

Study on the Evolution of the Farming Systems and Livelihoods Dynamics in Northern Chin State



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SUMMARY

Chin State has been often characterized among all States and Regions of Myanmar as the highest poverty gap ratio, highest occurrence of food deficits, poor road connectivity on steep mountain ridge and narrow valleys, low population density but lowest percent availability of cultivable lands and high percentage of waste and scrub lands, adherence to the shifting cultivation system, lack of rural based industries, and higher rate of out migration. Group of Research and Exchange of Technologies (GRET), French-based INGO has been for more than 17 years implementing the livelihood programmes and natural resources management (NRM) scheme in Northern Chin State. This study has been conducted in four townships of the northern Chin State in 2012 to assess the evolutionary process of farming systems, the changing livelihood strategies, changing agents and to recommend future actions. Field trips to 12 sample villages in four townships, focus group discussion, case studies, desk review, and collection of secondary data and application of GIS-RS were performed to meet the expected outputs.

Shifting cultivation system is major livelihood of majority of poor farmers. Maize -based subsistence farming had been and is still changing towards rice-based semi-commercial farming system. Terracing has been developed since 1960s but the changing process was slow. Only better-off farmers attempted terracing. There is prevailing equity in assigning taun-yar (shifting cultivation plot) lands to villagers. There is mixture of communal land and private hereditary lands in taun-yar land use but the low- land paddy fields and terraced fields are private-owned. In the last 20 years, maize was staple food supplemented with sulphur bean, millet, beans and vegetable. Rice was luxury food and dietary change to rice as staple food occurred in association with development of low-land paddy fields in the mid-1960s and changing process became rapid after 1970s. Evolution of terraced fields was slow until 1990s. The present decade (2001-2010) marks the mass adoption of terracing practices due to the assistance of the UN agencies and international and national NGOs.

Due to increased population taun-yar cultivation had shortened the fallow period accompanied with yield decline. It was found that taun-yar cultivation provides maize from 3 to 6 months only in a year to farmers who rely on other income sources for the food need of the remaining months. Low land paddy cultivation provides staple rice for the family need of 5 to 7 months in a year. Livelihood combination is necessary to meet the year round requirement of food. The assistance of GRET as changing agent are guidance in site selection, hands-on training on terracing, tapping water resources, methods of soil conservation or mulching with crop residues on bare soil, injection of food for work or cash for work, all these packages have good impact on the livelihood of the beneficiaries as well as natural resources conservation. For future gain in economic viability in farming, improved fruit trees culture, integrated resource management with local governance, access roads and markets, agro-forestry practices are issues of concerns.

I. INTRODUCTION

Group of Research and Exchange of Technologies (GRET), French-based INGO has been for more than 17 years implementing the livelihood programmes and natural resources management (NRM) scheme in Northern Chin State, Myanmar and has been acknowledged for its experience and rich knowledge of the project's area. It aims at improving the livelihoods of the vulnerable households by promoting sustainable livelihood and NRM schemes as well as building the capacities of local actors and communities in order to ensure the sustainability and appropriateness of any actions.

The Northern Chin farming systems are based on shifting cultivation systems with a marked reduction of the fallow period (from 15 ears to 6-9 years) in the last decades. The overuse of land and overexploitation of natural resources have led to high rate of deforestation and severe environmental degradation and climatic changes. As a direct consequence, the food production has considerably decreased and households suffered a food gap varying from 4 to 8 months. The steepness of the slope and narrow valley of the common phenomena of the Chin mountain land systems have also led to high land development costs, lack of access to agricultural inputs and few provisions of technical services and moreover difficult communication weakens the marketing channels. Due to lack of job opportunities, migration in both temporary and permanent increased to ensure that the remaining family members could be supported by remittance.

Meanwhile there are local initiatives by individuals and communities to evolve more permanent and sustainable farming systems and contribute on a long term basis to the poverty alleviation and food security through agricultural intensification and diversification, increase of productive resources and improved management of the natural resources. Local communities, public services and development organizations have been highly engaged in building the resilience of the Chin population towards adverse events and climatic changes to reduce the vulnerability of the families towards the uncertainties of food production and irregularity of incomes.

