

NATURAL RESOURCE MANAGEMENT

MIZORAM

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L.K. Jha

NATURAL RESOURCE MANAGEMENT

Vol. I
(MIZORAM)

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Resource Bases of Mizoram

G. Kumar

Mizoram, 'The Land of the Highlanders', became the 24th state of the Indian Union when it was conferred statehood on the 20th Feb. 1987. The people of the erstwhile Lushai Hill district of Assam and later Union Territory since 1972, realized their long cherished desire for autonomy. Peace and harmony was ushered in after about 30 years of socio-political turmoil due to insurgency in this part of the country. The Peace Accord signed between the Union Government and the Mizo National Front on the 30th June 1986, was also aimed at increasing the pace of economic development and consolidate the achievements therefrom, in the best interest of the people—the people who belong to a distinct ethno-socio-cultural group of Tibeto-Burman stock residing in a terrain which is physically distinct and has significant strategic importance.

Spread over an area of about 21,087 square kilometres, the state of Mizoram roughly lies between 21°56' and 24°31' north latitudes and 92°16' 93°26' east longitude in the north-eastern corner of the Indian Union. It is bounded by Cachar District of Assam and the state of Manipur in the North, Chin Hills of Myanmar in the East and South, and the Chittagong Hill Tracts of Bangladesh and the state of Tripura in the West. Having an international boundary of about 710 kilometres, the state is strategically very important.

Moreover, with a population of about 690,000 (1991) distributed in its 671 villages and 22 urban conglomerates and a very high effective literacy of over 82 per cent, the state of Mizoram has to cope with ever expanding demands on its limited physical and natural resources. Despite a very large concentration of population in urban conglomerates (46.33%), the economy of the state is essentially agriculture based. It is obvious from the fact that more than 60 per cent of the working population finds engagements in agricultural activities. About 35 per cent of the workers are provided employment directly or indirectly by the state government whereas less than 2 per cent people are engaged in secondary industrial activities of manufacturing and transformation. Agricultural land, thus,

appears to be the only basic productive resource in the state. Agricultural lands including pastures, cultivable wastes, fallows and net sown area, however, account for only about 24 per cent of the geographical area of the state. On the other hand, the forests account for about 76 per cent of the total area. Yet revenue collected from the forest resources accounted less than 0.27 per cent of the NSDP in 1989-90. In the light of resource generation for sustenance and development, it must be noted that the current uses and potential uses of resources are assuming new dimensions due to rapidly increasing population and accelerated per capita consumption incidental upon it. The phenomenon is particularly seen in the developing regions which are aiming at achieving higher standard of living through diversification of their economy. However, least interference by the outside forces to accelerated the process of economic development of the developing regions, largely assists in the stability of the governments and also preserving their socio-cultural identities. They must be allowed to develop their economies based on their own resources and according to their own genius. It is believed that if attempts are made to monitor resources in their totality and some methods are devised to exploit them rationally by indicating areas of priority on regional level, rapid economic growth with a vision of social equity may be achieved. The task, as in case of the state of Mizoram, should be relatively easier, in areas where man-resource relationship has not yet assumed much complexity.

Any resource study, thus, must involve the analyses and comprehension of the relationship that exists between the components of resources viz.— natural, human, and cultural resources at regional, inter-regional, and intra-regional levels. More so in the light of man's concern towards environmental degradation and ecological imbalances that appears to threaten the survival of human civilization on global level. In the present paper, an attempt has been made to assess the resources of Mizoram separately as well as in their totality which will facilitate the resource planners to suggest rational use in conformity with the laws of ecology.

NATURAL RESOURCES OF MIZORAM

Natural resources have been defined as those aspects of man's physical world which have been influencing him since the days of his evolution and on what he depended even in his primitivity to draw support and sustenance.¹ Thus, the elements or property of the earth - 'mentifacts' or 'artifacts', which have been useful² or which even primitive man by virtue of his natural abilities has been able to exploit³; may be considered

natural resources. These elements of man's physical world also sets the limits within which he develops his arts to satisfy his wants⁴.

Man's physical world, at least in the regional context that consists of the elements of climate and the nature of terrain including the geological formations, provides a fairly permanent geographical base to a region and is also either an asset or acts as a hindrance for resource regeneration and their use⁵ (artifacts).

The elements of natural resources may, however, be classified in three categories : (a) physical resources including physiography, climate, geological formation and hydrology; (b) biotic resources consisting of renewable forests, crops and livestock; and (c) agro-mineral resources representing both flow and fund resources. The latter two subsets may, however, be considered to be more and more 'derived resources' in conformity with the upward mobility of man on the ladder of civilization.

PHYSIOGRAPHY

In Mizoram topography definitely plays a dominant role in all facets of life. Therefore, a study of topography, especially with regard to the slope, is of utmost significance. Any geographical study of landscape, however, must include a rational division of the land surface upon which other distributions have been fashioned, such as of agriculture and specially settlements in the state. "Plans for regional development should include geographical analysis of the elements of total landscape complex that are relevant to the direction which development is intended to follow.⁶ The form of terrain throws light on landuse and the growth and distribution of crops in areas where relief encompasses complex and diverse lithology and landforms. Relief of the land exercises a direct influence on land use, particularly through altitude, ruggedness and slope, whilst on lower ground it affects flooding. "Relief also influences farming by modifying the climate and affecting the ease of cultivation and degree of cultivation".⁷

Physiography of Mizoram (Fig. 1.1) which has a broadly north-south alignment of hill ranges, has been a resource to the inhabitants of the region. Against all the odds, the people preferred to settle on the ridge tops primarily for security reasons. Cultivable lands in the around the villages provided a buffer region against an invading enemy apart from providing the people their sustenance. Valleys were avoided due to the presence of thick vegetative growth and dangerous animals and reptiles, though water supply would have been sufficient there.

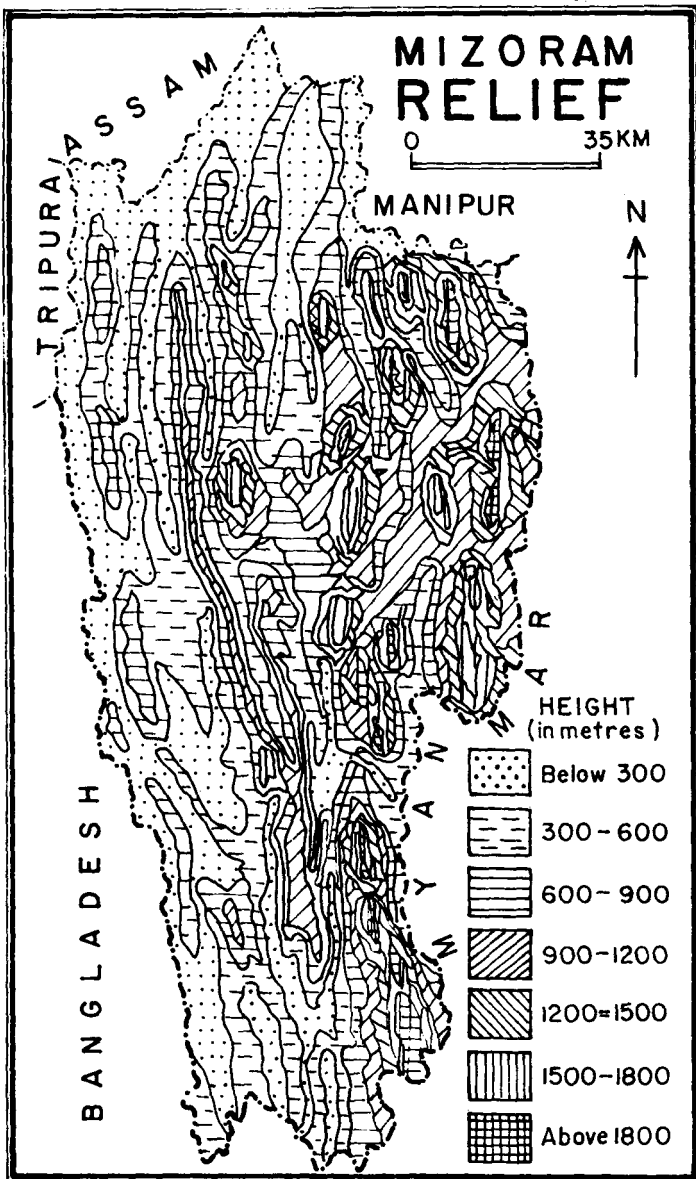


Fig. 1.1

Almost whole of Mizoram is composed of tertiary hill ranges running parallel to each other and separated by deep and narrow gorges and valleys. Two distinct physical units, thus, may be recognized in the state: (i) Hill Ranges, and (ii) Intermontane valleys and foot-hill plains.

(i) Hill Ranges

Hill ranges in Mizoram are characterized by a declining elevation from east to west and their continuity being broken by criss-crossing streams. The eastern hill range known as Sialkal range along the border of Manipur and Myanmar has an average height of about 1500 metres above the mean sea level. But the topography is much rugged and is characterized by steep slopes. The elevation in this part varies from 400 metres to more than 2100 metres. The highest peak in this range-Longteng has a height of 2149 metres followed by Naunuarzo (2140 metres), and Sur (2018 metres).

