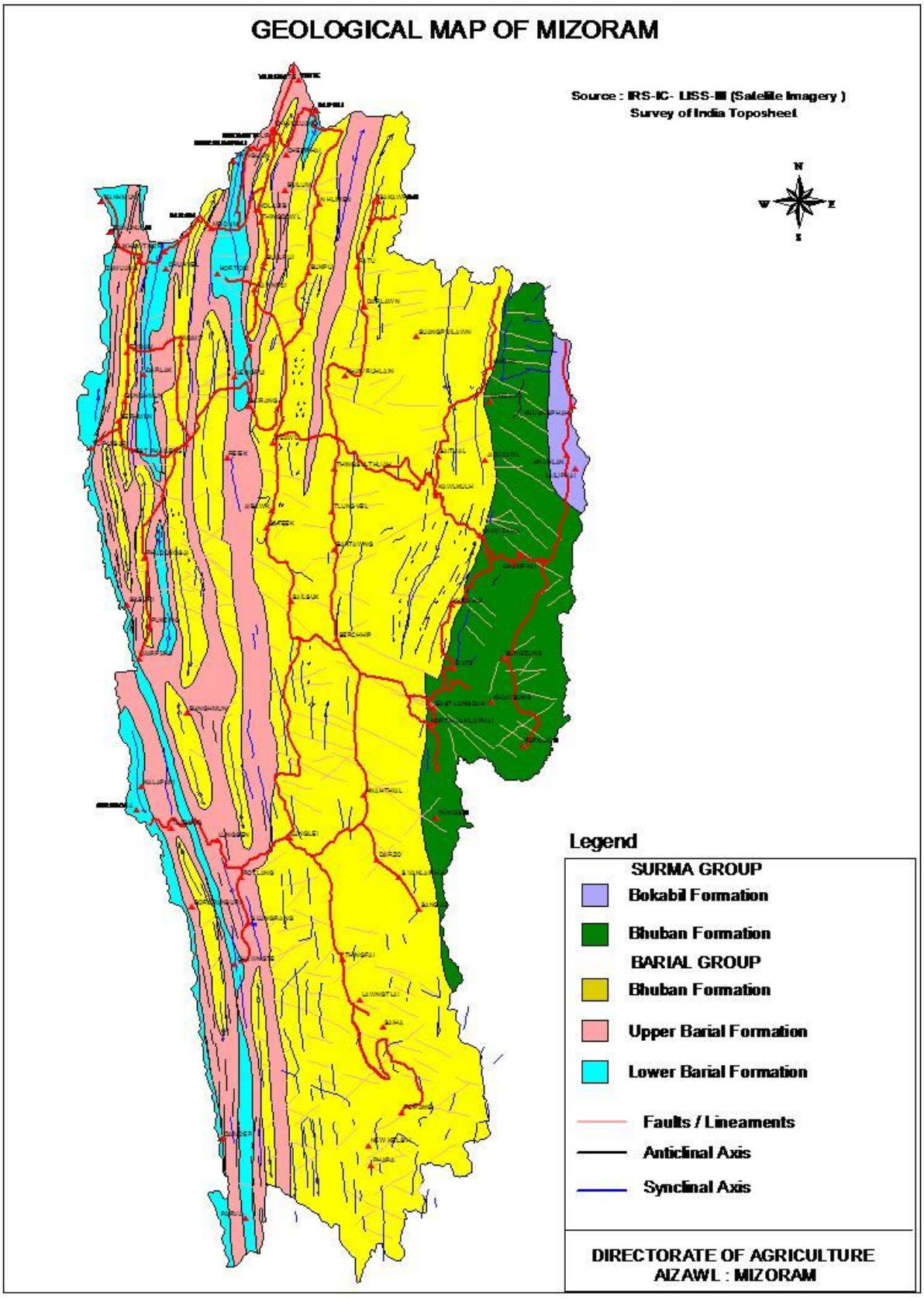
A number of lineaments have been traced in the images. Three prominent trends of lineaments have been identified in the area, viz. N-S, NW-SE and NE-SW. the N-S lineaments are parallel to the axial traces of folds while the NW-SE and NE-SW trends represent shear fractures.

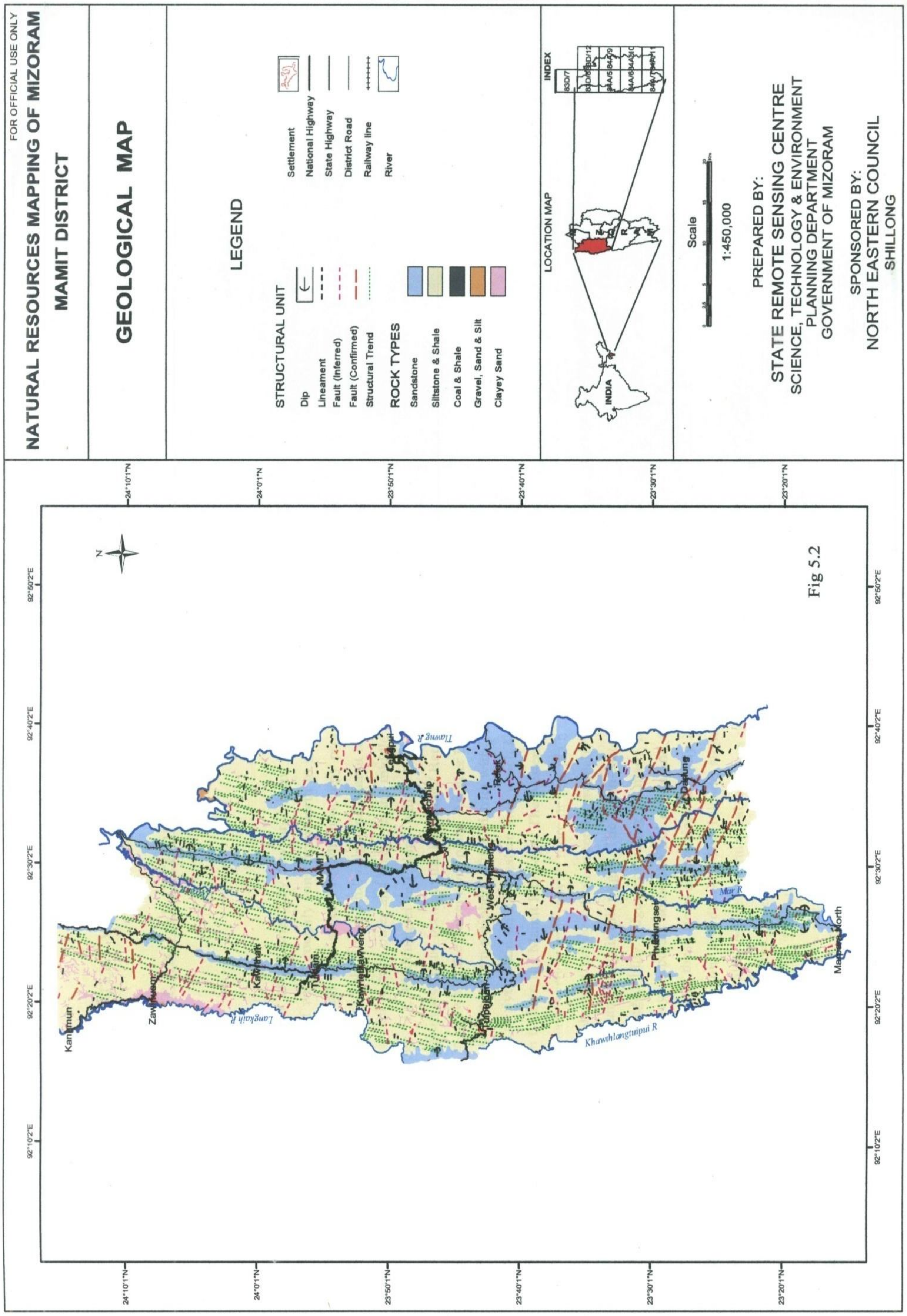
iv) Economic Minerals

So far no significant mineral reserve has been proved in Mizoram. The compact sandstones have been extensively quarried as construction material and road metal, especially around urban centers. It has been reported that there exists a good reserve of China clay in the Doyang river valley, but its economic viability is doubtful due to the terrain conditions. Oil and Natural Gas Corporation (ONGC) has carried out exploratory grilling for oil in Kolasib which has indicated only traces of hydrocarbon.

Table 1.12.1 Area under Rock Types

Sl. No.	Rock Types	Area (in Sq.Km.)	Area in %
1	Sandstone	1,082.61	35.78
2	Siltstone & Shale	1,915.60	63.31
3	Limestone	1.51	0.05
4	Clayey Sand	21.48	0.71
5	Gravel, Sand & Silt	4.54	0.15
Grand Total		**3,025.75**	**100.00**


GEOLOGICAL MAP OF MIZORAM
Source : IRS-IC- LISS-III (Satellite Imagery)
Survey of India Toposheet
N
W
E
S
Legend
SURMA GROUP
Bokabil Formation
Bhuban Formation
BARIAL GROUP
Bhuban Formation
Upper Barial Formation
Lower Barial Formation
Faults / Lineaments
Anticlinal Axis
Synclinal Axis
DIRECTORATE OF AGRICULTURE
AIZAWL : MIZORAM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NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
GEOLOGICAL MAP
LEGEND
STRUCTURAL UNIT
Dip
Lineament
Fault (Inferred)
Fault (Confirmed)
Structural Trend
ROCK TYPES
Sandstone
Siltstone & Shale
Coal & Shale
Gravel, Sand & Silt
Clayey Sand
Settlement
National Highway
State Highway
District Road
Railway line
River
LOCATION MAP
INDIA
INDEX
Scale
1:450,000
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SPONSORED BY:
NORTH EASTERN COUNCIL
SHILLONG
MAMIT
West Phaileng
Phuldungsei
Khawthlangtuipui R
Langkaih R
Tlawng R
Mat R
N
Fig 5.2

1.13 LAND IRRIGABILITY CLASSES

The suitability of land for irrigation depends on physical factors like quality and quantity of irrigation water and Socio-Economic factors like land development costs, provisions of drainage facilities etc. The following land irrigability classes have been established.

Class 1 Land that have few limitations for sustained use under irrigation.
Class 2 Land that have moderate limitations for sustained use under irrigation.
Class 3 Land that have severe limitations for sustained under irrigation.
Class 4 Land that are marginal for terraced use under irrigation because of very severe limitations.
Class 5 Land that is temporarily classed as not suitable for sustained use under irrigation pending further investigations.
Class 6 Land not suitable for sustained use under irrigation.

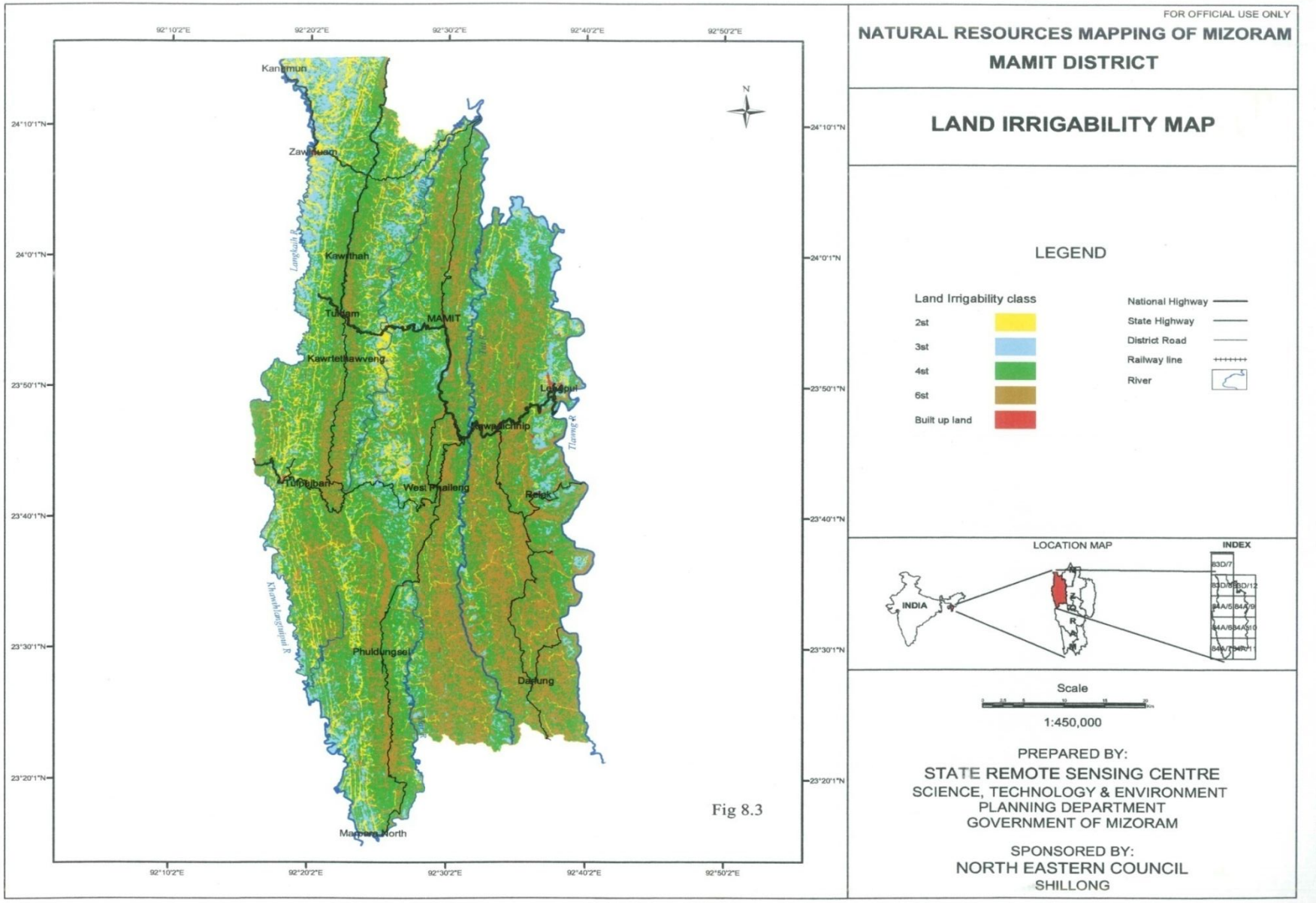
i) Land Irrigability Sub-Classes

Sub-Class are the groups of land irrigability units that have the same kind of dominant limitations for sustained use under irrigation. The limitations are indicated by suffixing the letters 'S' or 'd' to class number and are indicative of deficiency in soils, topography or drainage respectively. Land having more than one limitation is also indicated with the relevant letters of the Sub-Class.