1. Objectives of the Study

Accordingly, a field survey and comprehensive study on the evolution of the farming systems and livelihood dynamics in the Northern Chin State has been conducted in the months of January to February, 2012 with support from GRET Chin project office, Yangon and Hakkha. The main purposes of this study are to provide:

- i. A comprehensive analysis of the evolution of the farming systems and livelihood of the Chin villagers
- ii. A good picture of the initiatives in places in order to better tailor the humanitarian and development interventions to the local situations and existing needs and opportunities. Based on the output of the analysis, GRET will organize workshops with different stakeholders to present the findings and learning and discuss future livelihood strategies and potential alternatives to be developed by development actors.

2. Expected Mission Outcomes

The finalized report is required to deal with in detail:

- iii. An overview of the main agrarian and livelihood changes occurred in the last decades.
- iv. A characterization of different agrarian and livelihood systems currently developed in the Northern Chin State. When analyzing the different farming systems, the consultant will take into consideration the agro-eco-systems, socio-economic factors, and tenure and impact of those systems on the environment and management of natural resources. Diversity of the agro-ecological and socio-economic situations of the four study townships will also be observed.
- v. Information on the financial strategies of the households will also be provided.
- vi. Identification of the constraints and opportunities to further improve and develop more sustainable farming systems and livelihood activities.
- vii. Presentation of the individual and collective strategies developed by Chin communities for coping with changes

3. Methodology

a) Selection of Survey Areas

The study mission has been undertaken in Hakha, Falam, Thantlang and Tedim townships. Three GRET-assisted project villages in each township have been selected for study presumably representing diverse agro-ecological and socio-economic situations and different livelihood activities of the whole project areas.

Table 1 ***Selected project villages for survey in four townships of Northern Chin State***

Township	Village 1	Village 2	Village 3
Hakha	Zathal (Sakta) *	Tiphul (Tiphul)	Tinam (Tinam)
Falam	Ramthlo (Ramthlo)	Thanhniar (Laizo)	Phaizawl (Phaizawl)
Thantlang	Congthia (Congthia)	Farrawn (Vanzang)	Sihmuh (Thangzang)
Tedim	Ngennung (Vulvum)	Laibung (Laibung)	Suangzang (Suangzang)

* Name in parenthesis is village tract name.

The GRET assisted projects have been operated since 1995 in four townships of the Chin State, viz; Hakha, Falam, Thantlang and Tedim. The coverage of villages under GRET project represents 24.1 % of total villages of the four townships. GRET covered initially 56 villages and has now extended to 105 villages in the latest project phase. Survey programme of this study has covered 12 villages in four townships as stated below.

Survey schedules were prepared and implemented as stated in Appendix Table 1.

Four survey team members of GRET (residence local staff of Hakha, Falam, Matupi and Tedim respectively) assisted the survey programme in translating the local dialect and compiling the data and information. The survey team members are listed in Appendix Table 2.

b) Focus Group Discussion (FGD)

Semi-structured and open-ended questionnaires were prepared in consultation with the Chin GRET project manager. Local knowledge of the junior Chin researchers was also taken noted during the preparation stage. Major points included in the survey questionnaire are dealing with the past and present situations of household diet and consumptions, their livelihood activities, farming systems, food costs, changes in dietary habits, old and current practices of taun-yar (shifting cultivation), dynamics of fallow and cultivation circles of taun -yar system, change in staple foods consumption with respect to wealth classes of the communities, their access to land resources and off-farm activities, changing pattern of the unstable shifting cultivation to permanent farming and terracing, local initiatives and intervention of the government and development organizations in natural resources management, changes in ecology, migration pattern, population pressure and carrying capacity of the land resources, transport routes and market channels of foods directed to the Chi State, gender issues, costs of cultivation and comparative advantages of farm commodities and assessment of their long-term survival, coping strategies of the local communities to alleviate food shortage, etc.

During the FGD, age-old peoples were first invited to discuss the last 10 to 20 years situations of the local environment, settlement pattern, and farming systems dynamics, which were comparatively asked together with the present situations. The perception of both old and young peoples was also recorded.

c) Individual Data Input and Community Profile

At least one-third portion of all households in each village were invited to gather the information on the access to different types of lands, crop outputs, number of months that could be fed to the household with such outputs, his off-farm activities to supplement the food need, number of migrant workers in a family, etc. List of individual households owning number and types of lands according to the wealth class of the village was compiled with the help of the Village Administration Council and GRET community leaders in the respective village. Structured information was gathered for getting community profile

d) Transact Walks and Record of Ground Truth

Visit to the households and village structure was recorded and if necessary digital photo record and geographic positioning systems (GPS) readings were taken. Field visits were made to rapidly assess the farming and livelihood activities. Natural vegetation, land forms and infrastructural development were observed inside and outside the village.