Sialkal range is separated from central Mizoram ranges of Chalfihl and Tawi by narrow and small river valleys of Tuipui and Tuivai in the north and R. Chhimtuipui in the south. The highest peak of Mizoram Blue Mountains or Phawngpui (2187 metres) is located in the southern extension of these ranges in the district of Chhimtuipui.

Further westward, the region commands a view of the rolling mountain till the Mamit and Hachhek ranges merge with the intermontane valleys between the Lushai hills in the east and the Chittagong hill tracts in the west.

The average height in the state varies between 300 metres in the west and about 1500 m in the east. Upper portions of the high ranges are thickly wooded. Clad with an evergreen vegetation they abound in varied flora and fauna. The lower hills and slopes, for the greater portion, have become deforested owing to the practice of both Jhum and terraced cultivation. Due to the scanty undergrowth, loose and delicate soil structure, absence of old rocks and widespread soft clay on precipitous slopes, landslides are frequent and cause serious impediments to trade and agricultural enterprises. It also affects adversely the maintenance of transport and communication network where they occur most. Soils which remain bare or bear weak vegetation often shrink easily after the showers and further aggravate the problem.

(ii) Intermontane Valleys and Foot-Hill Plains

The hill ranges are dissected by a number of seasonal and perennial streams forming narrow 'V' shaped valleys and occasionally widening in the patches of small flat lands. With the introduction of "Jhum Control Programme" by the Govt. of Mizoram, these intermontane valleys are gradually offering a happy respite from traditional slash and burn cultivation.

There are, however, only a few relatively flat patches in the intermontane valleys probably of post Pleistocene lacustrine origin which are of any economic significance. Champhai valley in the eastern part along the border with Myanmar, Vanlaiphai in the south eastern portion and Thenzawl in the southern part of Aizawl and Chamdud plains in the western part of Chhimtuipui district are a few flat lands in an otherwise undulating terrain. Besides these plains, however, whole of western margin of the state along the border with Bangladesh and Tripura and northern boundary with the Cachar district of Assam may generally be regarded as the Lushai foot-hills. These relatively flat patches which rarely attain a height of more than 300 metres above the mean sea level, include the small plains of Tuisenhnar in the vicinity of Khawzawl village, Zawlpu in the Mat river valley, Phaisen Chhumluang to the west of Bilkhwatir and Hortoki and Bairabi along the river Tlawng. Most of these small flat patches are given to wet rice cultivation with the only exception of Chamdud plains which is still thickly forested with a very small population in the region.

The ruggedness of the terrain, which is obvious from the fact that the north-south extension of the state at its maximum is only 277 kilometres whereas maximum width from east to west is only 121 kilometres, associated with the immaturity of the structure and strong exogenetic processes in operation, has proved to be a handicap in introducing developmental measures in the state. Not only this, the studies of geological structure in the state so far suggest that agricultural land and forests are the only productive resources for some time to come.

GEOLOGICAL FORMATION

A resource base of a region may be understood with reference to its geology. Geological formations which affect the economy of a region in various ways explain the mineral resource base, availability of building materials, feasibility of hydal power development etc. Also scenic beauty, one of the bases to develop tourism depends to a large extent on the

geological formation of a region. However, it is not always possible to assess the impact of geology on the resources. Yet it is important to know the geological structure of a region to understand and evaluate its resources.

Geologically Mizoram may be considered part of the Tripura-Mizoram Miogeosyncline depression (Assam Gulf) formed in the post ocean thrust of the Himalayan orogeny leading to regional uplift of Barail group of segments of Pegu system in Myanmar (Burma) probably extending westward along the eastern boundary of Mizoram.

In general, however, four lithostratigraphic units may be identified in Mizoram :- (i) Barail, * (ii) Surma, (iii) Tipam, and (iv) Alluvium groups in order of their succession.

The Barails conforming to the oldest rocks are dominant in the east generally beyond the valley of river Tuichang in the south and river Tuivai in the north at an altitude of about 900 metres to 1800 metres. The Barails predominately contain weathered shale, siltstone and grey wacks characterized by enclosed bands of micaceous, feldspathic sandstones. Along the north-western margin of the oldest sediments, however, a break in stratigraphy occurs where lower miocene strata of Surma series is absent (Fig. 1.2)

The Barail beds generally dip at steep angles. The structure is soft and their splintery character causes frequent land slides which is further compounded by the practice of Jhum cultivation and deforestation.

West of Barails Surma series of rocks are dominated by sandstones admixed occasionally with ferruginous materials, mudstone and shales. Having dips at steep angles along with loose arenaceous sediments, generally at higher and argillaceous sediments at lower altitude, landslides and mudslumps are frequent. It adversely affects the agricultural pursuits and exploitation of resources whatever the state has.

Along the north western margin of the state younger Tipam group of sediments with an exposed thickness of about 900 metres, occur. The

* The occurrence of Barails in Mizoram is rather controversial. The Director General, GSI (1974)⁸, and other workers from Geological Survey of India viz. Nandi et al. (1983)⁹ have reported the occurrence of Barails from the surrounding Champhai in the eastern part of the state. Geologists from ONGC, viz. Ganju (1975)¹⁰ and Jokhan Ram and Venkatraman (1984)¹¹, however, do not support the views of the GSI and considered these as a part of Surma Group.

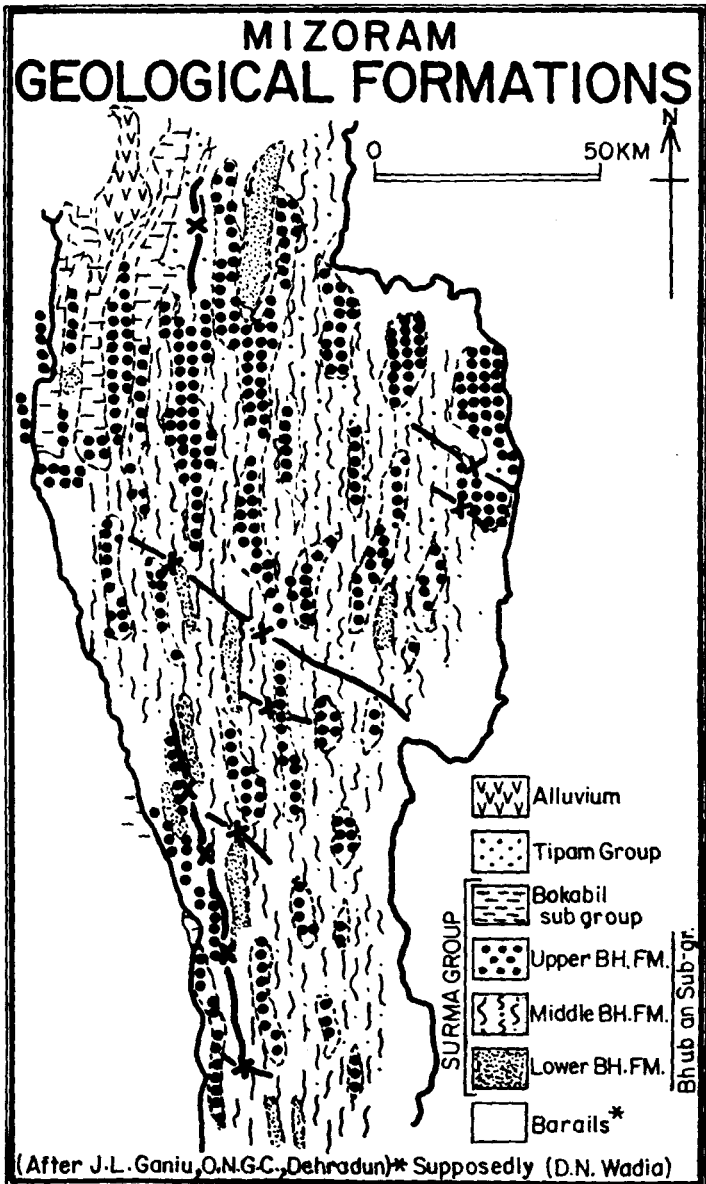


Fig. 1.2

sediments mainly comprise of sandstones with occasional clay bands in them. This formation, contrary to the Barail or Surma formation, has subdued topography with relatively wider streams.

Alluvium deposits, on the other hand, are limited to only river beds comprising mainly loose sand and gravels as thin layers in the river valleys.

The geological structure of the state is further complicated by the presence of faults which run very often at the right angles to the hill ranges. Recent genesis of the region added with the presence of faults and faultiness reveals the structural weakness of the zone. This also explains to some extent the absence of minerals of any economic significance in the state except probably for the occurrence of good quality clay in Tlawing river valley.

CLIMATE

Owing to its location, physiographic characteristics and the influence of the south west tropical maritime airmass, Mizoram generally commands a typical monsoon type of climate. It is humid and warm in summer and dry and cool in winter. The climate of the state, however, is also influenced by the periodic cyclonic disturbances, local mountain and valley breezes and extensive forest cover.

Generally, however, climate is cool in summer and not very cold in winter. The summer temperature generally varies from 21° to 30°C whereas the winter temperature have a range of 11°C to 23°C. Spatial variation in temperature is caused mainly due to elevation and range between 21°C in the high hills and 30°C in the northern and western foothills during summer. Mean summer temperature in the high hills is almost uniform ranging between 21°C and 23°C. To the contrary, there is a greater fluctuation in the low hills and plains where it ranges from 23°C to 30°C.