Interpretation of soil mapping unit into land irrigability classes and statistics are given below

Table 1.13 Land irrigability Statistics of Mamit District

Sl. No.	Class	Description	Area (in Sq.Km.)	%
1	2nd	Irrigable lands with moderate limitations of soil and drainage, fine textured, slow permeability, poor drainage, slight erosion	321.59	10.63
2	3rd	Irrigable lands with severe limitations of soil and topography, land has strongly sloping to steep, medium to moderate fine textured, well drained, moderate erosion.	477.06	15.77
3	4th	Marginal irrigable lands with very severe limitations of soil and topography, land has steep to very steep, medium to moderately fine textured, well drained, severe erosion and excess run-off.	1,305.62	43.15
4	6th	Land not suitable for sustained use under irrigation, very very steep slopes and hill crest, very severe erosion.	895.18	29.59
5	Water body		13.43	0.44
6	Built up land		12.86	0.43
Total			**3,025.75**	**100.00**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NATURAL RESOURCES MAPPING OF MIZORAM
MAMIT DISTRICT
LAND IRRIGABILITY MAP
LEGEND
Land Irrigability class
2st
3st
4st
6st
Built up land
National Highway
State Highway
District Road
Railway line
River
LOCATION MAP
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Scale
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Tuikam
MAMIT
Kawrtethawveng
Lawngtlai
Tuipuibari
West Phaileng
Reiek
Phuldungsei
Darlung
Mampara North
Langkaih R.
Tlawng R.
Khawbungpui R.
92°10'2"E
92°20'2"E
92°30'2"E
92°40'2"E
92°50'2"E
24°10'1"N
24°0'1"N
23°50'1"N
23°40'1"N
23°30'1"N
23°20'1"N
N

Fig 8.3

Chapter - II
District Water Profile

Irrigation is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and re-vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. There is a great necessity of irrigation in Indian agriculture. India has a great diversity and variety of climate and weather conditions. These conditions range from extreme of heat to extreme of cold and from extreme dryness to excessive rainfall. Due to some reasons irrigation is needed in Indian agriculture.

- Uncertainty of Monsoon rainfall both in time and place.
- Irregularity in distribution of rainfall throughout the year.
- Excessive rainfall causing flood.
- Draught is an annual event in some areas.
- India is a land of Rabi Crops. But there is not rainfall in winter months.
- Some soils need more water.
- Introduction of H.Y.V seeds and multiple cropping need water throughout the year.
- The types of Irrigation mainly practiced in India are:

i) Tanks - a) Pond
b) Tank
ii) Well - a) Dug Well
b) Tube Well - i) Shallow ii) Deep
iii) Canal - a) Perennial
b) Non-Perennial

2.1 Crop water Requirement

Crop water requirement is the water required by the plants for its survival, growth, development and to produce economic parts. This requirement is applied either naturally by precipitation or artificially by irrigation. Hence the crop water requirement includes all losses like: a) Transpiration loss through leaves (T) b) Evaporation loss through soil surface in cropped area (E) c) Amount of weather used by plants (WP) for its metabolic activities which is estimated as less than 1% of the total water absorption. These three components cannot be separated so easily. Hence the ET loss is taken as crop water use or crop water consumptive use. d) Other application losses are conveyance loss, percolation loss, runoff loss, etc., (WL). e) The water required for special purposes (WSP) like puddling operation, ploughing operation, land preparation, leaching, requirement, for the purpose of weeding, for dissolving fertilizer and chemical, etc. Hence the water requirement is symbolically represented as:

$$WR = T + E + WP + WL + WSP$$

(The other application losses and special purposes are mostly indented for wet land cultivation. Hence for irrigated dry land crop the ET loss alone is accounted for crop water requirement). The estimations of the water requirement of crop are one of the basic needs for crop planning on the farm and for the planning of any irrigation project.

2.1 Irrigation Status of Mamit District

Crop Type	Kharif			Rabi			Summer Crop			Total		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
Cereals	968	2190	3158							968	2190	3158
Coarse Cereal		740	740								740	740
Pulses		398	398	188		188				188	398	586
Oilseeds	-	120	120	4		4				4	120	124
Sugarcane		56	56								56	56
Oil Palm		5132	5132								5132	5132

Source : Agriculture Statistics, Directorate of Agriculture, Mizoram

a) Zawlnuam

Crop Type	Kharif			Rabi			Summer Crop			Total		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
Cereals	581	876	1457							581	876	1457
Coarse Cereal		296	296								296	296
Pulses												
Oilseeds		167	167	100		100				100	167	267
Sugarcane	-	55	55	4		4				4	120	124
Oil Palm		32	32								56	56

b) West Phaileng

Crop Type	Kharif			Rabi			Summer Crop			Total		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
Cereals	271	810	1081							271	810	1081
Coarse Cereal		259	259								259	259
Pulses		151	151								151	151
Oilseeds		44	44							0	44	44
Sugarcane		24	24								24	24
Oil Palm		2361	2361								2361	2361

c) Reiek

Crop Type	Kharif			Rabi			Summer Crop			Total		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
Cereals	116	504	620							116	504	620
Coarse Cereal		185	185								185	185
Pulses		80	80								80	80
Oilseeds		44	44							0	44	44
Sugarcane		21	21								21	21
Oil Palm		308	308								308	308

2.2 Production and Productivity of Major Crops

Season	Crop Sown					Rainfed				Irrigated				Total		
	Cereal	Coarse Cereal	Pulses	Oilseeds	Any other crops	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Production (MT)	Productivity (kg)	Area (Ha)
Kharif (rice)	Rice					2190	1971	900		968	2426	2506		4241	1392	3158
Coarse Cereal		Maize				740	1038	1402						1038	1402	740
Pulses			Bean, arhar			398	726	1821						726	1821	398
Oilseeds				Soybean, mustard		120	69	450						69	450	120
Rabi	Rice															
Coarse Cereal		Maize														
Pulses			Pea Bean							188	234	1244		172	1075	160
Oilseeds										4	2	500		2	500	4
Sugarcane						56	1680	30000						56	30000	56
Oil Palm (MT)					Oil Palm	5132	76980	15						76980MT	15MT	5132

Source : Agriculture Statistics, Directorate of Agriculture, Mizoram

a) Zawlnuam

Season	Crop Sown					Rainfed				Irrigated				Total		
	Cereal	Coarse Cereal	Pulses	Oilseeds	Any other crops	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Production (MT)	Productivity (kg)	Area (Ha)
Kharif (rice)	Rice					876	1727	1971	581	1456	2506	3183		1457	876	1727
Coarse Cereal		Maize				296	415	1402				415		296	296	415
Pulses			Bean, arhar			167	304	1821				304		167	167	304
Oilseeds				Soybean, mustard		55	25	450				25		55	55	25
Rabi	Rice															
Coarse Cereal		Maize														
Pulses			Pea Bean							100	124	1244		124	1244	100
Oilseeds																
Sugarcane						30	900	300000						300000	900	30
Oil Palm (MT)					Oil Palm	2463	36945	15						2463	2463	36945

b) West Phaileng

Season	Crop Sown					Rainfed				Irrigated				Total		
	Cereal	Coarse Cereal	Pulses	Oilseeds	Any other crops	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Production (MT)	Productivity (kg)	Area (Ha)
Kharif (rice)	Rice					810	1597	1971		271	679	2506		2276	2105	1081
Coarse Cereal		Maize				259	363	1402				415		363	1402	259
Pulses			Bean, arhar			151	275	1821				304		275	1821	151
Oilseeds				Soybean, mustard		44	20	450				25		20	450	44
Rabi	Rice															
Coarse Cereal		Maize														
Pulses			Pea Bean													
Oilseeds																
Sugarcane						24	900	300000						300000	900	24
Oil Palm (MT)					Oil Palm	2361	35415	15						35415	15	2361

c) Reiek

Season	Crop Sown					Rainfed				Irrigated				Total		
	Cereal	Coarse Cereal	Pulses	Oilseeds	Any other crops	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Area (Ha)	Production (MT)	Productivity (kg)	Cost of cultivation	Production (MT)	Productivity (kg)	Area (Ha)
Kharif (rice)	Rice					504	993	1971		116	291	2506		1284	2071	620
Coarse Cereal		Maize				185	259	1402						259	1402	185
Pulses			Bean, arhar			80	146	1821						146	1821	80
Oilseeds				Soybean, mustard		21	9	450						9	450	21
Rabi	Rice															
Coarse Cereal		Maize														
Pulses			Pea Bean													
Oilseeds																
Sugarcane																
Oil Palm (MT)					Oil Palm	308	4620	15						4620	15	308

2.3 Irrigation based Classification

Irrigated (Ha)		Rainfed	
Gross	Net	Partially Irrigated	Rainfed
880	880	1029	24766

Source : Agriculture Statistics, Directorate of Agriculture, Mizoram

Chapter - III
Water Availability

3.1 Surface Water Scenario

Surface water is water on the surface of the planet such as in streams, river, lake, wet land or pond/tank. It can be contrasted with ground water and atmospheric water. Non-saline surface water is replenished by precipitation and by recruitment from ground water. It is lost through evaporation, see page into the ground where it becomes ground water used by plants for transpiration, extracted by mankind for agriculture, living, industry etc. or discharged to the sea where it becomes saline.

To derive surface water volume basically, we measure volumes and surface areas of a set of farm ponds and tanks and the develop relationship between surface areas and volumes. After that using these relationships, calculated volumes of the whole study region surface water bodies based on our remote sensing surface area.

3.2 Status of surface water availability

Surface water is water that is found in lakes, rivers, streams, ponds and other natural water courses. This valuable resource provides drinking water, water supply and supports important industries such as fishing, farming and electric power generation. Surface water supports various recreational activities such as swimming and boating and provides habitat for aquatic life. Overall, a clean abundant supply of surface water supports the health of humans and aquatic ecosystem, a strong economy and provides a high quality of life for any region.

Table 3.1 Status of water availability

Sl. No.	Sources	Kharif	Rabi	Summer	Total
1	**Surface Irrigation**				
i	Canal (Major & Medium) Irrigation (Tank)				
ii	Minor Irrigation Tanks	0.000055540	0.000222160	Nil	0.000277700
iii	Lift Irrigation/Diversion	0.016568820	0.001840980	Nil	0.018409800
iv	Various water bodies including rain water harvesting				
v	Treated effluent received from STP				
vi	Untreated effluent	-	-	-	-
vii	Perennial sources of water	-	-	-	-
2	**Ground water**				
i	Open Well				
Ii	Deep Tube Well				
Iii	Medium Tube Well				
iv	Shallow Tube Well				

3.3 Ground Water Quality:

As per earlier field investigation reports, it is found that the water sample collected from springs indicates thar pH values range between 6.9 and 8.3. Electrical conductivity of the water is found to vary from 31-249 micromhos/cm at 25ºC excepting a few places. The concentration of bicarbonate ranges from 12 to 158 ppm. The range of concentration of Calcium and Magnesium is in between 4-22 and 1-10 ppm respectively. Concentration of iron ranges from 0.02 to 0.3 ppm which is within permissible limit. In general, the chemical quality of ground water in the district is fresh and potable and is suitable for domestic and industrial purposes

3.4 Ground Water Management Strategy:

Hydrogeological investigations carried out by the Central Ground Water Board during 1984-85 & 1985-86 in the entire state revealed the occurrence of a good number of perennial springs in different altitudes. The discharges of the springs progressively increase in the lower altitudes. These springs can be developed scientifically for providing safe drinking water to the rural people. Rain water harvesting which is well known to the people of the district can also be developed for solving scarcity of potable water.