e) Determination of the Equity in Access to Lands

Access to agricultural lands, size and type, was compiled in terms of class intervals and frequencies and Lorenz Curves were constructed according to the standard method. By comparison, similar data set was obtained during the previous survey in GRET -assisted villages in Monywa Township. Distribution of land ownership was compared in Chin village and plain land village of Upper Myanmar by means of Lorenz Curves and Gini-Coefficients.

f) Assessment of Population Pressure

Population intensity is customarily expressed in terms of population density, i.e. population per sq. mile or population per sq. km. Such density figures are not indicative of real population pressure on natural resources. A better measure on rural areas can be found from the optimum population Index as modified from Misra et al. (1979).

Index of population pressure (I) = $(P1) / A$

Where:

I = index of population pressure per sq.km of the rural area

P1 = Region-wise derived rural population capable of being supported by the utilized land resources by assuming a constant income per person.

A = Total area of the rural region at a particular point in time.

P = Actual rural population at a particular point in time.

P / A = Actual population density of rural area per sq. km.

In attempt to assess the carrying capacity of the Chin project areas, population census data were compiled from various departments with some difficulties. The contact government departments are Department of Immigration, Department of General Administration and Chin State library sources, altogether with the former British Administration documents, Chin intellectuals and Catholic and Baptist missionary old records. It was expected that the old and current records of population will tell us if there is real population pressure in the past and in the current times affecting the livelihoods in terms of carrying capacities of the existing natural resources, the productivity and output values.

g) Land Use Factor

In our next attempts to evaluate the farming systems dynamic moving from the shifting cultivation to semi- permanent and permanent farming systems, the land use factor as expressed by "R" value (Ruthenberg, 1976), referring to my old lecture note during the schooling days at the University of Florida, U.S.

R = percentage of land involved in the rotation that is being cropped in any one or more years.

R % = $[C / (C + F)] \times 100$ Where C = years in cultivation

F = years in fallow period

R value will be applied to avoid the arbitrary boundary between shifting cultivation and semi-permanent rain-fed farming.

R indicates relationship between crop cultivation and fallow period within the total length of one cycle of land cultivation. Shifting cultivation system has generally expressed the R value of 10. The larger the R value, the more stationary character of the farming system. If R exceeds 30, we can hardly speak of it as shifting cultivation. It could be regarded as semi-permanent farming. If R value exceeds 70 %, permanent farming is said to be practiced. An R value of 150 would indicate 50 % of the area is carrying two crops a year.

h) Land Cover/Use Map of Northern Chin State

Chin Hills have often been characterized by shifting cultivation, deforestation and loss of land covers. Some talked about this issue at the rural village tract level, some at urban level and some at the whole state level. In this study programme, the respective satellite images were downloaded covering the ground truth data taken at the visiting project rural sites (village tract level). Moreover assessment has been made over the whole Chin State. Land covers changes are numerically recorded for all village tracts area in the northern Chin State. An overview of land cover/use classification of the project area using remotely sensed data was briefly documented as follows.

To produce a land cover/use map, there were many decisions, choices, and compromises regarding image selection and analysis methods depend on the study area and available resources. Although the terms "land cover" and "land use" are sometimes used interchangeably, they are actually different. Simply, land cover is what covers the surface of the earth and land use describes how the land is used. For conservation priority purpose, the output classified map includes a mix of land cover and land use (commonly use "land cover" map). The important thing is that each class on the map be clearly defined and distinct from other classes.

i) Satellite Data

When selecting satellite data, the main objective was to have a basic coverage of satellite data for the entire project area with every part of the area covered by cloud free data. According to the project need, medium resolution satellite data was considered the most suitable satellite type for producing the land cover database, taking into account the cost and time limits for the production of the database. After initial studies, it was decided to use the Landsat ETM+ data and IRS data acquired in dry seasons of 1990, 2000 and 2010.

Reference Data

Different types of reference dataset were used in the classification process. The main reference dataset were country-wise data such as 1:50,000 scaled topographic map, very high resolution Google Earth data, and ground truth data collected from field survey march 2012.

Land Cover Classes

The basic principle when defining the Land cover class was to make the dataset to "Level-1" classification, using the legend and class descriptions of the existing land cover data produced by the Forest Department. Whenever necessary, the Level-1 classes may be further divided into two or more subclasses depend on the field observations and applications.