On the other hand, winter temperature fluctuates between 13°C and 20°C on high hills in different parts of the state and remains static in the low lying ranges and plains ranging 18°C to 21°C. This may be attributed to brighter sun shine unhindered by clouds, therefore higher incidence of solar radiant energy, on the hill tops during winter. The temperature condition in the state, thus, shows marked variation in its spatial as well as seasonal distribution. Not only this, where the annual range of temperature is about 20°C the diurnal fluctuations of temperature is also very high varying between 10°C and 15°C.

The precipitation in the state is also characterized by seasonal and spatial variations. The rainy season extends from April to October with an average fall of 250 cm. Rainfall, however, is not equally distributed over all the parts of the state. Central highlands conforming mostly to the district of Lunglei receives the highest rainfall (315 cm) followed by the district of Chhimituipui (243 cm) and Aizawl (235 cm).

Precipitation is heavier in late summer when the state comes under the direct influence of maritime tropical airmass brought in by the SW monsoon. In fact, more than 65 per cent of rainfall takes place between June and October. But premonsoon disturbances in May continuing with the cyclonic disturbances starting in late February bring sufficient rainfall after a relatively drier spell from November to early February. July and August are the rainiest months whereas December-January are the driest months with almost no rainfall.

On the basis of temperature and rainfall attributes as well as wind direction three seasons may clearly be recognized in the state: (i) Winter extending from November to February; (ii) Summer from March to May; and (iii) Rainy season from June to October.

Winter season corresponds broadly to the retreat of SW monsoon and onset of NE monsoon. After October the incidence of rainfall evidently decreases in frequency. Cold and dry weather sets in. The night temperature falls as low as dew point. It may reach freezing point at higher altitudes. Though no part of the state has snowfall, frosts are common in the hills in December and January. January is the coldest month and is also the driest.

When the vernal equinox (21st March) approaches, temperature gradually rises. Days become warmer. The period is also marked by atmospheric disturbances caused by northward shift of the jet stream following the northward movement of the sun. The dry spell of winter months is broken by occasional thundershowers and hailstorms. These premonsoon showers are considered vital in the agricultural calendar of the state and marks the beginning of agricultural operations. With the advance of summer the quantity and frequency of rainfall increases till it merges with SW monsoonal rainfalls.

With the onset of SW monsoon sky becomes cloudy, humidity with higher precipitation load increases and variable premonsoon winds stabilize. Though these rainfalls are agriculturally the most meaningful to the farmers in their choice of enterprise, these are also responsible for rapid

depletion of top soils, numerous landslides and mudslumps in a structurally weak zone, with resultant difficulty in movements of people and goods.

By the end of September, a change in the frequency of precipitation is observed as SW monsoon retreats. Sky gradually becomes clear. Temperature decreases and light and steady north east wind replaces the turbulent winds of SW monsoon, Weather becomes pleasant.

HYDROLOGY AND BASIN MORPHOLOGY

Hydrography of the state is a direct reflection of the drainage and climatic conditions. The streams have a definite bearing on the ruggedness and slope development of the terrain and hence on Mizo life. Moreover, with the development of agriculture, consciousness about the utility of power and the need to harvest fresh water for drinking purposes and develop riverine fauna, the streams and their morphological characters are assuming new dimensions in the state economy.

The state is endowed with numerous ephemeral and few perennial streams. They swell or decline in response to seasonal variations in precipitation. They are also developed generally in conformity with its topographical features. Surface runoff owing to spatial and seasonal variations in precipitation influences much the soil and vegetation cover in the state.

The north-south alignment of the hill ranges acts as water divides with streams forming deep gorges in between them. Therefore, the dominant drainage pattern in the region may be described as 'trellis type' in which elongated and parallel running streams join the master streams orthogonally. In structurally weak upper reaches, however, the streams of fourth or fifth order appear to have developed 'dendritic pattern'.

One characteristic feature of the streams of Mizoram is that most of the major streams originate in the Central Highlands flowing either in northerly or southerly direction. They generally form a subsystem to either Barak river valley of Cachar district of Assam in the north or Chhimtuipui (Kolodyne in Myanmar) in the south. There are about 13 major streams which originate in the Central Highlands of which 10 flow in northerly direction and 3 towards the south (Fig. 1.3) Rivers Tlawng (Dhaleshwari), Tian, Tuichawng, Tuirial, Tuichang, Tuipui, Tuivawl, Teirei, Tuirini, and Serlui flow towards the Barak valley whereas Chhimtuipui, Khwatlangtuipui and river Mat flow towards the south. All these rivers

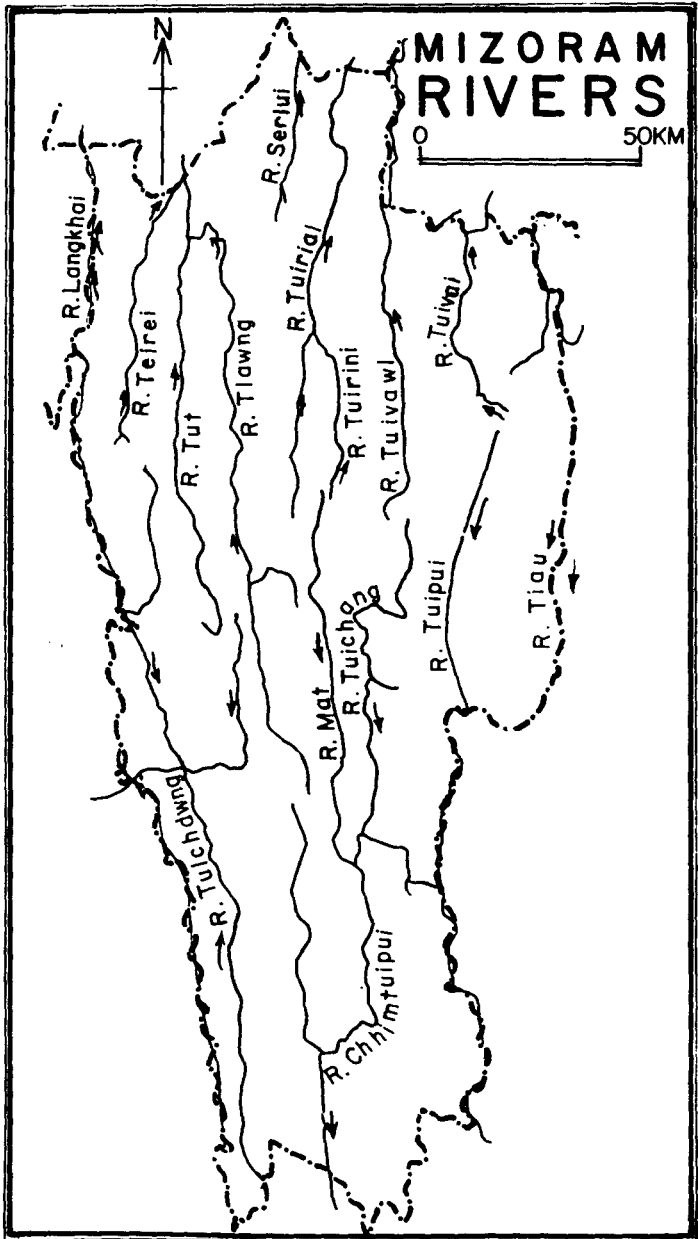


Fig. 1.3

and many small streams and rivulets which may be tributaries to them or some other rivers outside the boundary of Mizoram, form distinct basins. So much so that pilot study on 'Soil Erosion And Land Degradation Problems In Mizoram'¹² conducted by the Institute of Resource Development and Social Management (IRDAS), Hydrabad, identified 22 watersheds in the state (Fig. 1.4).

Ruggedness of the terrain, soil types, vegetation, and land use patterns together influence the run off of the streams and are responsible to bring change in the soil profile and quality of the land. As a matter of fact, only about 7 per cent of the land falls under 20° of slope which under British conditions is believed to be the maximum limit of sustainable crop cultivation.¹³ On the other hand, more than 72 per cent of the land has a gradient of more than 50° distributed in different watersheds. Naturally, therefore, the relief characteristics, biotic exploitation, use of natural resources, and population density which vary in their distribution, are responsible for differential soil erosion and land degradation. However, the areas having thick vegetative cover owing to lesser exploitation consequent upon lesser population and lack of transportation facilities are also the areas which have the least problem of soil erosion and land resource degradation. As about 76 per cent of the land has been classified as forest lands, such problems are more evident in more settled north and north western parts of the state due to their easy accessibility to the national market, causing indiscriminate exploitation of forest wealth. Besides, widely practised shifting cultivation also causes large scale deforestation. This further intensifies soil erosion and land degradation processes which ultimately lead to deterioration of the environment.

SOIL

Soils of Mizoram are essentially derived from secondary rocks belonging to the Barail, Surma, and Tipam series of miocene to pleistocene period. The climate and topography have been the most influencing factors in the making of soils. As such various microclimatic conditions in a complex physiographic structure are responsible for the development of soils in the state. The lower slopes of the hills and valleys are endowed with rich fertile soils in contrast to steep sides of barren rocks of high mountains.

The soils of the state may, however, be classified broadly in two groups of (I) Alluvium, and (II) Residual soils.