Existing hydrogeological set up indicates the limited ground water development prospects in the linear rolling valleys. Though the valleys are underlain by shale, siltstone and sandstone, the intercalated sandstone layers may be productive for construction of shallow ground water structures. Thus, ring well with 2-3 mm diameter and 10-15 m depth below ground level may be constructed in the suitable locations. These wells may be constructed with half baked bricks keeping weep holes in the sandstone layers. In the major part of the district, tapping perennial springs and rainwater harvesting would remain the main source for water supply to the local populace. The springs should be properly developed, conserved and protected wherever they are used for domestic purposes. Some of the spring waters in lower altitudes may be impounded in some structures and pumped again for water supply.

Table 3.2 Brief ground water level data in Mizoram and ground water analysis

Sl. No.	District	Lowest range (in meter)	Highest range (in meter)	Common range (in meter)
1	Mamit	2.10	11.94	7.43
		Lowest range	**Highest range**	**Common range**
1	pH	4.90	8.40	6.80
2	Electrical Conductivity	174µs/cm	1756µs/cm	200-300µ/cm
3	Alkalinity	0/mg	860 mg/l	100-150 mg/l
4	Turbidity	05.NTU	91.0 NTU	1.0 NTU
5	Chloride	0 mg/l	300.0 mg/l	30-50 mg/l
6	Hardness	Trace	500 mg/l	100-150 mg/l
7	Iron	0 mg/l	20 mg/l	0.3-0.5 mg/l

Table 3.2.1 Standard of water quality - IS-10500 (2012)

Sl. No.	Parameters	Unit	BIS (IS:10500)-2012		WHO Desirable Limits
			Desirable Limits	Max. Permissible Limits	
1	pH	-	6.5-8.5	6.5-8.5	6.5-9.2
2	Arsenic	Mg/L	0.01	0.05	0.01
3	Fluoride	Mg/L	1.0	1.5	1.5
4	E-Coli	Number	Absent	Absent	Absent
5	TDS	Mg/L	500	2000	1200
6	Nitrate	Mg/L	45	45	50
7	Iron	Mg/L	0.30	0.30	0.30
8	Calcium (as Ca)	Mg/L	75	200	No Specification
9	Magnesium (as Mg)	Mg/L	30	100	No Specification
10	Sulphate	Mg/L	200	400	500
11	Alkalinity	Mg/L	200	600	No Specification
12	Turbidity	NTU	1	5	10

Table 3.2.2 District-wise Ground Water Availability & Ground Water Extracted

Sl. No.	District	Area (in Ha.)	Household (in Nos.)	Population (in Nos.)	Ground Water Availability (BCM)	Ground Water Extracted (BCM)
1	Aizawl	3,57,631	82,524	4,00,309	0.00668	0.00176
2	Lunglei	4,53,800	33,058	1,61,428	0.00848	0.00224
3	Saiha	1,39,990	11,144	56,574	0.00262	0.00069
4	Champhai	3,18,583	25,520	1,25,745	0.00595	0.00157
5	Kolasib	1,38,251	17,270	83,955	0.00258	0.00068
6	Serchhip	1,42,160	12,622	64,937	0.00266	0.0007
7	Lawngtlai	2,55,710	22,984	1,17,894	0.00478	0.00126
8	**Mamit**	**3,02,575**	**17,731**	**86,364**	**0.00565**	**0.00149**
	MIZORAM	**21,08,700**	**2,22,853**	**10,97,206**	**0.0394**	**0.0104**

Source : PHED Department

3.2.3 Status of Ground Water Availability

Sl. No.	District	No	Block	Draft	Stage of Ground water development %	Categorization
1	Mamit	1	Zawlnuam	0.15mcm	3.94 %	Safe
		2	West Phaileng	0.14mcm	3.94 %	Safe
		3	Reiek	0.13mcm	3.94 %	Safe

Source : CGWB

3.3 Status of Command Area

Sl. No.	Name of Village	Information of Command Area			Information on other services Command			Total Area	
		Total Area	Developed Area	Undeveloped Area	Total Area	Developed Area	Undeveloped Area	Developed Command	Undeveloped Command
Mamit IRRIGATION DIVISION (AIBP & RIDF)									
1	Zawlnuam	70	70					70	
2	Sihthiang	100	100					100	
3	Saikhawthlir	80	80					80	
4	Lushaicheera	70	70					70	
5	Borai	12	12					12	
6	Sihthiang	25	25					25	
7	Zawlnuam	30	30					30	
8	Kanhmun	45	45					45	
9	Chuhvel	54	54					54	
10	Zawlnuam	30	30					30	
11	Bungthuam	30	30					30	
12	Zawlnuam	12	12					12	
13	Saikhawthlir	50	50					50	
14	Zawlnuam	10	10					10	
15	Zawlnuam	15	15					15	
16	Saikhawthlir	26	26					26	
17	Chuhvel	58	58					58	
18	Sihthiang	55	55					55	
19	Zawlnuam	46	46					46	
20	Saikhawthlir	33	33					33	
21	Zawlnuam	40	40					40	
22	Suarhliap	40	40					40	
23	Rengdil	65	65					65	
24	Dapchhuah	**996**	**996**					**996**	

3.4 Existing Type of Irrigation

Source of Irrigation	Surface Irrigation					Ground Water						Other sources including Traditional WHS
	Canal based		Tank/Pond/Reservoirs			Tube well		Open well		Bore Well		
	Govt Canal	Community/Pvt canal	Community /ponds	Individual	Dams	Govt	Pvt	Govt	Pvt	Govt	Pvt	
				650		250		4				

Chapter - IV
Water Requirement/Demand

Domestic Water Demand

According to Froukh, the term 'domestic water demand' is the amount of water required for domestic uses. Water demand forecasting is essential to water utilities, both of day-to-day operations and for long-term planning. A number of factors like climate, culture, food habits, work and working conditions, level and type of development, and physiology determine the requirement of water. As per the Bureau of Indian Standards, a minimum water supply of 200 litres per capita per day (lpcd) should be provided for domestic consumption in cities with full flushing systems. It also mentions that the amount of water supply may be reduced to 135 lpcd for the LIG and the economically weaker sections (EWS) of the society and in small towns. All the calculation in this DIP is done by assuming the water demand 120 lpcd.

a) Water Supply System in Mizoram

i) Rural Water Supply

Prior to 1972 the Government of India did not take much initiative in assisting drinking water supply programme in the rural areas and the same had been taken up from the State's own resources in a small scale. With the launch of Accelerated Rural water Supply Programme (ARWSP) in the year 1972, The Government of India started playing effective role in the rural drinking water supply sector with the major thrust of ensuring provision of adequate drinking water supply to the rural community through the Public Health Engineering System. Since then, implementation of rural drinking water supply picked up with the help of funding from the Government of India.

In the year 1991 the programme was renamed as Rajiv Gandhi National Drinking Water mission with additional stress on water quality, appropriate technology intervention, human resources development support and other related activities. In the year 1999, the Government of India had further introduction Sector reform Project that stressed upon involvement of community in planning, implementation and management of drinking water related schemes.

The Rural Water Supply (RWS) sector, in the present phase, emphasizes on ensuring sustainability of water availability in terms of portability, adequacy, convenience, affordability and equity while also adopting decentralized approach involving PRIs and community organizations. Adequate flexibility is afforded to the State/UTs to incorporate the principles of decentralized, demand driven, area specified strategy taking into account all aspects of the sustainability of the sources, system, finance and management of the drinking water supply infrastructure. Adoption of

appropriate technology, revival of tradition systems, conjunctive use of surface and ground water, conservation, rain water harvesting and recharging of drinking water sources have been emphasized in the new approach. In the RWS sector sustainability of drinking water sources and system are a major issue. As a consequence, ensuring availability of drinking water both in terms of adequacy and quality, on sustainable basis, is the major challenge.

Water quality is impacted due to rising levels of manmade chemical pollutants such as pesticides and insecticides. The biological contamination of large number of drinking water sources is serious problem, primarily due to prevalent open defecation and insanitary conditions around the drinking water sources especially in rural villages. With the basic sanitation programme being implemented in the villages, the prevalence of water borne diseases such as diarrhea, cholera, etc. is being seen to have decreased but the incidence is still relevantly high in some parts of the State.

The National Goal in rural water supply is "To provide every rural person with adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. The basic requirement should meet minimum water quality standards and be readily and conveniently accessible at all times and in all solutions".

ii) Urban Water Supply:

Mizoram has 1 city and 22 Census Towns. With the continuous effort of the Department in providing water supply in urban towns much achievement have already been made. So far, fully covered status (70 Lpcd) have been achieved in 10 Towns. Out of the remaining 13 town, efforts has been made to achieve Norms for water supply Level which is 70 lpcd (135 lpcd where Sewerage system is contemplated) by preparing DPR as well as by constructing/augmenting existing Water Supply Schemes by pulling funds under various programme from Government of India. It is expected that all balance uncovered Towns will be fully covered under Government of India Programme like JNNURM, UIDSSMT, NLCPR, NEC and 10% Lump Sum Grant. As on 1st April 2015, about 74,456 nos. of house water connections was provided in these city and urban towns. The programme is still underway to improve the level of water supply in quantity and quality. It is expected that all the towns would be fully covered by the end of 2020 AD.

The break-up of minimum water requirement for human consumption Set by the Government of Mizoram are as under:

Quantity (Lpcd)

Sl. No.	Purpose	Urban
1	Bathing	30
2	Flushing of W/C	15
3	Ablution	20
4	Washing of House & Utensils	25
5	Cooking	20
6	Drinking	10
Total		**120**

4.1 Domestic Water Demand

Domestic Water Demand			Department of Water Resource	
Block	**Population 2015**	**Gross Water Requirement (BCM)**	**Population 2020**	**Gross Water Requirement (BCM)**
Zawlnuam	53839	0.0046095	63144	0.007577
West Phaileng	24223	0.0020739	28410	0.003409
Reiek	20050	0.0017166	23515	0.002822
Total	**98112**	**0.0084001**	**115070**	**0.013808**

Source : Economic Survey 2014

4.2 Crop Water Requirement

It is essential to know the water requirement of a crop which is the total quantity of water required from its sowing time up to harvest. Naturally different crops may have different water requirements at different places of the same country, depending upon the climate, type of soil, method of cultivation, effective rain etc. The total water required for crop growth is not uniformly distributed over its entire life span which is also called crop period. Actually, the watering stops same time before harvest and the time duration from the first irrigation during sowing up to the last before harvest is called base period, they do not differ from practical purposes.

The total depth of water required to raise a crop over a unit area of land is usually called delta. Some typical values of delta for common crops in some regions of India are as follows:

Rice

- 1,000mm to 1,500mm for heavy soils or high water table
- 1,500mm to 2,000mm for medium soils
- 2,000 to 2,500 for light soils or deep water table
- 1,600mm to upland conditions

Oil Palm

- 300mm per day in for plant below 3 years old
- 500mm per day for plant above 3 years old

Maize

- 100mm during rainy season
- 500mm during winter season
- 900mm during summer season

Horticulture Crops : 400 – 500mm

Sugarcane

- 1,400mm to 1,500mm in Bihar
- 1,600mm to 1,700mm in Andhra Pradesh
- 1,700mm to 1,800mm in Punjab
- 2,200mm to 2,400mm in Madhya Pradesh
- 2,800mm to 3,000mm in Maharashtra

This information is based on Handbook of Agriculture (fifth edition, 2000) published by the Indian Council of Agricultural Research.

Table 4.2 Crop Water Requirement

Block	Crop	Area sown (Ha)	Irrigated Area (Ha)	Crop Water Demand	Water Potential Required (BCM))	Existing Water Potential	Water Potential to be created (BCM)	Remark
Zawlnuam	Various Crop	8965	439	Various data	0.14344	0.022548	0.1208920	This includes area under Oil Palm, WRC, Oilseeds, pulses, Horticulture crops etc. considering dry period from Nov to March
West Phaileng		6275	319		0.1004	0.010930	0.0894700	
Reiek		2690	39		0.04304	0.004601	0.0384390	
Total		**17930**	**798**		**0.28688**	**0.022548**	**0.2643320**	

4.3 Livestock Water Demand

Global trend in animal production indicates a rapid and massive increase in the consumption of livestock products. It is predicted that meat and milk consumption will grow at 2.8 and 3.3% per annum respectively, in developing countries like India where the whole system of rural economy has revolved around livestock production. Providing enough quality water is essential for good livestock husbandry. Water makes up 80% of the blood, regulates body temperature and is vital for organ functions such as digestion, waste removal and the absorption of nutrients. Understanding daily livestock watering needs is key when designing a livestock watering system.

The daily water requirement of livestock varies significantly among animal species. The animal's size and growth stage will have a strong influence on daily water intake. Consumption rate can be affected by environmental and management factors. Air temperature, relative humidity and the level of animal exertion or production level are examples of these factors. The quality of the water, which includes temperature, salinity and impurities affecting taste and odour, will also have an effect. The water content of the animal's diet will influence its drinking habits. Feed with relatively high moisture content decreases the quantity of drinking water required.

Given that drinking water needs are species, farm and management specific, many producers today are opting to install water-metering equipment to obtain accurate measurements of water use If medication is ever provided through the livestock's watering system, the meter can be used to ensure proper dose rates.