The classes listed below are the land cover and land use classes for the project area;

1. Closed forest (canopy > 40 %, vegetation height > 3 m)
2. Open Forest (canopy < 40 %, vegetation height < 3 m)
3. Scrub/Bush/Grass Land
4. Agriculture (Le/Yar - Terrace) slope < 30 % was assumed as paddy land
5. Agriculture-Taun-yar
6. Water Body

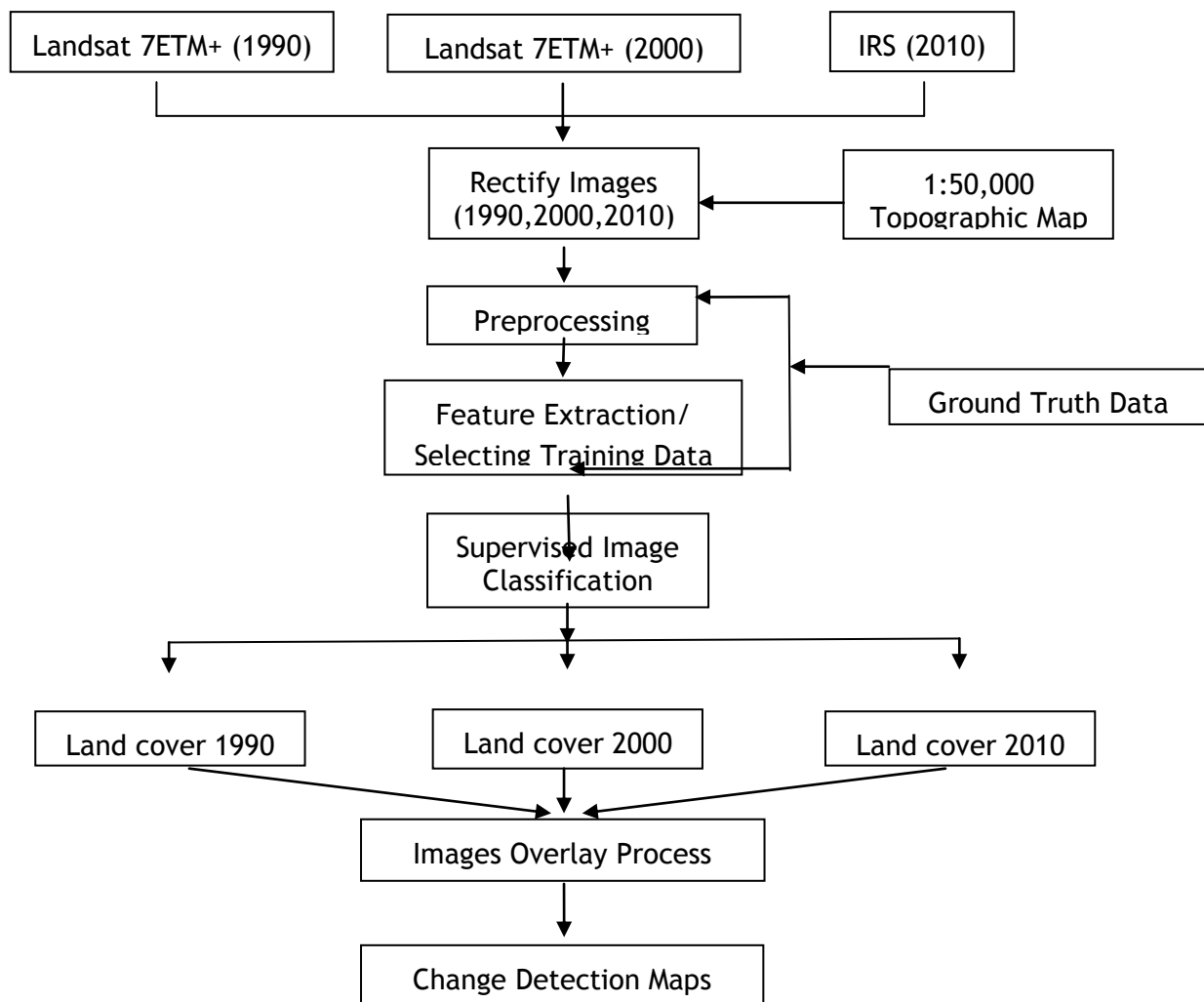


Figure 1 *Flowchart of Land cover Change process*

Classification Methodology

Before deciding upon what classification methodology to use, several criteria have been considered:

- Obtaining a product of high quality
- Create a methodology that is repeatable (for updating purposes using field data)
- Time and cost efficiency in the production work

These criteria indicates the need for an automated procedure, class labeling each pixel by integrating different types of geographical datasets and satellite data based upon their characteristics with logical, predefined rules. In order for an automated classification algorithm to associate pixel values with the correct land cover category, the inputs from the reference data were used. This procedure was referred to as supervised classification.