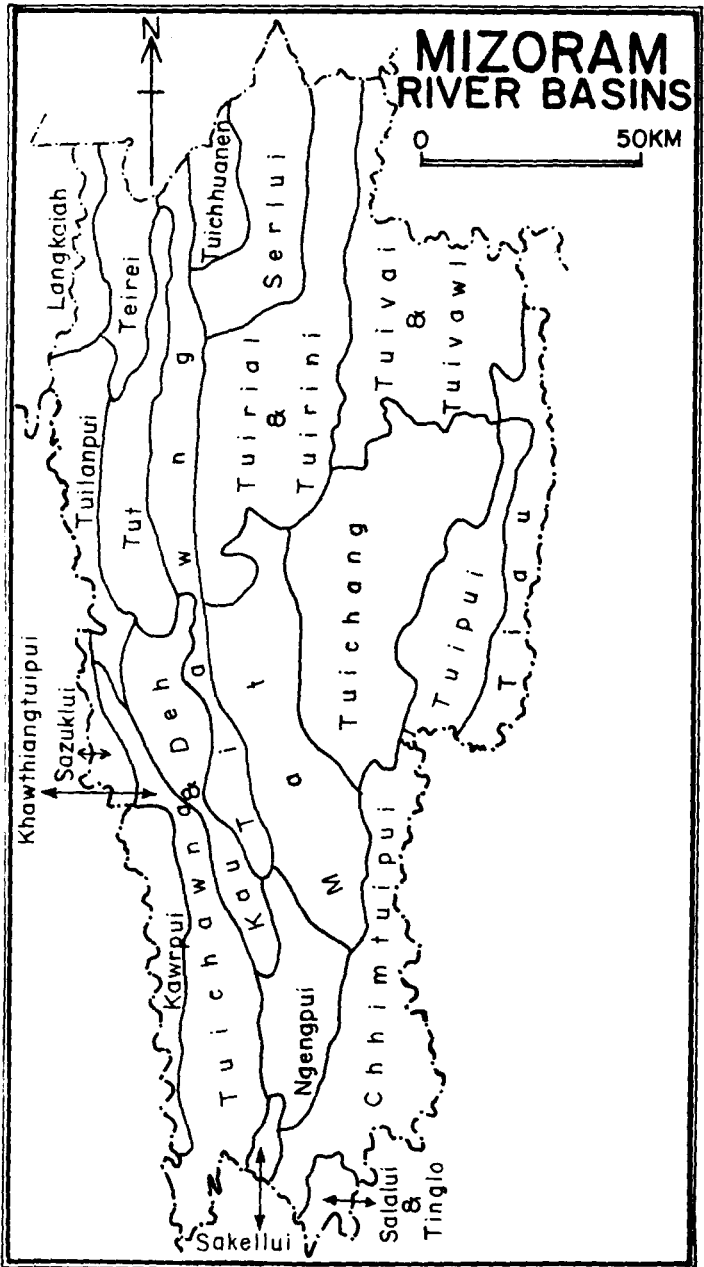


Fig. 1.4

Alluvial soils usually occur in the foothills of the north and west and in the intermontane plains and valleys. They are young dominated by coarse sand. Residual soils which may further be classified as lateritic, brown earth and podzolic occur in most part of the state on steep slopes.

Soils are generally fertile and responsive to fertilizer application. Mizoram soils are acidic, rich in organic carbon but very poor in available phosphate and potash content. The fertility of the soil, however, is much affected by cultivation practices and landslides which are a common feature during the rainy months. On the whole, the vegetation, crop, and other vegetal elements, which abound, show that the soil is not so poor. In fact, there is no resource more important to Mizoram than soil whatever its production capabilities, and however unjustly and excessively mined. The soil as a medium of crop growth has provided, directly or indirectly, the most important share of the income of the state. Therefore, the soil resource must be used in such a manner that they are conserved and not exploited. Exploitation can mean soil destruction and depletion through erosion and overuse. Population growth, increasing pressure on land and somewhat modern farm technology are bringing about a break down in the traditional system of dry farming and fallowing in Mizoram. By the improvement of water supply (wherever feasible) to agricultural crops, and the use of chemical fertilizer and high yielding exotic seeds, the period of fallowing is being shortened and the intensity of cropping is increasing. Though there is ample scope for the expansion of cultivation which may be achieved by the agricultural colonization of the cultivable wastelands, the scope is limited because of the roughness of the terrain. Hence the available soil resource need to be conserved and used carefully and rationally.

NATURAL VEGETATION

The state of Mizoram despite indiscriminate felling of trees is still richly endowed with forest cover. The steep sided mountains assisted by a tropical warm and humid climate have virgin expanses of woodlands which in a more hospitable terrain might have been harvested and thoroughly exploited. In spite of the fact that shifting cultivation has been a way of life in the Lushai hills and the period of Jhum cycle consequent upon increasing demand on agricultural land, has been shortening, the state may boast to have more than 15,900 square kilometres of land under forests i. e. about 76 per cent of its total geographical area. As a matter of fact, actual forest cover is believed to be more than the recorded area by more than 14 per cent. As a result, per capita forest cover (3.68 ha.) in the

state is the third highest after Arunachal Pradesh and Andman & Nicobar Islands with 10,88 ha. and 4.04 ha. per head respectively. In respect of actual forest cover as per cent of geographical area also the state ranks third with 86.2 per cent after Andman & Nicobar Islands (91.96%) and Nagaland (86.8%), according to 1989 Forest Survey of India¹⁴.

Such a high incidence of forest cover in Mizoram may be attributed to three tier management of its forest resources as they are owned and controlled by the state, district councils and village councils at different levels. The following table gives details of different categories of forest areas in the state.

Table 1.1* : Table showing area under forest in Mizoram by categories

| <i>Particulars</i> | <i>Area in sq. km.</i> |
|---|------------------------|
| 1. State owned : | |
| (a) Protected forest | 1,300 |
| (b) Reserved forest | 5,255 |
| (c) Wild Life sanctuary | 572 |
| | 7,127 |
| 2. District Council Owned/Controlled : | |
| (a) Protected forest | 347 |
| (b) Reserved forest | 363 |
| (c) Wild Life Sanctuary | 210 |
| (d) Village Safety and Supply Reserve | 866 |
| | 1,786 |
| 3. Village Council Controlled : | |
| (a) Village Safety and Supply Reserve | 1,782 |
| (b) Unclassified forest | 5,240 |
| | 7,022 |
| TOTAL | 15,935 |

*Source : Statistical Hand Book, 1992, Mizoram.

The forests of Mizoram may be classified into the following three categories:

- (i) Tropical Wet Evergreen Forests,
- (ii) Tropical Semi Evergreen Forests, and
- (iii) Montane Sub Tropical Pine Forests.

The distribution of these forests in Mizoram is a clear reflection of the topographical and climatic characteristics prevailing in different parts of the state (Fig. 1.5).

(i) Tropical Wet Evergreen Forests

The most important of the forest types in the state, tropical wet evergreen forests largely occur in the south and western side of Mizoram. These forests abound in valuable evergreen timber species like *Dipterocarpus turbinatus*, *Artocarpus chaplasha*, *Terminalia maryocarpa*, *Amoora wallichii*, *Michelia champaca*, *Callophyum inophyllum*, *Mesua fercea* etc. on a lower level of slopes bamboos of different kinds along with cane occur abundantly. Some other species like *Dipterocarpus macrocarpus*, *Terminalia chebula*, *Duabanga sonneraioides*, *Syzygium cumini*, *Cinnamomum* etc. are also common in these forests.

(ii) Tropical Semi Evergreen Forests

These forests are generally limited to the north, north western and central parts of the state and cover larger area than any other types. Important species in these forests include *Michelia champaca*, *Schima Wallichii*, *Gmelina arborea*, *Toona ciliata*, *Chukrassia tabularis*, *Sterculia villosa*, *Sterculia colarata*, *Podocarpus nerifolia*, *Adina cordofolia*, *Bombax ceiba*, *dillenia* etc. Bamboo and cane, though occur in abundance, are generally found in the shady low lying areas.

In drier areas of wet evergreen and semievergreen forests, however, deciduous trees predominate. They abound in species like *Juglans regia*, *Emblia officinalis*, *Macranga peltata*, *Castonopsis*, *Sapium baccatum*, *Gmelina arborea*, *Albizia procera*, *Albizia lebbeck*, *Sterculia villosa* etc.

(iii) Montane Sub Tropical Pine Forests

These forests are generally found at higher altitude along the eastern boundary of the state where the climate is relatively cooler with decreasing amount of rainfall.

Common species in these forests are *Pinus keseya*, *Quercus incana*, *Quercus serrata*, *Castonopsis hysrics*, *Schima wallichii*, *Prunus cerasoides*, *Myrica*, *Rhododendron*, *Arundinaria*, *Rhus rubus*, *Eupatorium* and *Clerodendron* etc.