Table 4.3 gives block water demand for livestock for current year and for 2020. Number of livestock as per 2011 census is 126134. Estimation is done based on livestock water demand which is different for types of animals. There is no additional water requirement as stored water is more than water requirement. 25% of water is reserved for this purpose in all current and future structures.

Table 4.3 Livestock Water Demand

Block	Total number of livestock	Present water demand	Water Demand in 2020	Existing water potential	Water potential to be created
Zawlnuam	45104	0.001923009	0.002499912	0.00033775	0.002162162
West Phaileng	21542	0.000918443	0.001193976	0.000161312	0.001032664
Reiek	14544	0.000620083	0.000806108	0.000108909	0.000697199
		0.003461535	0.004499996	0.000607972	0.003892024

Table 4.4 Industrial Water Demand

Block	Name of Industry	Water Demand (BCM)	Water Demand 2020 (BCM)	Existing Water Potential (BCM)	Water potential to be created (BCM)
Zawlnuam					
West Phaileng					
Reiek	**Ispat**	**0.00000126**	**0.00000329**	**0.000000192**	0.000003098
Total	**Ispat**	**0.00000126**	**0.00000329**	**0.000000192**	0.000003098

Table 4.5 Total Water Demand at Various Sector

Sl. No.	Block	Components					Total BCM
		Domestic (BCM))	Crop (BCM))	Livestock (BCM))	Industry (BCM))	Power Generation	
1	Zawlnuam	0.007577	0.14344	0.0002370	0.00000	0.00000	0.151254
2	West Phaileng	0.003409	0.10040	0.0000869	0.00000	0.00000	0.103896
3	Reiek	0.002822	0.04304	0.0000711	0.000003098	0.00000	0.045936
Total		**0.013808**	**0.28688**	**0.000395**	**0.000003098**	**0.00000**	**0.301086**

4.6 Water Budget

Name of Block	Existing Water Availability(BCM)		Total	Water Demand (BCM)		Water Gap (BCM)	
	Surface water	Ground water		Present	Project 2020	Present	Project 2020
Zawlnuam	0.008400	0.000595	0.008995	0.151254	0.179300	0.1422590	0.170305
West Phaileng	0.005300	0.000596	0.005896	0.103896	0.125500	0.0980000	0.119604
Reiek	0.001248	0.000298	0.001546	0.045933	0.053800	0.0443870	0.052254
Total	**0.014948**	**0.001489**	**0.016437**	**0.301083**	**0.358600**	**0.2846460**	**0.342163**

Chapter - V
Strategic Action Plan

Net Area Sown in Mamit District is 25,251 Ha. Out of which area is either partially or totally rainfed. Terrains, topography, forest area clearances, availability of skilled manpower, approachability of sites, presence of left wing extremism, land slope, availability quality power, land acquisition issues, site availability are some of the various factors which are determining the irrigation strategy for specific areas.

Major crop in the district is Paddy crop, which consumes 1200mm of water. If in place of paddy, crops like maize, pulses and oilseeds are sown for the same available water, cropped are can be increased to four times. Changing crop pattern will also improve soil fertility and reduces crop vulnerability to droughts and diseases.

In this regard, it may be mentioned that the water sector has very strong linkages with all other developmental activities. In view of fast changing development scenario, it is emphasized that the key priorities and identified strategies cannot be considered as static and firm. These need to be reviewed and improved upon from time to time. In this regard, a comprehensive “Strategic Plan for District Irrigation” has been prepared through geospatial approach.

5.1 Methodology

Diverse research methodologies using RS and GIS have been applied by different authors to identify potential rainwater harvestings in remote and data scarce areas; in most of these methods, thematic maps are derived from remote sensing data and integrated in GIS to evaluate suitable sites for rainwater harvesting. Remote sensing is of immense use for natural resources mapping and generating necessary spatial database required as an input for GIS analysis. GIS is a tool for collecting, storing and analyzing spatial and non-spatial data, and developing a model based on local factors can be used to evaluate appropriate natural resources development and management action plans. Both these techniques can complement each other to be used as an effective tool for selecting suitable sites for water harvesting structures.

In assessment of proposed rainwater harvesting structures potential using GIS and RS, outlines six key factors that require to be integrated into a GIS framework in order to successfully develop a suitable model for RWH. This includes rainfall, hydrology (rainfall-runoff relationships), slope, land cover, soils (texture, structure, depth) and socio-economics of the area under consideration.

The following criteria have been followed for making decision on selecting suitable site for various water harvesting structure as per National Mission for Sustainable Agriculture (NMSA) guidelines.

Check dams

The slope should be less than 25 percent.
The land use may be barren, shrub land and riverbed.
The infiltration rate of the soil should be less.
The type of soil should be sandy clay loam.

Percolation tanks and nala bunds

The slope should be less than 10 percent.
The infiltration rate of the soil should be moderately high.
The land use/cover may be barren or scrub land.
The type of soil should be silt loan.

The suitability of WHS sites can be confirmed as the site is located on second and third order drainage and satisfies the conditions of land use, soil type and slope as per NMSA guidelines. Water harvesting structures are extremely important to conserved precious natural resources like, soil and water, which is depleting day by day at alarming rate. The following table provide strategic action plan for irrigation for each block as well as for whole district and estimated costs and period of implementation.

Table 5.1 Strategic Action Plan for Irrigation in Zawlnuam Block, Serchhip District under PMKSY: Per Drops More Crop (Other Interventions)

(Rupees in lakh)

Sl. No.	Name of Block	Concerned Ministry	Component	Activity	Total Number/Capacity	Command Area (Ha)	Period of Implementation	Estimated Cost	Remarks
1	Zawlnuam	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Secondary Storage Structures	60	150	5 years	120.00	Construction of Secondary Storage Structures with Poly lining, protective fence, Connectivity from perennial source, inlet and outlet (Construction cost - Rs. 350 per cum)
2	Zawlnuam	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Farm Ponds	75	75	5 years	67.50	50% of cost (Construction cost - Rs. 125 for plain/Rs. 150 per cum for hilly areas) limited to Rs. 75000 for plain areas and Rs. 90000 for hilly areas including lining.
3	Zawlnuam	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Tank Renovation & Restoration	80	80	5 years	12.00	Restoration/Renovation of small tank. 50% of the cost of renovation limited to Rs. 15,000/- per unit
4	Zawlnuam	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Pipe/pre-cast distribution system	100	100	5 years	10.00	Pipe/pre-cast distribution system. 50% of the cost of system limited to Rs. 10,000/- per ha.
5	Zawlnuam	Ministry of Agriculture & Farmers Welfare	Per drop more crop	Micro Irrigation at Open field Drip Irrigation Systems (Wide spaced crop) 4m to <8m	35	35	5 years	14.83	Spacing : 4m to <8m @ Rs 42,375/Ha
6	Zawlnuam	Ministry of Agriculture & Farmers Welfare	Per drop more crop	Micro Sprinkler Irrigation Systems (Closed spaced crop)	35	35	5 years	25.76	Small & Marginal Farmers & Rs. Rs 73,625/Ha
7	Zawlnuam	Ministry of Land Resources	On Farm Development	In Situ Moisture Conservation	45	45	5 years	1.80	In-situ moisture conservation: land levelling, field bunding, mulching, broad bed and furrow system, 50% of cost limited to Rs.4,000/- per ha.

Sl. No.	Name of Block	Concerned Ministry	Component	Activity	Total Number	Command Area (Ha)	Period of Implementation	Estimated Cost	Remarks
8	Zawlnuam	Miniistry of Land Resources	Resource Conservation	Bench Terracing / Zing Terracing	56	56	5 Years	112.00	50% of cost limited to Rs. 20,000/- per ha.
9	Zawlnuam		Gully Control Structure	Upper reach gully control bund(Earthen with vegetative support/loose boulder/gabion)	35	35	5 Years	1.05	50% of the cost subject to a limit of Rs. 3,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
10	Zawlnuam		Gully Control Structure	Middle reach gully control bund (Earthen with vegetative support/loose boulder/check bund/gabions)	47	47	5 Years	5.64	50% of cost subject to a limit of Rs. 12,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
11	Zawlnuam		Gully Control Structure	Lower reach gully control structure (Earthen with vegetative support/loose boulder/ check bund/gabions)	52	52	5 Years	104.00	50% of the cost subject to a limit of Rs. 20,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
Total								**474.58**	

Table 5.2 Strategic Action Plan for Irrigation in West Phaileng Block, Mamit District under PMKSY: Per Drops More Crop (Other Interventions)

Sl. No.	Name of Block	Concerned Ministry	Component	Activity	Total Number/Capacity	Command Area (Ha)	Period of Implementation	Estimated Cost	Remarks
1	West Phaileng	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Secondary Storage Structures	72	180	5 years	144.00	Construction of Secondary Storage Structures with Poly lining, protective fence, Connectivity from perennial source, inlet and outlet (Construction cost - Rs. 350 per cum)
2	West Phaileng	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Farm Ponds	90	90	5 years	81.00	50% of cost (Construction cost - Rs. 125 for plain/Rs. 150 per cum for hilly areas) limited to Rs. 75000 for plain areas and Rs. 90000 for hilly areas including lining.
3	West Phaileng	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Tank Renovation & Restoration	56	56	5 years	8.40	Restoration/Renovation of small tank. 50% of the cost of renovation limited to Rs. 15,000/- per unit
4	West Phaileng	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Pipe/pre-cast distribution system	90	90	5 years	9.00	Pipe/pre-cast distribution system. 50% of the cost of system limited to Rs. 10,000/- per ha.
5	West Phaileng	Ministry of Agriculture & Farmers Welfare	Per drop more crop	Micro Irrigation at Open field Drip Irrigation Systems (Wide spaced crop) 4m to <8m	45	45	5 years	19.07	Spacing : 4m to <8m @ Rs 42,375/Ha
6	West Phaileng	Ministry of Agriculture & Farmers Welfare	Per drop more crop	Micro Sprinkler Irrigation Systems (Closed spaced crop)	45	45	5 years	33.13	Small & Marginal Farmers & Rs. Rs 73,625/Ha
7	West Phaileng	Ministry of Land Resources	On Farm Development	In Situ Moisture Conservation	250	250	5 years	10.00	In-situ moisture conservation: land levelling, field bunding, mulching, broad bed and furrow system, 50% of cost limited to Rs.4,000/- per ha.

Sl. No.	Name of Block	Concerned Ministry	Component	Activity	Total Number	Command Area (Ha)	Period of Implementation	Estimated Cost	Remarks
8	West Phaileng	Ministry of Land Resources	Resource Conservation	Bench Terracing / Zing Terracing	75	75	5 Years	15.00	50% of cost limited to Rs. 20,000/- per ha.
9	West Phaileng		Gully Control Structure	Upper reach gully control bund(Earthen with vegetative support/loose boulder/gabion)	25	25	5 Years	0.75	50% of the cost subject to a limit of Rs. 3,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
10	West Phaileng		Gully Control Structure	Middle reach gully control bund (Earthen with vegetative support/loose boulder/check bund/gabions)	55	55	5 Years	6.60	50% of cost subject to a limit of Rs. 12,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
11	West Phaileng		Gully Control Structure	Lower reach gully control structure (Earthen with vegetative support/loose boulder/ check bund/gabions)	60	60	5 Years	12.00	50% of the cost subject to a limit of Rs. 20,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
Total								**338.95**	

Table 5.3 Strategic Action Plan for Irrigation in Reiek Block, Mamit District under PMKSY: Per Drops More Crop (Other Interventions)

Sl. No.	Name of Block	Concerned Ministry	Component	Activity	Total Number/Capacity	Command Area (Ha)	Period of Implementation	Estimated Cost	Remarks
1	Reiek	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Secondary Storage Structures	60	150	5 years	120.00	Construction of Secondary Storage Structures with Poly lining, protective fence, Connectivity from perennial source, inlet and outlet (Construction cost - Rs. 350 per cum)
2	Reiek	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Farm Ponds	72	72	5 years	64.80	50% of cost (Construction cost - Rs. 125 for plain/Rs. 150 per cum for hilly areas) limited to Rs. 75000 for plain areas and Rs. 90000 for hilly areas including lining.
3	Reiek	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Tank Renovation & Restoration	75	75	5 years	11.25	Restoration/Renovation of small tank. 50% of the cost of renovation limited to Rs. 15,000/- per unit
4	Reiek	Ministry of Agriculture & Farmers Welfare	Per drop more crop (other Intervention)	Pipe/pre-cast distribution system	75	75	5 years	7.50	Pipe/pre-cast distribution system. 50% of the cost of system limited to Rs. 10,000/- per ha.
5	Reiek	Ministry of Agriculture & Farmers Welfare	Per drop more crop	Micro Irrigation at Open field Drip Irrigation Systems (Wide spaced crop) 4m to <8m	65	65	5 years	27.54	Spacing : 4m to <8m @ Rs 42,375/Ha
6	Reiek	Ministry of Agriculture & Farmers Welfare	Per drop more crop	Micro Sprinkler Irrigation Systems (Closed spaced crop)	65	65	5 years	47.85	Small & Marginal Farmers & Rs. Rs 73,625/Ha
7	Reiek	Ministry of Land Resources	On Farm Development	In Situ Moisture Conservation	80	80	5 years	3.20	In-situ moisture conservation: land levelling, field bunding, mulching, broad bed and furrow system, 50% of cost limited to Rs.4,000/- per ha.