It is noteworthy that despite a large area under forests only about 24 per cent (3883 sq km) of forested area was found to have a crown density

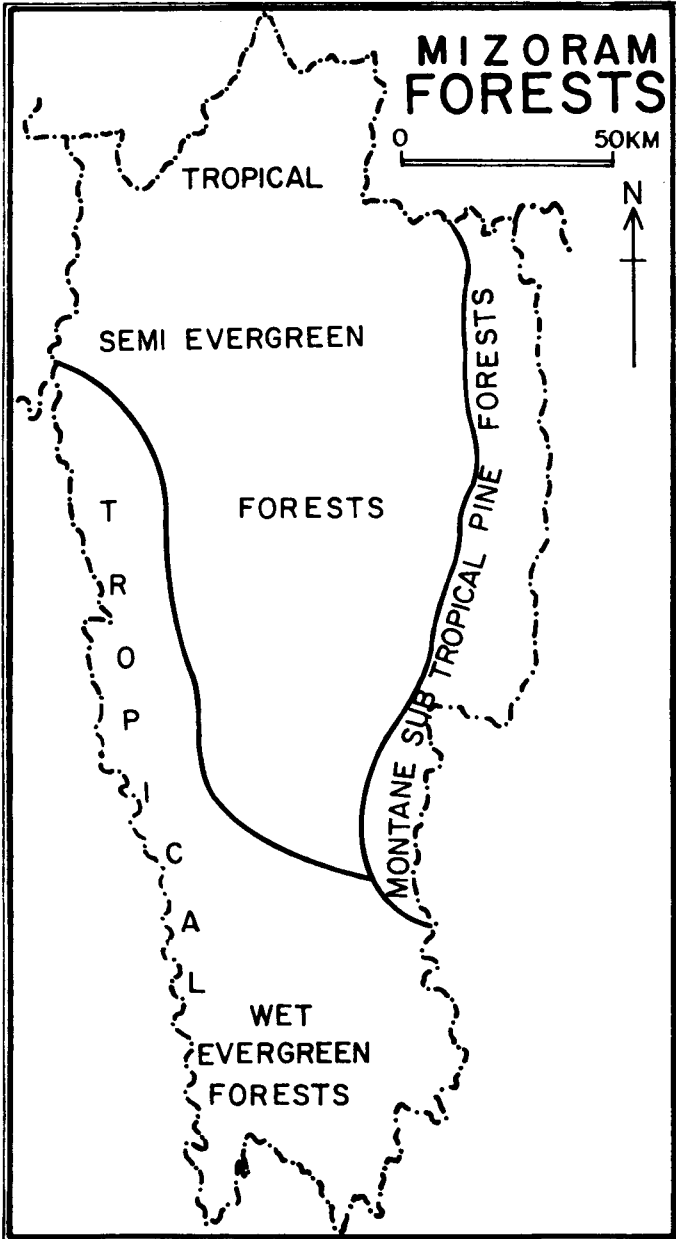


Fig. 1.5

of above 40 per cent in 1989. Rest of the area (14,295 sq km) was classified as open forest with 10 to 40 per cent crown density located in difficult terrain and small pockets. This may largely be attributed to the practice of shifting cultivation in the region. With shortening period of jhum cycle, the trees are not allowed to grow. It is estimated that around 40,000 to 50,000 ha. of forested area is brought under jhum cultivation annually. The gross forest area affected by jhum in the state is reported to be about 2 lakh hectares. The assessment of forest area based on 1981 - 83 and 1985 - 87 also reveals that in a period of 4 years there has been a decline by about 5 per cent in the forest cover of the state. And though there are states which have recorded much higher negative change in their forest endowments, on national level, this, by no means, can be considered small in a state which has a very limited resource and where the expansion of most important of its resources - agricultural land may lead to its further degradation and environmental hazards.

HUMAN RESOURCE

Being the beneficiary as well as the most important and dynamic agent of all the resource processes, man himself is the most vital resource¹⁵. It is underlined by the fact that "in human ecosystem, it is the man who assigns utility to various elements of his environment and confers upon them the role of resources"¹⁶. In order to assign utility to various elements of nature, man is as much involved as the elements of his physical and cultural environment. At the same time he appears to be most dependable through the time for 'aid and support' on himself which makes him outstandingly the most important of the resource elements. Man, therefore, is not only the most important instrument of resource processing and utilizer of the end product, he is also the creator of the resources.

There are, however, two facets of human resources. One suggests his direct involvement in resource creation and processing that is the interaction between him and his physical world. He is, thus, a means by virtue of contributing his labour - both mental and physical; besides his cultural advantages. The other facet exposes him as the end which all the resource processing and transformations are aimed at. In order to sustain his living and to raise his standard of living, man is the only consumer of all the end products. These factors may appear to be on the debit side of the resource creation and transformation. But these are also the factors which give incentive to further the resource creation. "The environmental elements that men calls upon to serve as resources and the nature and size of the

requirements he places upon them depends on his numbers, his needs and desires as well as his values and skills.¹⁷

The three sub-divisions of the human world - physical, cultural, and human organization of the area - are the basis for understanding humanland in its regional context. Each category may be treated as covering a particular set of phenomenon; but at the same time each of the three categories overlaps the other two. Therefore, any attempt to identify human resource has to take into consideration the interaction amongst them which is continuously going on in a process of acquiring resources and their transformation.

It is, thus, suggested to confer resourceship only on those aspects of human world which aid and support the populace through the times. This may appear to suggest only the working population which undoubtedly is the 'most potent' resource factor. But at the same time, appraisal must be made of the total population which the working population is obliged to sustain, atleast at the prevailing standard of living. Zimmermann, therefore, opines that "human resources are both dynamic and most potent; they are also the most precious because they combine the productive agent with the end object of entire process"¹⁸. This necessitates the appraisal of the total population, and assessment of the resource efficiency including the human resource in its global as well as regional context. At the same time the total population has to be studied as an incentive factor. Consumer of resources, producer of resources, and himself a productive resource, a manager of the yield and stock of resources, human dimensions in resource studies are of utmost significance.

The study of human resource in a state like Mizoram assumes great significance as it neither commands much sizable natural resource nor can be said to have much of a cultural advantages to help its economic development. The only substantial resource which it has is its human resource. The men depend almost entirely on their own labour. It is obvious from the fact that almost 2/3 of the net state domestic product is accounted for by the service sector in the state. A critical analysis is, therefore, needed in view of the existing natural resources and cultural heritage to assess whether human resource can make up for the paucity of the two or not. The study of the working force in relation to population distribution and growth as well as its liability both at the state and regional level thus assumes greater significance.

Mizoram has a total population of about 689,756 (1991) of which male population constitutes about 52 per cent and female population about 48 per cent respectively. The population distribution in the state, however, is much influenced by the physical attributes of the area and socio-economic changes that have emerged especially after 1972 when it became a Union Territory. Its 722 rural and 22 urban settlements which generally follow the ridge contours of different hills account for about 54 per cent and 46 per cent of the population respectively. And though the over all density of population in the state is very sparse (33 persons per sq. km.), there are areas and pockets which have a density of population over 300 persons per sq. km. consequent upon the recent spurt in the growth of urban centres and urban population. It is obvious from the fact that Aizawl, the capital of the state, alone accommodates more than 22 per cent of the total population over an area of only a little over 0.5 per cent of its total area. Moreover, the growth in urban population and increase in the number of urban centres to 22 from 6 in 1981, certainly has affected the distribution of population in the state. It is reflected in the density distribution of population if the urban and rural population are taken into account independently. Concentration of population in urban pockets and a tendency to avoid the hill slopes and the valleys from the very beginning of the Mizo settlement is also reflected in the distribution of population.

Table 1.2 shows the distribution of rural and urban population in Mizoram at block level in 1991.

Such distribution of population has been influenced in the state by a number of socio-politico-economic reasons. The causes may be traced in the analysis and political changes brought in by the British incursions in this part of the country in the last decade of the 19th century.

An analysis of the trend of population growth reveals that it has not been consistent. It is difficult, however, to assess the causes of such inconsistency in the decade prior to 1951. In between 1901 and 1911 Mizoram is believed to have experienced a modest rise of about 10.64 per cent in its population. It was followed by a decline in the growth rate (7.90%) between 1911 and 1921. Between 1921 - 1931 the growth rate recorded was more than three times (26.42%) of previous decade followed by a small slump (22.81%) in 1941. The post-independence census operation in 1951 showed an increase of population by 28.42 per cent followed by 35.61 per cent in 1961. The 1971 census, however, recorded a decline in the growth rate by about 11 per cent (24.93%) over previous

Table : 1.2

| Sl. No. | Name of R.D. blocks | Total population | %age of state popu. | Density per sq. km. | Name of towns | Town popu. | %age of block popu. |
|---------|---------------------|------------------|---------------------|---------------------|---------------|------------|---------------------|
| 1. | Zawlnuam | 30,853 | 4.47 | 28.34 | Zawlnuam | 3,455 | 9.09 |
| 2. | W. Phaileng | 21,591 | 3.13 | 21.60 | Mamit | 3,546 | 11.49 |
| 3. | Reiek | 12,128 | 1.76 | 12.94 | Lengpui | 1,808 | 14.91 |
| 4. | Tiangnuam | 1,70,667 | 24.74 | 320.40 | Aizawl | 1,55,240 | 90.96 |
| 5. | N. Thingdawl | 44,833 | 6.50 | 30.45 | Sairang | 3,527 | 2.07 |
| | | | | | Kolasib | 13,482 | 30.07 |
| | | | | | Vairengte | 5,607 | 12.51 |
| | | | | | N. Kawnpui | 5,290 | 11.80 |
| 6. | Darlawn | 20,983 | 3.04 | 22.14 | Bairabi | 2,421 | 5.40 |
| 7. | Aibawk | 14,439 | 2.09 | 23.40 | Darlawn | 3,690 | 17.20 |
| 8. | Serchip | 29,993 | 4.35 | 37.56 | - | - | - |
| | | | | | Serchip | 13,688 | 45.64 |
| 9. | Thingsultliah | 27,095 | 3.93 | 31.00 | Thenzawl | 4,502 | 15.01 |
| 10. | Ngopa | 23,347 | 3.38 | 16.59 | Saitual | 7,104 | 26.22 |
| | | | | | - | - | - |

| Sl. No. | Name of R.D. blocks | Total population | %age of state popu. | Density per. sq. km. | Name of towns | Town popu. | %age of block popu. |
|---------|---------------------|------------------|---------------------|----------------------|------------------------|-----------------|---------------------|
| 11. | Khawzawl | 50,192 | 7.28 | 31.61 | Khawzawl | 8,402 | 16.74 |
| 12. | E. Lungdar | 32,344 | 4.69 | 24.35 | Khawhal Champhai | 2,102 20,809 | 4.19 41.46 |
| 13. | W. Bunglemun | 15,549 | 2.25 | 11.19 | Biate N. Vanlaiphai | 2,325 2,804 | 7.19 8.67 |
| 14. | Lungsen | 26,496 | 3.84 | 25.32 | - | - | - |
| 15. | Lunglei | 48,493 | 7.03 | 43.41 | Tiabung | 3,409 | 12.87 |
| 16. | Hnathial | 20,877 | 3.04 | 21.19 | Lunglei | 35,599 | 73.41 |
| 17. | Chawngte | 24,870 | 3.61 | 36.24 | Hnathial | 5,548 | 26.57 |
| 18. | Lawngtlai | 29,330 | 4.25 | 22.48 | - | - | - |
| 19. | Sangau | 10,746 | 1.56 | 18.99 | - | - | - |
| 20. | Tuipang | 34,930 | 5.06 | 24.95 | Saiha | 13,669 | 39.13 |

decade. But the next population census in 1981 registered doubling in the rate of growth (48.55%) whereas in 1991 the growth rate declined to 39.70 per cent.

It appears that the inconsistency in the population growth is not so much a result of natural phenomena as it is political and economic. After the introduction of 'Inner Line Regulation' in 1873 and its subsequent modifications in the last part of the 19th century, the British regime opened up quite a few military and administrative establishments in the area. It added to the modest rise of population in the first decade of the century. The second decade which faced a world wide decline in the population growth rate due to First World War had its adverse impact on the population of Mizoram, mostly due to withdrawal of British troops from the Mizo soil. The third decade marks a turning point in the history of Mizoram. The Christian Missionaries which from the very beginning (in 1894) were engaged in 'culturally destructive policy' in the tribal belts of India, adopted a more benevolent attitude towards the Mizos. They, therefore, succeeded in making dent in some parts and extended schooling and medical facilities in different areas of the state. This resulted in reduction of infant mortality and also started patching up of inter-tribal feuds which so far used to cause enormous deaths amongst the tribals. Better health facilities like sanitation measures and medicines also showed them the way out from certain diseases which were considered incurable with resultant deaths.

Again, the state experienced a decline in growth rate between 1931 and 1941. This may be attributed to the World War which again forced the with-drawl of British army in late thirties. The rise in growth in post-independence period may be said to be caused largely by gradual incorporation of census areas for the first time in 1951 and 1961. The decrease of growth rate in the decade 1961-71 is believed to have been caused by the historic and infamous 'Mautam Famine' that struck Mizoram in 1959 and which tolled hundreds of lives in the early sixties. Moreover, the armed insurgency that started in 1966 led to senseless killings and perpetuated a sense of alienation and insecurity amongst the people. It might have also adversely affected the census operation. In view of this, the decade ending 1981 experienced the most out-standing rise following the grant of Union Territory status to Mizoram in 1972. A requirement to build up the state and gradual abatement of hostilities thereafter, resulted in the influx of people from outside the state. The state government also wanted the help of the outsiders to develop the state. The government, thus,

encouraged people from all walks of life to come to Mizoram. Thus came qualified persons to man administration, schools, colleges and hospitals: hundreds of labourers also came to help reconstruction works of various types. Besides, it is believed that the population has been positively affected by the migration in the aftermath of Indo-Pakistan war of 1971 and formation of Bangladesh. Frequent floods and political turmoil in Bangladesh still cause immigration to the north east Indian states. The impact of migration is most clear when one analyses the growth rate in the state relative to other states where there had not been influx of immigration.

It has to be noted that the birth and death rates in Mizoram is one of the lowest amongst the north eastern states of India, 22.10 and 4.10 per thousand respectively. Only Nagaland in this part of the country has a lower birth rate at 19.70 per thousand and comparable death rate. Considering the natural growth it is estimated that immigration in the state has been to the tune of about 85,000 to 100,000 persons in the decade 1981-91.

The impact of immigration is also visible in the sex ratio of the state which is the most unfavourable when compared with other states of this region, with 924 females per thousand males except Arunachal Pradesh and Nagaland where it is 861 and 890 females per thousand males respectively. In a community like that of Mizo which treats male and female births at par such skewed sex ratio may only be attributed to migration.

Migration also appears to have influenced the composition of the work force in the state. In a state where influx of people from across the border is regulated by law, it is allowed only to add to the work force. In Mizoram almost half of the total population (49.36%) has been categorized as working population in 1991, the highest in the country. In the light of the fact that about 19 per cent of the total population is under 6 years of age and more than 25 per cent are enrolled in one kind of educational institution or the other the percentage of the working population is certainly very high. It may, however, be suggested that the difficulties of the terrain persuade the people to engage in one kind of productive activity or the other. It is also reflected in the female participation in the economically productive activities which accounts for more than 43 per cent of the total workers. Yet in a state with a small population and despite its ruggedness of a very large area, the percentage of working force to the total population by all accounts is very high. This may partly be explained by immigrating population in working age group. But the major cause of such high

percentage of working population appears to be the primitive subsistence agriculture which despite small yields demands greater involvement of human labour.

Migration, however, has influenced the population distribution and composition of the work force much only in areas which are relatively easily accessible, generally in urban centres which also offer relatively a wider range of gainful employment. In absence of any significant base for the development of industries, the urban centres are preferred by the literate lots seeking employment in governmental and semi-governmental agencies; the government being the biggest employer, in view of a very high effective literacy percentage (82.27%), second only to Kerala which has over 90 per cent literacy, such rural-urban migration is only expected.

A more detailed study of the working population also reveals that despite a high percentage of urban population agriculture provides occupation to the majority of the workers (Table 1.3). As a matter of fact, if one goes by the occupational criterion, only a very few of the 22 centres recently developed to impart specific services will qualify as towns, for about 41 per cent of the urban workers finds their livelihood in agricultural sector. Even Aizawl, the only city of the state may be considered to have a very high percentage (17%) of workers engaged in agricultural sector.

Table 1.3 shows the distribution of rural and urban workers in different sectors of occupation in Mizoram (1991).

In light of the above, it may easily be concluded that the agricultural sector, in a state where only 25 per cent of land is believed to be suitable for cultivation and forestry despite vast area under forest cover contributing a meagre 0.27 per cent to the NSDP, over burdened. More so if one considers the share of agriculture and its allied sector in SDP to the tune of only 33 per cent. Service sector, on the other hand, with lesser employment provides almost 2/3 of the Net State Domestic Product.

The sectoral contribution in SDP, however, appears to be undergoing a dramatic change since 1970-71 when agriculture and its allied sectors used to contribute more than 76 per cent. Consequent upon a heavy plan expenditure and establishment of several development departments coupled with healthy trends in state's literacy campaign, the scenario with regard to contribution to the SDP is changing fast. Literacy, it is believed, helps in the process of finding access to the assets, thus increasing people's

Table : 1.3

| Categorise | Number of workers | Primary Sector | | Secondary Sector | | Tertiary Sector | | Marginal workers (per cent total population) |
|------------|-------------------|----------------|--------------------|-----------------------|---------------------------|-----------------|------|--|
| | | Agriculture | Mining & Quarrying | H.H. Indu. & Manufact | Construc. trade & transp. | Other services | | |
| Total | 290,317 | 65.77 | 0.22 | 2.61 | 8.80 | 22.61 | 6.81 | |
| Rural | 169,337 | 83.69 | - | 0.65 | 2.73 | 12.93 | 5.65 | |
| Urban | 120,980 | 40.69 | 0.51 | 5.35 | 17.29 | 36.15 | 8.18 | |

options of employment and income that are needed for a decent standard of living.

In respect of literacy expansion Mizoram has certainly distinguished itself amongst the states of India. With effective literacy more than 82 per cent in 1991, the state ranks second only to Kerala. The growth of literacy in the state has really been spectacular especially after independence of the country when it was close only to 30 per cent. In a closely knit society like that of Mizos with small village councils having a definite bearing on the social and administrative set ups, educational facilities provided by the government and voluntary agencies especially churches, have been taken full advantage of. And yet there exists intra-state disparity with regard to literacy distribution mostly due to inaccessibility and primitive economy of the regions particularly in the southern district of Chhimtuipui. Moreover, Chakma immigration in this part from the adjoining Chittagong hill tracts of Bangladesh also appears to have affected the literacy percentage adversely.