Sl. No.	Name of Block	Concerned Ministry	Component	Activity	Total Number	Command Area (Ha)	Period of Implementation	Estimated Cost	Remarks
8	Reiek	Ministry of Land Resources	Resource Conservation	Bench Terracing / Zing Terracing	75	75	5 Years	15.00	50% of cost limited to Rs. 20,000/- per ha.
9	Reiek		Gully Control Structure	Upper reach gully control bund(Earthen with vegetative support/loose boulder/gabion)	30	30	5 Years	0.90	50% of the cost subject to a limit of Rs. 3,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
10	Reiek		Gully Control Structure	Middle reach gully control bund (Earthen with vegetative support/loose boulder/check bund/gabions)	45	45	5 Years	5.40	50% of cost subject to a limit of Rs. 12,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
11	Reiek		Gully Control Structure	Lower reach gully control structure (Earthen with vegetative support/loose boulder/ check bund/gabions)	69	69	5 Years	13.80	50% of the cost subject to a limit of Rs. 20,000/- per structure in case of individual and 100% in case of common land proposed in project mode with other activities.
Total								**317.24**	

Table 5.4 Strategic Action for Irrigation in West Phaileng Block Mamit District under PMKSY (Watershed Development Component)

Sl. No.	Name of the Block	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha.)	Period of Implementation (5/ 7 yrs)	Estimate Cost (Rs. in lakh)
1	West Phaileng	Ministry of Rural Development (MoRD)/ Department of Land Resources (DoLR)	Plantation including Horticulture, Afforestation etc.	-	871.76	5	130.76
			Checkdams	35	69.74	5	52.31
			Terrace	145	72.65	5	43.59
			Contour & Trench	116	58.12	5	34.87
			Bunding	87	43.59	5	26.15
			Other Soil & Water Conservation	58	29.06	5	17.44
			Water Harvesting Structure	44	108.97	5	39.23
			Farm pond	54	81.73	5	32.69
			Percolation Tank	58	116.24	5	26.15
			Pond/ Fishery	44	87.18	5	19.61
			Other WHS	44	43.59	5	13.08
			All Livelihood Activities	70	-	5	69.74
			All Production & Micro-enterprise Activities	252	-	5	75.55
Total							**581.17**

Table 5.5 Strategic Action for Irrigation in Zawlnuam Block Mamit District under PMKSY (Watershed Development Component)

Sl. No.	Name of the Block	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha.)	Period of Implementation (5/ 7 yrs)	Estimate Cost (Rs. in lakh)
2	Zawlnuam	Ministry of Rural Development (MoRD)/ Department of Land Resources (DoLR)	Plantation including Horticulture, Afforestation etc.	-	1915.20	5	287.28
			Checkdams	77	153.22	5	114.91
			Terrace	319	159.60	5	95.76
			Contour & Trench	255	127.68	5	76.61
			Bunding	192	95.76	5	57.46
			Other Soil & Water Conservation	128	63.84	5	38.30
			Water Harvesting Structure	96	239.40	5	86.18
			Farm pond	120	179.55	5	71.82
			Percolation Tank	128	255.36	5	57.46
			Pond/ Fishery	96	191.52	5	43.09
			Other WHS	96	95.76	5	28.73
			All Livelihood Activities	153	-	5	153.22
			All Production & Micro-enterprise Activities	553	-	5	165.98
Total							**1276.80**

Table 5.6 Strategic Action for Irrigation in Reiek Block Mamit District under PMKSY (Watershed Development Component)

Sl. No.	Name of the Block	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha.)	Period of Implementation (5/ 7 yrs)	Estimate Cost (Rs. in lakh)
3	Reiek	Ministry of Rural Development (MoRD)/ Department of Land Resources (DoLR)	Plantation including Horticulture, Afforestation etc.	-	463.59	5	69.54
			Checkdams	19	37.09	5	27.82
			Terrace	77	38.63	5	23.18
			Contour & Trench	62	30.91	5	18.54
			Bunding	46	23.18	5	13.91
			Other Soil & Water Conservation	31	15.45	5	9.27
			Water Harvesting Structure	23	57.95	5	20.86
			Farm pond	29	43.46	5	17.38
			Percolation Tank	31	61.81	5	13.91
			Pond/ Fishery	23	46.36	5	10.43
			Other WHS	23	23.18	5	6.95
			All Livelihood Activities	37	-	5	37.09
			All Production & Micro-enterprise Activities	134	-	5	40.18
Total							**309.06**

Table 5.7 Stretegic Plan of Micro Irrigation under PMKSY 'Per Drop More Crop'

(Reiek Block)

Technology	Category of farmers & Spacing	Average System Cost(per Ha) as per scheme guidelines (Rs. in lakhs)	Estimated No. of beneficiaries	Targeted Area(Ha)	Total cost of installation (Rs. In lakh)	Sharing of amount among Central Govt. State Govt. and Beneficiary			
						Share of Central Govt/ Assistance Sought from DAC &FW (Rs. In lakh) 54% of COI	Mandatory Tate Govt. Share (Rs.in lakhs) (6% of COI)	Share of Beneficiary contribution (Rs. In lakh) (40% of COI)	Additional State Govt. Share, if any (Additional Subsidy by state Govt to beneficiaries) (Rs. In lakh)
		Non-DPAP/DDP		Non-DPAP/DDP	Non-DPAP/DDP	Non- DPAP/DDP	Non-DPAP/DDP	Non-DPAP/DDP	
A. Horticultural Crop: **B. 1. Micro Irrigation at Open field**									
1) Drip Irrigation System (Wide spaced crop)	**S &M**								
a) M. Orange	4m to < 8m	0.42375	72	216	91.53	49.4262	5.4918	36.612	
b) Kiwi	4m to < 8m	0.42375	65	130	55.0875	29.74725	3.30525	22.035	
c) Dragon fruit	2m-4m	0.73	190	190	138.7	74.898	8.322	55.48	
d) Grape	2m-4m	0.73	50	100	73	39.42	4.38	29.2	
2) Drip Irrigation System (Closed spaced)	**S &M**				0	0	0	0	
a) Flowers	< 1.20m	1.25	95	95	118.75	64.125	7.125	47.5	
b) Vegetables	< 1.20m	1.25	120	120	150	81	9	60	
c) Strawberry	< 1.20m	1.25	150	150	187.5	101.25	11.25	75	
2. Micro Irrigation under Protected Cultivation:					0	0	0	0	
1) Drip Irrigation System (Closed spaced)	**S &M**				0	0	0	0	
a) Flowers	< 1.20m	1.25	140	140	175	94.5	10.5	70	
b) Vegetables	1.20m	1.25	112	112	140	75.6	8.4	56	
2) Micro Sprinkler Irrigation Systems	**S &M**				0	0	0	0	
a) Vegetables	< 1.20m	0.73625	100	100	73.625	39.7575	4.4175	29.45	
b) Flowers	< 1.20m	0.73625	110	110	80.9875	43.73325	4.85925	32.395	
B. Agricultural Crop:					0	0	0	0	
1. Micro Irrigation at open field:					0	0	0	0	
a) Drip Irrigation Systems (Wide spaced crop)	**S &M**				0	0	0	0	
b) Oil Palm	4m to 8m	0.42375	554	1108	469.515	253.5381	28.1709	187.806	
C. Training Programmes (27 Nos. of trainings)		0.50 per training			13.5	13.5			
D. Administrative cost/contingency @ 5%					51.5047	51.5047			
Grand Total			**1758**	**2571**	**1818.6997**	**1012**	**105.2217**	**701.478**	

Table 5.8 Stretegic Plan of Micro Irrigation under PMKSY 'Per Drop More Crop'

(West Phaileng Block)

Technology	Category of farmers & Spacing	Average System Cost(per Ha) as per scheme guidelines (Rs. In lakhs)	Estimated No. of beneficiaries	Targeted Area(Ha)	Total cost of installation (Rs. In lakh)	Sharing of amount among Central Govt. State Govt. and Beneficiary			
						Share of Central Govt/ Assistance Sought from DAC &FW (Rs. In lakh) 54% of COI	Mandatory State Govt. Share (Rs. In lakhs) (6% of COI)	Share of Beneficiary contribution (Rs. in lakh) (40% of COI)	Additional State Govt. Share, if any (Additional Subsidy by state Govt to beneficiaries) (Rs. In lakh)
		Non-DPAP/DDP		Non-DPAP/DDP	Non-DPAP/DDP	Non-DPAP/DDP	Non-DPAP/DDP	Non-DPAP/DDP	
A. Horticultural Crop: **1. Micro Irrigation at Open field:**									
1) Drip Irrigation System (Wide spaced crop)	**S &M**								
a) M. Orange	4m to < 8m	0.42375	121	363	153.82125	83.063475	9.229275	61.5285	
b) Kiwi	4m to < 8m	0.42375	100	200	84.75	45.765	5.085	33.9	
c) Dragon fruit	2m-4m	0.73	200	200	146	78.84	8.76	58.4	
d) Grape	2m-4m	0.73	180	180	131.4	70.956	7.884	52.56	
2) Drip Irrigation System (Closed spaced)	**S &M**								
a) Flowers	< 1.20m	1.25	140	140	175	94.5	10.5	70	
b) Vegetables	< 1.20m	1.25	130	130	162.5	87.75	9.75	65	
c) Strawberry	< 1.20m	1.25	160	160	200	108	12	80	
2. Micro Irrigation under Protected Cultivation:									
1) Drip Irrigation System (Closed spaced)	**S &M**								
a) Flowers	< 1.20m	1.25	150	150	187.5	101.25	11.25	75	
b) Vegetables	1.20m	1.25	134	134	167.5	90.45	10.05	67	
2) Micro Sprinkler Irrigation Systems	**S &M**								
a) Vegetables	< 1.20m	0.73625	140	140	103.075	55.6605	6.1845	41.23	
b) Flowers	< 1.20m	0.73625	140	140	103.075	55.6605	6.1845	41.23	
B. Agricultural Crop:									
1. Micro Irrigation at open field:									
a) Drip Irrigation Systems (Wide spaced crop)	**S &M**								
b) Oil Palm	4m to 8m	0.42375	691	1382	585.6225	316.23615	35.13735	234.249	
C. Training Programmes (27 Nos. of trainings)		0.50 per training			13.5	13.5			
D. Administrative cost/contingency @ 5%					63.368375	63.368375			
Grand Total			**2286**	**3319**	**2277.11213**	**1265**	**132.014625**	**880.0975**	

Table 5.9 Stretegic Plan of Micro Irrigation under PMKSY 'Per Drop More Crop'

(Zawlnuam Block)

Technology	Category of farmers & Spacing	Average System Cost(per Ha) as per scheme guidelines (Rs. In lakhs)	Estimated No. of beneficiaries	Targeted Area (Ha)	Total cost of installation (Rs. In lakh)	Sharing of amount among Central Govt. State Govt. and Beneficiary			
						Share of Central Govt/ Assistance Sought from DAC &FW (Rs. In lakh) 54% of COI	Mandatory State Govt. Share (Rs. In lakhs) (6% of COI)	Share of Beneficiary contribution (Rs. In lakh) (40% of COI)	Additional State Govt. Share, if any (Additional Subsidy by state Govt to beneficiaries) (Rs. In lakh)
		Non-DPAP/DDP		Non-DPAP/DDP	Non-DPAP/DDP	Non-DPAP/DDP	Non-DPAP/DDP	Non-DPAP/DDP	
A. Horticultural Crop: **1. Micro Irrigation at Open field:**									
1) Drip Irrigation System (Wide spaced crop)	**S &M**								
a) M. Orange	4m to < 8m	0.42375	154	462	195.7725	105.71715	11.74635	78.309	
b) Kiwi	4m to < 8m	0.42375	150	300	127.125	68.6475	7.6275	50.85	
c) Dragon fruit	2m-4m	0.73	250	250	182.5	98.55	10.95	73	
d) Grape	2m-4m	0.73	230	230	167.9	90.666	10.074	67.16	
2) Drip Irrigation System (Closed spaced)	**S &M**								
a) Flowers	< 1.20m	1.25	170	170	212.5	114.75	12.75	85	
b) Vegetables	< 1.20m	1.25	180	180	225	121.5	13.5	90	
c) Strawberry	< 1.20m	1.25	200	200	250	135	15	100	
2. Micro Irrigation under Protected Cultivation:									
1) Drip Irrigation System (Closed spaced)	**S &M**								
a) Flowers	< 1.20m	1.25	170	170	212.5	114.75	12.75	85	
b) Vegetables	1.20m	1.25	170	170	212.5	114.75	12.75	85	
2) Micro Sprinkler Irrigation Systems	**S &M**								
a) Vegetables	< 1.20m	0.73625	162	162	119.2725	64.40715	7.15635	47.709	
b) Flowers	< 1.20m	0.73625	160	160	117.8	63.612	7.068	47.12	
B. Agricultural Crop:									
1. Micro Irrigation at open field:									
a) Drip Irrigation Systems (Wide spaced crop)	**S &M**								
b) Oil Palm	4m to 8m	0.42375	691	1732	733.935	396.3249	44.0361	293.574	
C. Training Programmes (27 Nos. of trainings)		0.50 per training			13.5	13.5			
D. Administrative cost/contingency @ 5%					78.8253	78.8253			
Grand Total			**2687**	**4186**	**2849.1303**	**1581**	**165.4083**	**1102.722**	