Table 1.4 shows the distribution of literacy in Mizoram on district level in 1991.

Table 1.4

| <i>Districts</i> | <i>LITERACY (in per cent)</i> | | |
|------------------|-------------------------------|-------------|---------------|
| | <i>Total</i> | <i>Male</i> | <i>Female</i> |
| 1. Aizawl | 88.06 | 90.40 | 85.50 |
| 2. Lunglei | 77.73 | 82.36 | 72.58 |
| 3. Chhimtuipui | 59.11 | 66.14 | 51.24 |

Literacy expansion in the state appears to be bringing about changes in the occupational structure of the state as people strive to find an alternative to an over burdened agricultural sector. But due to resource constraints associated with availability and mobility of resources people find it difficult to be gainfully employed in secondary sector of manufacturing and transformation. As a result, tertiary service sector has been experiencing a disproportionate shift from productive activities.

Table 1.5 shows sector wise distribution of workers in Mizoram from 1971 to 1991.

Table 1.5

| <i>Years</i> | <i>Primary sector</i> | <i>Secondary sector</i> | <i>Tertiary sector</i> |
|--------------|-----------------------|-------------------------|------------------------|
| 1971 | 83.90 | 0.32 | 15.78 |
| 1981 | 73.12 | 0.85 | 26.03 |
| 1991 | 65.99 | 2.61 | 31.41 |

The shift in sectoral employment, however, untenable it may appear, has certainly affected the economy and the developmental processes in the state.

THE ECONOMY

The economy of the state despite attempts to diversify through developmental programmes, essentially remains agrarian. It is reflected in the occupational structure of the state (Table 1.5). About 66 per cent of the total working population is still engaged in agricultural and allied activities. The other important source of sustenance for the people has to be found in the tertiary sector i. e. construction, trade and commerce, transport and other services which together provide employment to more than 31 per cent of the workers. Secondary sector which is represented by small and household industries in Mizoram provides full time engagement to a meagre 2.61 per cent of the workers.

Such an occupational structure, thus, underlines the excessive pressure on agriculture particularly when one considers the inhospitality of the terrain. This is particularly true when one applies MacGregor's 'significance of slopes' on agriculture in the state. He considered upto 21° of slope suitable for agricultural operations, of course, under British conditions. In Mizoram only about 7 per cent of its geographical area falls in this category and maximum land with different agricultural uses is found between 22° and 50° of slopes which account for about 21 per cent of the geographical of the state. Crop farming practised on such gradient is clearly harmful to soil stability and fertility and is reflected in the low yield of crops.

However, about 24 per cent of the total geographical area in Mizoram is set apart for cultivation of different crops. But only about 22 per cent of the cultivable area is sown yearly.

Table 1.6 shows the general land use in Mizoram in 1989-90.

Table 1.6

| <i>Items</i> | <i>Area (in sq. km.)</i> | <i>Percentage of total geographical area</i> |
|--|------------------------------|--|
| 1. Land set apart for cultivation | 5070 | 24.04 |
| 2. Reserved forests | 5618 | 26.64 |
| 3. Protected forests | 1647 | 7.81 |
| 4. Wild life sanctuaries | 782 | 3.71 |
| 5. Remaining area including village forests, wastelands civil use etc. | 7970 | 37.80 |

Though a substantial chunk of its geographical area may be said to be set apart for cultivation, a very small area is given to permanent cultivation. As a matter of fact, only about 3 per cent of the total cultivable land is permanently cultivated. Most of the cultivable land is under jhum cultivation which has a cycle ranging between 3 and 4 years only. In view of the shortening jhum cycle and its adverse impact on ecology and the environment, attempts are, however, made to increase the acreage under ecofriendly agricultural practices through the introduction of 'Jhum Control Programme'.

Table 1.7 shows the agricultural land use in Mizoram in 1988-89.

Table 1.7

| <i>Land - use</i> | <i>Area (in hectares)</i> |
|--|---------------------------|
| 1. Net area sown | 65,000 |
| 2. Current Fallow | 183,000 |
| 3. Net Cultivated Area (1+ 2) | 248,000 |
| 4. Fallow land other than Current Fallow | 259,000 |
| 5. Other uncultivated land excluding fallow land | 81,000 |
| 6. Not available for cultivation | 211,000 |

Mizoram has a cultivable land area of about 5,070,000 hectares. For all practical purposes, however, only 65,000 hectares are available for

cultivation every year. Hence, the share of cultivated to cultivable land comes to only 12.80 per cent. Per Capita share of cultivated land, thus, is less than 0.1 hectare in the state though the share of cultivable land with 0.73 hectares per head, may be considered as one of the highest in the country. Mizoram, however, with about 0.60 per cent of the total geographical area of the nation with only 0.08 per cent of population to support, has ample scope for the expansion of agricultural activities and experimentation with it. It must be noted that notwithstanding government's earnest attempts to adopt 'Jhum Control Programme', Jhum cultivation still persists in larger part of the state and remains a way of life for majority of the people. About 57,000 hect. (1988-89) of land is believed to be under shifting cultivation accounting for about 88 per cent of the cropped area. Remaining 12 per cent area may be classified as under permanent cultivation mostly in small plains in different parts of the state and terraced fields.

Most of the cultivated area in the state, however, is given to cereal cultivation which account for more than 93 per cent of the net sown area. About 2 per cent of the net sown area is also given to the cultivation of pulses and other food crops. In fact, more than 96 per cent of NSA is given to food crop cultivation in the state. Of this about 92 per cent of the area is cultivated only with rice and maize. Rice alone accounts for about 81.5 per cent of the NSA followed by maize with 10.5 per cent.

Table 1.8 presents the area under different crops in Mizoram in 1989-90.

Table 1.8

| | <i>Crops</i> | <i>Area (in hect.)</i> | <i>Area (in per cent)</i> |
|----|--------------|------------------------|---------------------------|
| 1. | Rice (Jhum) | 38,349 | 51.49 |
| | Rice (WRC) | 14,620 | 19.63 |
| | | <u>52,969</u> | <u>71.12</u> |
| 2. | Maize | 6,853 | 9.20 |
| 3. | Pulses | 1,224 | 1.64 |
| 4. | Oil seeds | 3,140 | 4.22 |
| 5. | Spices | 2,940 | 3.95 |
| 6. | Vegetables | 3,900 | 5.24 |
| 7. | Fruits | 3,270 | 4.39 |
| 8. | Others | 190 | 0.26 |

Rice is the most dominant crop in the state. It is grown almost everywhere. Also, almost all the irrigated lands are given to rice cultivation. With the extension of area under wet rice cultivation, the rice production is also rising progressively. It is estimated that the state produces about 59,000 metric tonnes of rice annually at present.

Maize is second important crop cultivated in the state. And though it is grown as a second crop everywhere, its proportion is relatively high in the districts of Chhimtuipui and Lunglei respectively.

Other important crops in the state include pulses, oil seeds and vegetables. Recently fruit orchards have gained popularity in the state particularly in the district of Aizawl. Efforts are also a foot to develop tea and coffee plantations as well as sericulture through government demonstrations farms.

It is obvious that Jhum cultivation remains the most important practice in the state for various reasons. Firstly, the terrain forced the people to adopt such a practice from the very beginning. It became the way of life of the people. Secondly, the lack of irrigational facilities never permitted the cultivators to consolidate their enterprises. Even recent attempts to diversify agricultural pursuits through the introduction of horticulture is met only with limited success for want of market in the vicinity of the state as well as within the state coupled with the difficulties of transportation.

Jhum system is generally a system of monoculture limited mostly to rice and maize cultivation. On a smaller scale, however, farmers may attempt to grow a variety of crops together viz. rice as staple crop and vegetables and other cash crops to supplement their needs of the household.

Practice of Jhum, though, is generally recognized as a wasteful means as yield per unit area is very low especially when related with the high labour input required by the practice and irreversible loss of vegetative as well as soil cover, the practice continues, as alternative methods of soil tilling like terracing or diversification of agricultural enterprises are not yet considered economically viable and socially acceptable.

IRRIGATION

In Mizoram though irrigational facilities are limited, efforts have been made during recent years to bring as much cultivable land under

irrigation as possible. As a result, there has been a gradual rise in irrigated area in the state. At present about 6.25 per cent of the gross cropped area is provided with irrigational facilities, though they receive protective irrigation only once a year that coincides with the rainy season. Naturally, the absence of irrigated water during dry periods has not permitted double cropping in the state and almost all the cultivable land is cropped only once annually.

There are three kinds of irrigation system in vogue in Mizoram, namely :-

- (i) Contour or gravity channels (gully control) for distributing water from hill streams at higher altitudes.
- (ii) Contour or gravity channels with head works built across the stream and tapping water from reservoir. The system has helped in the expansion of terraced cultivation in different parts.
- (iii) Lift irrigation with manual or power devices.

The prospect of harvesting underground water resources in the state is considered bright, for some test borings for drinking water has proved successful in different parts of the state.

LIVESTOCK

Though there is quite a sizable livestock in the state, rearing of livestock for drought and milk is yet to become popular in the rural areas. However, almost every household owns some pigs and poultry but generally for their own consumption.

Table 1.9 depicts the livestock population in the state in 1987.

Table 1.9

| | | |
|----|---------|----------|
| 1. | Cattle | 50,355 |
| 2. | Buffalo | 5,602 |
| 3. | Mithun | 2,103 |
| 4. | Goats | 19,668 |
| 5. | Pigs | 81,505 |
| 6. | Poultry | 8,31,815 |
| 7. | Other | 18,544 |

It is, however, observed that the livestock population in the state has been steadily rising and with government's successful efforts to establish cattle breeding farms, dairy upgrading centres, rural dairy projects, and pig breeding centres, the local people are coming forward to exploit the available livestock resources for their own economic wellbeing.

MINING

In Mizoram mining activities are insignificant as no proven reserve of any significant mineral has been found in the state till date. The insignificance of mining activities is reflected in the fact that only 631 persons were engaged in mining activities in 1991. i.e. 0.22 per cent of the total main workers. The mining activity is mostly limited to stone quarrying in urban centres and their surroundings, as they provide ready market for the stone bricks and chips needed mostly in construction and development of roads and highways. As a matter of fact, about 618 miners were believed to be distributed in 22 urban centres of the state and only 13 in rural Mizoram.

It is, however, believed that there exists a good reserve of the China Clay in the Doyang river valley. On account of the difficulties of the terrain and high transportation cost, the same is difficult to be exploited. Similarly, traces of petroleum have been found but test drills near Kolasib have been found uneconomical for exploitation.

INDUSTRIES

The industrial activities in the state are primarily centred around small scale household works. Weaving, bamboo and cane works and wood carvings have been the traditional cottage industries in Mizoram. But commercial production of these articles are yet to be organized though state owned emporiums try to promote the products. At present these are mostly produced for family consumption.

In the absence of mineral production and abuse of the state's forest resources, the industries based on respective raw materials could not be developed. However, positive efforts are being made to give the state its industrial base through the encouragement to the small scale household industries and their diversification. About 3829 small scale industrial units were registered in 1991-92, and which included as diverse trades as tailoring bakery, furniture works, motor works, saw mills and hotel industries, apart from traditional household industries like carpentry, blacksmithy, tinsmithy, weaving etc.

With increasing acreage under horticulture attempts are, however, being made to develop food and fruit processing and canning industry based on locally available fruits like pineapple, oranges, passion fruits, ginger etc. As a matter of fact, these fruits and spices are grown almost everywhere in Mizoram, They may provide the bases for small units of fruit canning industry in different parts of the state. Similarly, small industrial units may be developed based on the raw materials obtained from the forests, which apart from commercially important timbers are believed to be rich in herbal plants and spicy fruits and leaves.

POWER RESOURCES

Though the state lacks in power resources, the use of electricity has been increasing in mizoram. About 3/4 of the total settlements i. e. about 511 villages and urban centres could be electrified till 1992. However, maximum consumption of electricity is for domestic purposes. The total demand of electricity in the state at present is about 68.07 million KWH against a total generation capacity of about 12.74 million KWH. Of this also 11.82 million KWH or 93 per cent is generated by diesel and 0.92 million KWH or about 7 per cent by hydel projects. Though there are paucity of conventional power resources like coal and petroleum in the state, the terrain and the climate are quite suitable for the development of hydel power. As such attempts are being made to tap the hydel power potential in the state. In the last decades, attempts were made to harness the hydroelectricity through mini-hydel projects with 1.0 MW capacity at Serlui, 1.0 MW at Khawiva and 0.3 MW at Tuirivang.

Recently two major hydel projects have also been undertaken with the help of National Hydro Electrical Corporation and Central Government. They are (i) Bairabi hydel project on River Tlawng with a proposed installed capacity of 160 MW; and Tuivai hydro-project with a proposed installed capacity of 200 MW.

Besides these hydel projects, attempts are also being made to harness some renewable energy technologies especially the bio-gas and solar energy. Tapping of non-conventional sources for energy and rational utilization of the state's hydro-electricity are expected to generate electricity more than the requirement of the state. Thus, the state government may have additional revenue income by selling surplus electricity to the adjacent states. In addition, it is expected to help in the expansion of industrial units and their production. Per capita consumption of electricity

which is one of the lowest in the north-eastern region at 57 KWH, may also improve with increased production and industrial uses.

At present, the state purchases about 55.33 million KWH of electricity from Assam, Manipur and Meghalaya and has to spend a substantial amount of its revenue on this. The situation will be reversed when the installed capacity of power generation will be increased to about 275 MW.

TRANSPORTATION

The undulating and rugged terrain of the state has posed insurmountable obstacles in respect of accessibility. Hence trade and commerce could not flourish. However, with limited resources attempts are being made to join the different parts of the state by road, the only possible and economic mode of transportation within its boundary.

Though the state has been brought on the rail map of the country with 1.5 k. m. of track and Bairabi providing the rail-head within the state, it has hardly improved the accessibility pattern.

In absence of other mode of transport, therefore, roads provide the only intra-state transport linkage in Mizoram.

There are three major categories of roads in the state viz. - (i) National Highway, (ii) State/District Highways, and (iii) Rural Roads.

The total length of roads in Mizoram is about 4850 k. m. of which 1760 k. m. or 36 per cent in metalled and 3090 km are insurfaced. The road length of 23 km per 100 km² is the lowest in the north eastern region with the only exception of Arunachal Pradesh where it is only about 18/100 km². The density of road in relation to the population, however, is certainly very high with about 10 km of roads for every 1000 persons against about 3 km of roads in the north eastern region and 2.27 km per thousand population on national level.

The national highway no. 54 provides the trunk route between Silchar, the nearest market in the north and Tuipang in the southern most corner of Mizoram. It crosses the whole length and divides the state in almost two equal parts. The total length of this road within the state is about 531.7 km. Besides the national highway, there are quite a sizeable length of state highways and district and village roads.

Table 1.10 shows the distribution of different types of roads in the state (as in 1990).

Table 1.10

| | <i>National Highway</i> | <i>State/Distt. Roads</i> | <i>Rural Roads</i> | <i>total</i> |
|------------------|-----------------------------|-------------------------------|------------------------|---------------|
| Surfaced roads | 531.7 | 1175 | - | 1706.7 |
| Unsurfaced roads | - | 1141 | 2003 | 3144.0 |
| Total | 531.7 | 2316 | 2003 | 4850.7 |

Almost all the district and block headquarters have been linked by roads constructed and maintained by the State Public Works Department as well as by the Border Road Transport Force (BRTF):

TRADE

The state though has a potential for the development of trade and commerce, the trade remains almost a one way traffic. As the state has essentially a subsistence economy unable to fulfil the requirement of the people, almost all the commodities including food stuffs are brought from other states.

Silchar, and Guwahati in Assam, Shillong in Maghalaya and Calcutta in West Bengal are the biggest market for Mizoram. Silchar and Guwahati are the major centres for food stuffs whereas from shillong and Calcutta clothes and other consumer goods are brought. The state, on the other hand, except for some agricultural produces like ginger and squash and some fruits, has nothing to trade with. No doubt the Mizo handicrafts may attract a popular market outside the state, but very little effort has been made to organize their production, and marketing in an aggressive manner.

Most probable reason for such trade imbalance in Mizoram is the over dependence of people on a lowly productive agricultural sector and resource consuming tertiary sector especially the service sector. It is reflected in the total share of different sector to the total NSDP which is about Rs. 28076 lakhs at current prices.

Table 1.11 shows the percentage of Net State Domestic Product of Mizoram sectorwise.

Table 1.11

| <i>Industry group</i> | <i>Contribution (in per cent)</i> |
|--|-----------------------------------|
| 1. Primary sector including agriculture | 33.75 |
| 2. Manufacturing, Construction, Electricity, Gas, and Water supply | 17.96 |
| 3. Transport, Communication and Trade, Banking and Insurance, Real Estate | 13.28 |
| 4. Ownership of dwelling and business service | 1.77 |
| 5. Public administration and other services | 33.24 |

It is obvious from the table that though agriculture and its allied sectors provide employment to about 66 per cent of the workers, it contributes only 1/3 to the SDP. The other sectors with much lower employment contribute much to the NSDP. This is largely because of heavy plan expenditure and establishment of several development and welfare department.¹⁹ It is also reflected in the per capita income of Rs. 4135 in Mizoram against Rs. 3157 for the North East Region and Rs. 3319 for India as a whole. This may appear to place the state in much comfortable position as compared to its neighbours but the price index due to high transport cost, heavy investment of public outlays and excessive profit makeup²⁰ is also higher by at least 122 per cent to the national average and about 113 per cent of the average price index in the North Eastern Region.

Moreover, despite a high per capita income the state is faced with the problem of growing unemployment among the educated youth, the widening disparities in the society and increasing rural-urban migration.

At present, about 36,000 people are registered with the employment exchange which accounts for about 12.5 per cent of the total main work force. This is certainly a very high percentage in a state with a small population. Growing economic disparities amongst the people is also reflected in a large scale rural urban migration which appears to be disrupting the social structure of an otherwise cohesive and closely knit Mizo society. In fact, the existing understanding of development which advocates economic and sectoral development, appears to be straining the very social fabric of the society and goes against the philosophy that has sustained the Mizo society and culture till to date. This necessitates respraisal of the state's resources and a plan to use them rationally for the

benefit of the people who are the ultimate target of all the developmental processes.

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