Table 5.10 Strategic Action Plan for Irrigation in District under PMKSY MGNREGA

Sl. No.	Name of the Blocks / Sub-District	Concerned Ministry / Department	Component	Activity	Total Number/ Capacity (cum)	Command Area / Irrigation Potential (Ha)	Period of Implementation (5/7 yrs)	Estimated Cost (Rs. In lakh)
1.	**Zawlnuam**	MoRD	MGNREGA	Irrigation	17	9	5	39.50
		Newly created WHS						
		DoLR- MoRD	MGNREGA	Farm Pond	74	6	5	22.20
				Check Dam	7	2	5	6.40
				Percolation Tank	2	.3	5	2.30
				Other ground water recharge structure	13	13	5	40.80
				Fishery pond / Cattle pond	13	14	5	87.90
		Renovated WHS						
		DoLR- MoRD	MGNREGA	Fishery pond / Cattle pond	1	.0001	5	0.60
		DoLR- MoRD	Convergence with MGNREGA	Water Conservation	9	8	5	21.80
				Land Development	14	9	5	43.00
2.	**West Phaileng**	MoRD	MGNREGA	Irrigation	59	8	5	8.70
		Newly created WHS						
		DoLR- MoRD	MGNREGA	Farm Pond	131	21	5	39.00
				Other ground water recharge structure	40	6	5	18.10
				Fishery pond / Cattle pond	124	17	5	70.00
		DoLR- MoRD	Convergence with MGNREGA	Land Development	183	9	5	21.90
3.	**Reiek**	**Newly created WHS**						
		DoLR- MoRD	MGNREGA	Farm Pond	89	9	5	26.70
			MGNREGA	Check Dam	2	.1	5	0.50
				Fishery pond / Cattle pond	18	11	5	20.75
		Renovated WHS						
		DoLR- MoRD	MGNREGA	Fishery pond / Cattle pond	20	4	5	10.50
		DoLR- MoRD	Convergence with MGNREGA	Land Development	582	18	5	57.40
Total								**538.05**

Table 5.11 Strategic Action Plan for Irrigation in District under PMKSY (Har khet ko pani) under Mamit District
SURFACE MINOR IRRIGATION SCHEMES

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Spillover Amount/ Projects
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	A. Zawlnuam R.D. Block										
1	Ramri Zau	Saikhawthlir	59.84	24	20.00	30.00	9.84			59.84	
2	Lohlapui Zau	Rengdil	49.80	20		15.00	20.00	14.80		49.80	
3	Zukvar Zau	Saikhawthlir	84.66	34		30.00	40.00	14.66		84.66	
4	Rawthlalui Zau	Chuhvel	87.15	35		30.00	40.00	17.15		87.15	
5	Rupe Zau	Chuhvel	82.17	33		30.00	40.00	12.17		82.17	
6	Pi Dari Lui	Darlak	124.50	50		40.00	50.00	34.50		124.50	
7	Lower Tuikhurlui Zau	Chuhvel	144.42	58		45.00	60.00	39.42		144.42	
8	Sihthianglui Zau	Sihthiang	249.00	100		50.00	80.00	80.00	39.00	249.00	
9	Serhuan Zau	Saikhawthlir	59.76	24			15.00	25.00	19.76	59.76	
10	Balilui Zau	Kanhmun	27.39	11			10.00	17.39		27.39	
11	Lalngenai Zau	Kanhmun	74.70	30			20.00	30.00	24.70	74.70	
12	Tuidum Zau	Kanhmun	62.25	25			15.00	25.00	22.25	62.25	
13	Huanpui Zau	Zawlpui	87.15	35			30.00	40.00	17.15	87.15	
14	Darlaklui Zau	Darlak	62.25	25			20.00	30.00	12.25	62.25	
15	Suarhliap Zau	Suarhliap	74.70	30				20.00	35.00	55.00	19.70
16	Damdiai	Suarhliap	74.70	30				20.00	35.00	55.00	19.70
17	Kawrthuklui Zau	Hriphaw	74.70	30					20.00	20.00	54.70
18	Sawravaului	Hriphaw	87.15	35					20.00	20.00	67.15
19	Tumpanglui	Tumpanglui	37.35	15					15.00	15.00	22.35
	Sub-Total : Zawlnuam RD Block		**1,603.64**	**644.00**		**270.00**	**449.84**	**420.09**	**260.11**	**1,420.04**	**183.60**
	Number of Project		**19**		**1**	**8**	**14**	**15**	**11**	**19**	**5**

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Spillover Amount/ Projects
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	B. West Phaileng R.D. Block										
1	Phaizau	Mamit	49.80	20			15.00	25.00	9.80	49.80	-
2	Sihlung	Mamit	67.23	27			15.00	30.00	22.23	67.23	-
3	Suangsau	Mamit	62.25	25			10.00	30.00	22.25	62.25	-
4	Bawngvate Lui	Mamit	74.70	30				20.00	40.00	60.00	14.70
5	Khawhnai	W.Phaileng	24.90	10				10.00	14.90	24.90	-
6	Tuivawm	W.Phaileng	107.07	43				30.00	50.00	80.00	27.07
7	Nalzawl	Nalzawl	124.50	50				30.00	60.00	90.00	34.50
8	Damparengpui Zau	Damparengpui	99.60	40				20.00	40.00	60.00	39.60
9	Tuirum	W.Phaileng	37.35	15				15.00	22.35	37.35	-
10	Herhsezawl	Kawnmawi	62.25	25				30.00	32.25	62.25	-
11	Lallen	Lallen	62.25	25				30.00	32.25	62.25	-
12	Saithah Zau	W.Phaileng	49.80	20					20.00	20.00	29.80
13	Hreichuk	Mamit	87.15	35					30.00	30.00	57.15
	Sub-Total : W.Phaileng RD Block		**908.85**	**365.00**		**-**	**40.00**	**270.00**	**396.03**	**706.03**	**202.82**
	Number of Project		**13**		**0**	**0**	**3**	**11**	**13**	**13**	**7**

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Spillover Amount/ Projects
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	C. Reiek R.D. Block										
1	Setlah Zau	Lengte	49.80	20			15.00	25.00	9.80	49.80	-
2	Lentupui/Hliappui	Nghalchawm	62.25	25				15.00	25.00	40.00	22.25
3	Hliappui	Lengte	129.48	52					25.00	25.00	104.48
4	Leihlawnsang Ph-II	Lengte	74.70	30					20.00	20.00	54.70
5	Lawngzawl Fangfar	Lengpui	99.60	40					30.00	30.00	69.60
6	Nghaltan	Lengte	99.60	40					30.00	30.00	69.60
7	Sanam	Khawrihnim	79.68	32					30.00	30.00	49.68
	Sub-Total : Reiek R.D. Block		**595.11**	**239.00**	**-**	**-**	**15.00**	**40.00**	**169.80**	**224.80**	**370.31**
	Number of Project		**7**		**0**	**0**	**1**	**2**	**7**	**7**	**6**
	Total : Mamit District (Surface Irrigation)		**3,107.60**	**1,248.00**	**-**	**270.00**	**504.84**	**730.09**	**825.94**	**2,350.87**	**756.73**
	No. of Projects		**39**	**0**	**1**	**8**	**18**	**28**	**31**	**39**	**18**

LIFT IRRIGATION SCHEMES

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Balance
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	A. Zawlnuam R.D. Block										
1	Ngawpui Zau	Zawlnuam	114.54	46		30.00	50.00	34.54		114.54	
	Total : Zawlnuam RD Block		**114.54**	**46**	**0.00**	**30.00**	**50.00**	**34.54**	**0.00**	**114.54**	**0.00**
	No of Project		**1**	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**0**
	B. West Phaileng R.D. Block		**NIL**								
	C. Reiek R.D. Block		**NIL**								
	Total : Lift Irrigation		**114.54**	**46.00**	**-**	**30.00**	**50.00**	**34.54**	**-**	**114.54**	**-**
	No. of Projects		**1**	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**0**

CAD

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Balance
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	A. Zawlnuam R.D. Block										
1	Ramri Zau	Saikhawthlir	22.88	25		10.00	12.88			22.88	
2	Lohlapui Zau	Rengdil	18.30	20		8.00	10.30			18.30	
3	Zukvar Zau	Saikhawthlir	31.11	34		15.00	16.11			31.11	
4	Rawthlalui Zau	Chuhvel	32.03	35		15.00	17.03			32.03	
5	Rupe Zau	Chuhvel	30.20	33		15.00	15.20			30.20	
6	Pi Dari Lui	Darlak	45.75	50		15.00	15.00	15.75		45.75	
7	Lower Tuikhurlui Zau	Chuhvel	53.07	58		15.00	20.00	18.07		53.07	
8	Sihthianglui Zau	Sihthiang	91.50	100		20.00	50.00	21.50		91.50	
9	Lawithahlui	Thinghlun	64.05	70		20.00	25.00	19.05		64.05	
10	Serhuan Zau	Saikhawthlir	21.96	24			9.00	12.96		21.96	
11	Balilui Zau	Kanhmun	10.07	11			5.00	5.07		10.07	
12	Lalngenai Zau	Kanhmun	27.45	30			10.00	17.45		27.45	
13	Tuidum Zau	Kanhmun	22.88	25			10.00	12.88		22.88	
14	Huanpui Zau	Zawlpui	32.03	35			15.00	17.03		32.03	
15	Darlaklui Zau	Darlak	22.88	25			12.00	10.88		22.88	
16	Chengkawllui	Zawlnuam	10.98	12			5.00	5.98		10.98	
17	Koboi Zau	Bungthuam	27.45	30			12.88	14.57		27.45	
18	Luimawi Zau	Luimawi	10.98	12			4.00	6.98		10.98	
19	Suarhliap Zau	Suarhliap	27.45	30				10.00	17.45	27.45	
20	Damdiai	Suarhliap	27.45	30				10.00	17.45	27.45	
21	Phaitlapawp	Sihthiang	22.88	25				10.00	12.88	22.88	
22	Saisih	Saikhawthlir	30.20	33				12.00	18.20	30.20	
23	Kawrthuklui Zau	Hriphaw	27.45	30					8.00	8.00	19.45
24	Sawravaului	Hriphaw	32.03	35					10.00	10.00	22.03
25	Tumpanglui	Tumpanglui	13.73	15					5.00	5.00	8.73
26	Luithi Zau	Zawlnuam	36.60	40					10.00	10.00	26.60
	Sub-Total : Zawlnuam R.D. Block		**793.36**	**867.00**	**-**	**133.00**	**264.40**	**220.17**	**98.98**	**716.55**	**76.81**
	Number of Project		**26**			**9**	**18**	**17**	**8**	**26**	**4**

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Balance
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	B. West Phaileng R.D. Block										
1	Phaizau	Mamit	18.30	20			8.00	10.30		18.30	
2	Sihlung	Mamit	24.71	27			10.00	14.70		24.70	
3	Suangsau	Mamit	22.88	25			9.00	13.90		22.90	
4	Bawngvate Lui	Mamit	27.45	30				10.00	17.50	27.50	
5	Khawhnai	W.Phaileng	9.15	10				3.00	6.20	9.20	
6	Tuivawm	W.Phaileng	39.35	43				15.00	24.40	39.40	
7	Nalzawl	Nalzawl	45.75	50				10.00	20.00	30.00	15.75
8	Damparengpui Zau	Damparengpui	36.60	40				10.00	15.00	25.00	11.60
9	Tuirum	W.Phaileng	13.73	15				5.00	8.70	13.70	
10	Herhsezawl	Kawnmawi	22.88	25				10.00	12.90	22.90	
11	Lallen	Lallen	22.88	25				10.00	12.90	22.90	
12	Saithah Zau	W.Phaileng	18.30	20					8.00	8.00	10.30
13	Hreichuk	Mamit	32.03	35					10.00	10.00	22.03
14	Hawrhpup	W.Phaileng	29.28	32					8.00	8.00	21.28
	Sub-Total : W.Phaileng R.D. Block		**363.29**	**397.00**	**-**	**-**	**27.00**	**111.90**	**143.60**	**282.50**	**80.96**
	Number of Project		**14**		**0**	**0**	**3**	**11**	**11**	**14**	**5**

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Balance
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	C. Reiek R.D. Block										
1	Setlah Zau	Lengte	18.30	20			8.00	10.30		18.30	-
2	Lentupui/Hliappui	Nghalchawm	22.88	25				10.00	12.88	22.88	-
3	Hliappui	Lengte	47.58	52					10.00	10.00	37.58
4	Leihlawnsang Ph-II	Lengte	27.45	30					8.00	8.00	19.45
5	Lawngzawl Fangfar	Lengpui	36.60	40					10.00	10.00	26.60
6	Nghaltan	Lengte	36.60	40					10.00	10.00	26.60
7	Sanam	Khawrihnim	29.28	32					10.00	10.00	19.28
8	Challui(Dialdawk)	Lengpui	13.73	15					8.00	8.00	5.73
	Sub-Total : Reiek R.D. Block		**831.16**	**893.00**		**-**	**8.00**	**20.30**	**68.88**	**97.18**	**135.24**
	Number of Project		**8**		**0**	**0**	**1**	**2**	**7**	**8**	**6**
	Total : Mamit District (CAD)		**1,987.81**	**2,157.00**	**-**	**133.00**	**299.40**	**352.37**	**311.46**	**1,096.23**	**293.01**
	No of project		**48**			**9**	**22**	**30**	**26**	**48**	**15**

RRR

Sl. No.	Name of District/RD Block/Project	Location	Total Cost	CCA (in Ha.)	Year-wise outlay (Rupees in lakh)						Balance
					2015-16	2016-17	2017-18	2018-19	2019-20	Total	
	A. Zawlnuam R.D. Block										
1	Lungtamlui Zau	Zawlnuam	22.58	76		10.00	12.58			22.58	
2	Tuikhurlui Zau	Chuhvel	27.90	26		10.00	17.90			27.90	
	Sub-Total : Zawlnuam R.D. Block		**50.48**	**102**		**20.00**	**30.48**	**-**		**50.48**	
	No. of projects		**2**		**0**	**2**	**2**	**0**	**0**	**2**	**0**
	B.Mamit R.D. Block	NIL									
	C.Reiek R.D. Block	NIL									
	Total : Mamit District (RRR)		**50.48**	**102**	**-**	**20.00**	**30.48**	**-**	**-**	**50.48**	**-**
	No. of projects		**2**		**0**	**2**	**2**	**0**	**0**	**2**	
	GRAND TOTAL		**5,260.43**	**3,553.00**	**-**	**453.00**	**884.72**	**1,117.00**	**1,137.40**	**3,612.12**	**1,049.74**

Table 5.12 Budget Details for Proposed Component in the District Irrigation Plan of (Mamit District)

Sl. No.	Department	Component	Amount (Rs. in Lakh)	Remarks
1	Agriculture Department	PMKSY Per Drop More Crop (Other Intervention)	1,130.77	
2	Horticulture Department	PMKSY Per Drop More Crop (Micro Irrigation)	6,944.94	
3	Rural Development Department	PMKSY Watershed (IWMP)	2,167.03	
	DRDA	MGNREGA	538.05	
4	Minor Irrigation Department	a) PMKSY Har Khet Ko Pani	5,260.43	
Total			**16,041.22**	

Annexure –I Strategic Action Plan for Irrigation in Mamit District under PMKSY

Sl. No.	Name of the Blocks/Sub Districts	Concerned Ministry/ Department	Component	Activity	Total Number/Capacity (Cum)	Command Area/ Irrigation Potential (Ha)	Period of Implementations (5/ 7 yrs)	Estimated Cost (Rs in lakhs)
1		MoWR	AIBP	Major Irrigation				
2		MoWR		Medium Irrigation				
4	Zawlnuam	MoWR	Har khet ko pani	Lift Irrigation	1	46	5	114.54
6	Zawlnuam	MoWR	Har khet ko pani	RRR	2	102	5	50.48
7.1 & 7.2	Zawlnuam	MoWR	Har khet ko pani	CAD	26.00	867.00	5	793.36
	West Phaileng				22.88	397.00	5	363.29
	Reiek				8.00	893.00	5	831.16
7.1 & 7.2	Zawlnuam	MoWR	Har khet ko pani	Surfave irrigation	19	644.00	5	1603.64
	West Phaileng				13	365.00	5	908.85
	Reiek				7	239.00	5	595.11
15	Zawlnuam	MoA&FW	Per drop more crop (other intervention)	Secondary Storage structure	60	240	5	120.00
17.1	Zawlnuam	MoA&FW	Per drop more crop (other intervention)	Farm ponds	75	75	5	67.50
18.1	Zawlnuam	MoA&FW	Per drop more crop (other intervention)	Tank Renovation & Restoration	80	80	5	12.00
16	Zawlnuam	MoA&FW	Per drop more crop (other intervention)	Pipe/pre-cast distribution	100	100	5	10.00
8	Zawlnuam	MoA&FW	Per drop more crop (other intervention)	Micro Irrigation at Open field Drip Irrigation Systems	35	35	5	14.83
10	Zawlnuam	MoA&FW	Per drop more crop (other intervention)	Micro Sprinkler Irrigation	35	35	5	25.76
16	Zawlnuam	MoLD	Per drop more crop (other intervention)	In Situ Moisture Conservation	45	45	5	1.80
19.5	Zawlnuam	MoLD	Per drop more crop (other intervention)	Bench Terracing / Zing Terracing	56	56	5	112.00
16	Zawlnuam	MoLD	Per drop more crop (other intervention)	Upper reach gully control bund	35	35	5	1.05
16	Zawlnuam	MoLD	Per drop more crop (other intervention)	Middle reach gully control	47	47	5	5.64

16	Zawlnuam	MoLD	Per drop more crop (other intervention)	Lower reach gully control	52	52	5	104.00
15	West Phaileng	MoA&FW	Per drop more crop (other intervention)	Secondary Storage structure	72	180	5	144.00
17.1	West Phaileng	MoA&FW	Per drop more crop (other intervention)	Farm ponds	90	90	5	81.00
18.1	West Phaileng	MoA&FW	Per drop more crop (other intervention)	Tank Renovation & Restoration	56	56	5	8.40
16	West Phaileng	MoA&FW	Per drop more crop (other intervention)	Pipe/pre-cast distribution	90	90	5	9.00
8	West Phaileng	MoA&FW	Per drop more crop (otherintervention)	Micro Irrigation at Open field Drip Irrigation Systems	45	45	5	19.07
10	West Phaileng	MoA&FW	Per drop more crop (other intervention)	Micro Sprinkler Irrigation	45	45	5	33.13
16	West Phaileng	MoLD	Per drop more crop (other intervention)	In Situ Moisture Conservation	250	250	5	10.00
19.5	West Phaileng	MoLD	Per drop more crop (other intervention)	Bench Terracing / Zing Terracing	75	75	5	15.00
16	West Phaileng	MoLD	Per drop more crop (other intervention)	Upper reach gully control bund	25	25	5	0.75
16	West Phaileng	MoLD	Per drop more crop (other intervention)	Middle reach gully control	55	55	5	6.60
16	West Phaileng	MoLD	Per drop more crop (other intervention)	Lower reach gully control	60	60	5	12.00
15	Reiek	MoA&FW	Per drop more crop (other intervention)	Secondary Storage structure	60	150	5	120.00
17.1	Reiek	MoA&FW	Per drop more crop (other intervention)	Farm ponds	72	72	5	64.80
18.1	Reiek	MoA&FW	Per drop more crop (other intervention)	Tank Renovation & Restoration	75	75	5	11.25
16	Reiek	MoA&FW	Per drop more crop (other intervention)	Pipe/pre-cast distribution	75	75	5	7.50
8	Reiek	MoA&FW	Per drop more crop (other intervention)	Micro Irrigation at Open field Drip Irrigation Systems	65	65	5	27.54
10	Reiek	MoA&FW	Per drop more crop (other intervention)	Micro Sprinkler Irrigation	65	65	5	47.85
16	Reiek	MoLD	Per drop more crop	In Situ Moisture Conservation	80	80	5	3.20

			(other intervention)					
19.5	Reiek	MoLD	Per drop more crop (other intervention)	Bench Terracing / Zing Terracing	75	75	5	15.00
16	Reiek	MoLD	Per drop more crop (other intervention)	Upper reach gully control bund	30	30	5	0.90
16	Reiek	MoLD	Per drop more crop (other intervention)	Middle reach gully control	45	45	5	5.40
16	Reiek	MoLD	Per drop more crop (other intervention)	Lower reach gully control	69	69	5	13.80
16	West Phaileng	MoRD&DoLR	IWMP	Plantation including Horticulture, Afforestation, etc.	-	871.76	5	130.76
18.2	West Phaileng	MoRD&DoLR	IWMP	Check Dams	35	69.74	5	52.31
19.5	West Phaileng	MoRD&DoLR	IWMP	Terrace	145	72.65	5	43.59
19.5	West Phaileng	MoRD&DoLR	IWMP	Contour & Trench	116	58.12	5	34.87
19.5	West Phaileng	MoRD&DoLR	IWMP	Bunding	87	43.59	5	26.15
18.5	West Phaileng	MoRD&DoLR	IWMP	Other Soil & Water Conservation	58	29.06	5	17.44
17.1	West Phaileng	MoRD&DoLR	IWMP	Water Harvesting Structure	44	108.97	5	39.23
17.1	West Phaileng	MoRD&DoLR	IWMP	Farm Pond	54	81.73	5	32.69
17.4	West Phaileng	MoRD&DoLR	IWMP	Percolation Tank	58	116.24	5	26.15
17.6	West Phaileng	MoRD&DoLR	IWMP	Pond/Fishery	44	87.18	5	19.61
17.5	West Phaileng	MoRD&DoLR	IWMP	Other WHS	44	43.59	5	13.08
	West Phaileng	MoRD&DoLR	IWMP	All Livelihood Activities	70	-	5	69.74
	West Phaileng	MoRD&DoLR	IWMP	All Production & Micro-enterprise Activities	252	-	5	75.55
16	Zawlnuam	MoRD&DoLR	IWMP	Plantation including Horticulture, Afforestation, etc.	-	1915.2	5	287.28
18.2	Zawlnuam	MoRD&DoLR	IWMP	Checkdams	77	153.22	5	114.91
19.5	Zawlnuam	MoRD&DoLR	IWMP	Terrace	319	159.6	5	95.76
19.5	Zawlnuam	MoRD&DoLR	IWMP	Contour & Trench	255	127.68	5	76.61
19.5	Zawlnuam	MoRD&DoLR	IWMP	Bunding	192	95.76	5	57.46
18.5	Zawlnuam	MoRD&DoLR	IWMP	Other Soil & Water Conservation	128	63.84	5	38.3
17.1	Zawlnuam	MoRD&DoLR	IWMP	Water Harvesting Structure	96	239.40	5	86.18
17.1	Zawlnuam	MoRD&DoLR	IWMP	Farm pond	120	179.55	5	71.82

17.4	Zawlnuam	MoRD&DoLR	IWMP	Percolation Tank	128	255.36	5	57.46
17.6	Zawlnuam	MoRD&DoLR	IWMP	Pond/ Fishery	96	191.52	5	43.09
17.5	Zawlnuam	MoRD&DoLR	IWMP	Other WHS	96	95.76	5	28.73
	Zawlnuam	MoRD&DoLR	IWMP	All Livelihood Activities	153	-	5	153.22
	Zawlnuam	MoRD&DoLR	IWMP	All Production & Micro-enterprise Activities	553	-	5	165.98
16	Reiek	MoRD&DoLR	IWMP	Plantation including Horticulture, Afforestation,	-	463.59	5	69.54
18.2	Reiek	MoRD&DoLR	IWMP	Checkdams	19	37.09	5	27.82
19.5	Reiek	MoRD&DoLR	IWMP	Terrace	77	38.63	5	23.18
19.5	Reiek	MoRD&DoLR	IWMP	Contour & Trench	62	30.91	5	18.54
19.5	Reiek	MoRD&DoLR	IWMP	Bunding	46	23.18	5	13.91
18.5	Reiek	MoRD&DoLR	IWMP	Other Soil & Water Conservation	31	15.45	5	9.27
17.1	Reiek	MoRD&DoLR	IWMP	Water Harvesting Structure	23	57.95	5	20.86
17.1	Reiek	MoRD&DoLR	IWMP	Farm pond	29	43.46	5	17.38
17.4	Reiek	MoRD&DoLR	IWMP	Percolation Tank	31	61.81	5	13.91
17.6	Reiek	MoRD&DoLR	IWMP	Pond/ Fishery	23	46.36	5	10.43
17.5	Reiek	MoRD&DoLR	IWMP	Other WHS	23	23.18	5	6.95
	Reiek	MoRD&DoLR	IWMP	All Livelihood Activities	37	-	5	37.09
	Reiek	MoRD&DoLR	IWMP	All Production & Micro-enterprise Activities	134	-	5	40.18
8	Reiek	MoA&FW	Per drop more crop	Micro Irrigation at Open field :	2571	2571	5	1818.69
8	West Phaileng	MoA&FW	Per drop more crop	Micro Irrigation at Open field :	3319	3319	5	2277.11
8	Zawlnuam	MoA&FW	Per drop more crop	Micro Irrigation at Open field :	4186	4186	5	2849.13
8	Zawlnuam	MoRD&DoLR	MGNREGS	Irrigation	17	9	5	39.50
17.1	Zawlnuam	MoRD&DoLR	MGNREGS	Farm pond	74	6	2	22.20
17.2	Zawlnuam	MoRD&DoLR	MGNREGS	Check Dam	7	2	5	6.40
17.4	Zawlnuam	MoRD&DoLR	MGNREGS	Percolation Tank	2	0.3	5	2.30
17.5	Zawlnuam	MoRD&DoLR	MGNREGS	Other ground water recharge structure	13	13	5	40.80
17.6	Zawlnuam	MoRD&DoLR	MGNREGS	Fishery pond / Cattle pond	13	14	5	87.90
18.5	Zawlnuam	MoRD&DoLR	MGNREGS	Fishery pond / Cattle pond	1	0.0001	5	0.60
19.1	Zawlnuam	MoRD&DoLR	MGNREGS	Water Conservation	9	8	5	21.80

19.5	Zawlnuam	MoRD&DoLR	MGNREGS	Land Development	14	9	5	43.00
8	West Phaileng	MoRD&DoLR	MGNREGS	Irrigation	59	8	5	8.70
17.1	West Phaileng	MoRD&DoLR	MGNREGS	Farm Pond	131	21	5	39.00
17.5	West Phaileng	MoRD&DoLR	MGNREGS	Other ground water recharge structure	40	6	5	18.10
17.6	West Phaileng	MoRD&DoLR	MGNREGS	Fishery pond / Cattle pond	124	17	5	70.00
19.5	West Phaileng	MoRD&DoLR	MGNREGS	Land Development	183	9	5	21.90
17.1	Reiek	MoRD&DoLR	MGNREGS	Farm Pond	89	9	5	26.70
17.2	Reiek	MoRD&DoLR	MGNREGS	Check Dam	2	0.1	5	0.50
17.6	Reiek	MoRD&DoLR	MGNREGS	Fishery pond / Cattle pond	18	11	5	20.75
18.5	Reiek	MoRD&DoLR	MGNREGS	Fishery pond / Cattle pond	20	4	5	10.50
19.5	Reiek	MoRD&DoLR	MGNREGS	Land Development	582	18	5	57.40
	Total							**16,041.21**

Annexure -II Population Census of Mamit District, Mizoram (Census of India)

District Code	Town/ Village Code	Name of Village	Rural/ Urban	No. of Household	Total population	Total Popu Male	Total Popu Female	Age Group 0 - 6 years	Schedule Caste	Schedule Tribe	Literates	Total Workers	Main Workers
281	**000000**	**Mamit**	**Total**	**17731**	**86364**	**44828**	**41536**	**15495**	**51**	**82080**	**60191**	**39339**	**36185**
281	000000	Mamit	Rural	14539	71465	37135	34330	13192	38	68096	48174	33160	30467
281	000000	Mamit	Urban	3192	14899	7693	7206	2303	13	13984	12017	6179	5718
281	**000000**	**Zawlnuam**	**Total**	**9712**	**47188**	**24477**	**22711**	**8634**	**33**	**43938**	**31848**	**20586**	**18436**
281	000000	Zawlnuam	Rural	7255	35571	18454	17117	6843	24	33037	22541	15919	14108
281	000000	Zawlnuam	Urban	2457	11617	6023	5594	1791	9	10901	9307	4667	4328
281	271013	Kanhmun	Rural	328	1482	738	744	207	0	1295	1116	657	468
281	271014	Luimawi	Rural	98	507	256	251	96	5	385	321	166	144
281	271015	Bajirungpaveng	Rural	13	79	40	39	15	0	79	12	21	16
281	271016	Thinghlun	Rural	161	831	440	391	145	5	683	561	378	208
281	271017	Kolalian	Rural	137	645	347	298	159	0	638	354	366	362
281	271018	Hriphaw	Rural	142	748	386	362	101	0	742	645	409	409
281	271019	Bungthuam	Rural	160	688	374	314	83	0	629	558	453	388
281	271020	Zawlpui	Rural	74	358	197	161	63	0	352	253	156	136
281	271021	Zamuang	Rural	237	1107	580	527	152	0	1096	916	561	468
281	271022	Rengdil	Rural	338	1588	796	792	266	0	1492	1197	835	801
281	271024	Kawrthah	Rural	616	2812	1428	1384	376	0	2731	2316	1233	1203
281	271025	Tumpanglui	Rural	61	307	157	150	58	0	305	246	159	159
281	271026	Sotapa Veng	Rural	45	177	94	83	45	0	176	49	69	55
281	271027	Mualthuam	Rural	123	646	323	323	158	0	331	278	200	188
281	271028	Darlak	Rural	234	1075	555	520	225	2	989	715	395	393
281	271029	Kawrtethawveng	Rural	370	2008	1040	968	314	0	1993	1647	752	742
281	271030	Serhmun	Rural	157	774	397	377	143	0	762	619	235	229
281	271033	W.Bunghmun	Rural	166	840	444	396	190	0	785	524	282	281
281	271040	Dampui	Rural	152	741	390	351	117	0	656	607	390	335

281	271041	Nalzawl	Rural	107	449	232	217	78	0	444	284	171	131
281	271042	Bawngva	Rural	154	760	398	362	190	0	695	332	207	207
281	271043	Phaizau	Rural	70	295	157	138	53	0	290	188	80	80
281	271045	K. Sarali	Rural	51	253	129	124	49	0	251	105	160	150
281	271046	Chilui	Rural	21	102	53	49	23	0	102	44	56	56
281	271047	N.Sabual	Rural	41	233	131	102	48	0	229	181	114	112
281	271048	N.Tlangkhang	Rural	19	80	42	38	27	0	80	35	43	41
281	271049	Sihthiang	Rural	284	1399	724	675	337	1	1290	653	680	667
281	271055	Kananthar	Rural	54	268	131	137	65	1	202	92	145	145
281	271056	Suarhliap	Rural	118	649	355	294	101	0	525	505	274	222
281	271057	Saikhawthlir	Rural	172	904	491	413	202	0	646	618	504	352
281	271058	Chuhvel	Rural	109	646	318	328	153	1	467	341	228	226
281	271061	Belkhai	Rural	102	496	269	227	123	0	496	117	224	224
281	271062	Khantlang	Rural	113	610	318	292	134	0	608	191	324	277
281	271063	Zomuantlang	Rural	107	496	267	229	114	0	495	260	181	130
281	271064	Tuipuibari	Rural	408	1992	1080	912	463	9	1909	1311	583	520
281	271065	Rajivnagar	Rural	708	3530	1796	1734	703	0	3439	1374	1777	1335
281	271068	Andermanik	Rural	228	1165	612	553	258	0	1149	437	595	594
281	271071	Tuidam	Rural	335	1695	870	825	248	0	1597	1427	803	771
281	271072	New Eden	Rural	118	634	310	324	129	0	632	494	299	299
281	271074	Thaidawr	Rural	156	712	374	338	193	0	710	207	357	252
281	271076	Vawngawnzo	Rural	73	304	156	148	97	0	180	168	184	122
281	271077	Damdiai	Rural	79	404	215	189	113	0	404	223	179	176
281	271078	Tiauzau	Rural	16	82	44	38	29	0	78	20	34	34
281	801497	Zawlnuam (NT)	Urban	784	3733	1949	1784	523	2	3261	2856	1698	1553
281	801497	Zawlnuam (NT) WARD NO.-0001	Urban	185	822	451	371	116	0	753	672	319	307
281	801497	Zawlnuam (NT) WARD NO.-0002	Urban	407	1987	1035	952	284	2	1611	1409	911	898
281	801497	Zawlnuam (NT) WARD NO.-0003	Urban	192	924	463	461	123	0	897	775	468	348
281	801498	Mamit (NT)	Urban	1673	7884	4074	3810	1268	7	7640	6451	2969	2775
281	801498	Mamit (NT) WARD NO.-0001	Urban	379	1918	1053	865	309	6	1839	1573	649	623

281	801498	Mamit (NT) WARD NO.-0002	Urban	235	1189	582	607	161	0	1170	1004	539	424
281	801498	Mamit (NT) WARD NO.-0003	Urban	188	830	415	415	131	0	816	675	271	262
281	801498	Mamit (NT) WARD NO.-0004	Urban	415	1948	973	975	299	1	1916	1636	723	705
281	801498	Mamit (NT) WARD NO.-0005	Urban	456	1999	1051	948	368	0	1899	1563	787	761
281	**000000**	**West Phaileng**	**Total**	**4303**	**21309**	**11232**	**10077**	**3867**	**14**	**20746**	**13945**	**9294**	**8671**
281	000000	West Phaileng	Rural	4303	21309	11232	10077	3867	14	20746	13945	9294	8671
281	000000	West Phaileng	Urban	0	0	0	0	0	0	0	0	0	0
281	271080	Damparengpui	Rural	402	2156	1121	1035	476	3	2136	1490	767	763
281	271084	Khawhnai	Rural	81	417	230	187	88	0	414	311	128	128
281	271085	Tuirum	Rural	99	494	267	227	121	0	491	264	131	131
281	271086	Salem Boarding	Rural	25	222	122	100	6	0	222	216	25	25
281	271087	Teirei Forest	Rural	87	386	202	184	79	0	372	279	223	158
281	271088	W.Phaileng	Rural	864	4377	2280	2097	628	11	4206	3614	1847	1830
281	271089	Kawnmawi	Rural	123	604	307	297	109	0	590	456	345	300
281	271090	N.Chhippui	Rural	52	254	132	122	38	0	254	215	98	96
281	271091	Lallen	Rural	163	824	425	399	89	0	807	727	457	450
281	271093	Saithah	Rural	78	337	174	163	57	0	335	276	181	179
281	271097	Parvatui	Rural	59	360	197	163	65	0	357	260	207	138
281	271098	Phuldungsei	Rural	351	1628	874	754	238	0	1520	1336	850	846
281	271102	Zopui	Rural	20	73	38	35	18	0	58	52	44	24
281	271104	W.Phulpui	Rural	143	621	310	311	122	0	609	382	311	308
281	271105	Lokisuri	Rural	12	67	36	31	12	0	67	55	21	21
281	271106	Silsuri	Rural	670	3349	1747	1602	701	0	3325	1343	1467	1366
281	271107	Pukzing	Rural	113	537	302	235	83	0	498	446	311	229
281	271108	Pukzing vengthar	Rural	78	328	169	159	60	0	316	219	92	92
281	271109	Hnahva	Rural	224	1164	643	521	245	0	1127	336	504	397
281	271110	Hruiduk	Rural	212	982	514	468	222	0	982	489	436	428
281	271111	Marpara North	Rural	447	2129	1142	987	410	0	2060	1179	849	762
281	**000000**	**Reiek**	**Total**	**3716**	**17867**	**9119**	**8748**	**2994**	**4**	**17396**	**14398**	**9459**	**9078**
281	000000	Reiek	Rural	2981	14585	7449	7136	2482	0	14313	11688	7947	7688

281	000000	Reiek	Urban	735	3282	1670	1612	512	4	3083	2710	1512	1390
281	271112	Saitlaw	Rural	9	59	32	27	20	0	57	28	21	16
281	271114	W.Serzawl	Rural	98	414	216	198	63	0	409	338	243	208
281	271115	Hmunpui	Rural	192	958	504	454	190	0	940	750	429	411
281	271116	Dilzawl	Rural	62	326	173	153	86	0	323	147	103	103
281	271117	Rawpuichhip	Rural	316	1507	746	761	218	0	1491	1261	856	807
281	271118	Lengte	Rural	122	583	304	279	112	0	581	467	338	338
281	271119	Nghalchawm	Rural	91	443	219	224	92	0	422	340	220	220
281	271120	Tuahzawl	Rural	89	437	215	222	62	0	423	370	258	255
281	271121	Dapchhuah (Tutphai)	Rural	230	1023	548	475	212	0	929	684	580	563
281	271122	Rulpuihlim	Rural	90	414	228	186	71	0	414	343	229	202
281	271123	Chungtlang	Rural	93	447	245	202	73	0	430	373	250	248
281	271124	Reiek	Rural	360	1627	786	841	233	0	1588	1368	929	900
281	271125	Ailawng	Rural	127	611	303	308	93	0	606	515	389	383
281	271126	W.Lungdar	Rural	160	834	419	415	159	0	830	672	484	483
281	271127	Khawrihnim	Rural	168	935	462	473	154	0	933	772	586	557
281	271128	N. Kanghmun	Rural	220	1126	557	569	190	0	1122	922	619	610
281	271129	Bawlte	Rural	67	330	173	157	48	0	321	271	178	178
281	271130	Bawngthah	Rural	70	355	189	166	61	0	350	292	213	213
281	271131	Darlung	Rural	164	902	477	425	136	0	896	761	457	448
281	271132	S.Sabual	Rural	115	637	326	311	115	0	634	503	300	298
281	271134	Lungphun	Rural	86	379	203	176	51	0	376	319	188	171
281	271135	Hreichuk	Rural	52	238	124	114	43	0	238	192	77	76
281	801499	Lengpui (NT)	Urban	735	3282	1670	1612	512	4	3083	2710	1512	1390
281	801499	Lengpui (NT) WARD NO.-0001	Urban	367	1638	836	802	243	4	1464	1352	702	692
281	801499	Lengpui (NT) WARD NO.-0002	Urban	368	1644	834	810	269	0	1619	1358	810	698