There are several types of statistics-based supervised classification algorithms. With Maximum Likelihood classification algorithms the analyst first located and defined samples called training areas in the image of each class that are required for the final map by using the inputs from reference data.

In order to achieve the best quality - within the limitations set by the spatial and spectral resolution of the satellite data, the nature of the reference data and the time and cost limits for the project - the final Land cover product obtained different input data from diverse sources as possible. This means that the final product not simply is based on only the results from the classification of the satellite data, but also from integrating land cover information from reference data and key informants.

Hence, the final product can't simply been seen as a classification, but more as a GIS generated product. Some classes were handled separately by manual editing with update inputs whenever possible and then combined in the final steps of the classification process.

Accuracy and Validation

All land cover maps are commonly made without visiting each site except for not more than 20 sites. For a specific purpose on the GIS guided monitoring, field visits to the study area need to be definitely made. Main reason for field visit is to collect data that can be used to evaluate the land cover map and estimate the accuracy of the individual classes (a process called validation). Data collected in the field must be geo-referenced by using GPS device so that the point where the data were collected can be located on the imagery.

Application

This classified data can be used for a host of any quantitative analysis applications such as conservation priority. They can also be used as visual aids in a presentation or as a layer in a Geographic Information System (GIS). It is important to keep in mind that a classified map is only an approximate representation of the features on the ground. The accuracy of this representation can greatly affect the results of any quantitative analysis.

II. Presentation of the survey cases

1. Location and Geography

The Chin State, in North Western hilly part of Myanmar, lies between latitude 24° on the north and latitude $24^{\circ} 45'$ on the south and between longitude $94^{\circ} 5'$ on the east and $93^{\circ} 20'$ on the west (Map 1). The hill tracts form a parallelogram and is stretching from north to south in 402 km (250 miles) while its breadth varies from 161 km to 241 km (100 to 150 miles), covering an area of 35,992 square kilometers (13,902 sq. miles). Mountain topography is a very irregular and rugged surface forming continuous ridge with interconnected hills of steep slope. The ridges are separated by narrow valleys, forming into saw tooth outline. Underhill mini plains are narrow and isolated. On Chin hill tops, there is rare to see extensive plateau as in the hilly areas of Shan State. The main ranges vary in height from 1,524 m (5000 ft.) to 2,743 m (9,000 ft.) above sea level. In the north the most striking peak is Kul (called Kennedy Peak) with 2,700 m (8,860 ft.). The largest river is Manipur. The bed of the Manipur River below Falam is about 396.3 m (1300 ft.).

In the times of British colonial administration, Chin Hills are constituted as Scheduled District under the Notification in 1886 and after Myanmar gained independence it was designated in 1961 as Chin Special Division and it was reorganized as Chin State in 1973 under the constitution of the Socialist Republic of the Union of Burma. Under the present parliamentary government, the Chin State government body has been formed to directly operate the state level administrative and development affairs.

Despite the fact that the Tropic of Cancer crosses near the township of Hakkha, capital city of the State, it is hard to say that Chin Hills are characterized by tropical climate. The climate, judged at an elevation of 2,500 to 6,500 ft., is considered to be sub-tropic. Total annual normal rainfall recorded at Hakha is 1850 mm (73 inches) Figure 2. Total annual rainfall at Thantlang is recorded to be about 2032 mm (80 inches) (Appendix Table 3). The coldest period in Hakha extends from December to February with minimum temperature going down to - 4°C.

The warmer months are May to September with the maximum temperature of about 25°C with small diurnal range. The night temperature during the summer and monsoon period is moving around 10°C to 12°C. (Figure 2) Frost usually occurred in the months of December and January at Falam, Hakkha, Tedim and Mindat and around January at Thantlang and Tonzang.

Climate and weather vary also with respect to topography and elevation. At bottom valley at Larva stream near Thantlang, kapok trees (silk-cotton trees) are found growing in bunches indicating a habitat of tropical climate in that pocket area (please see photo section Figure 53).

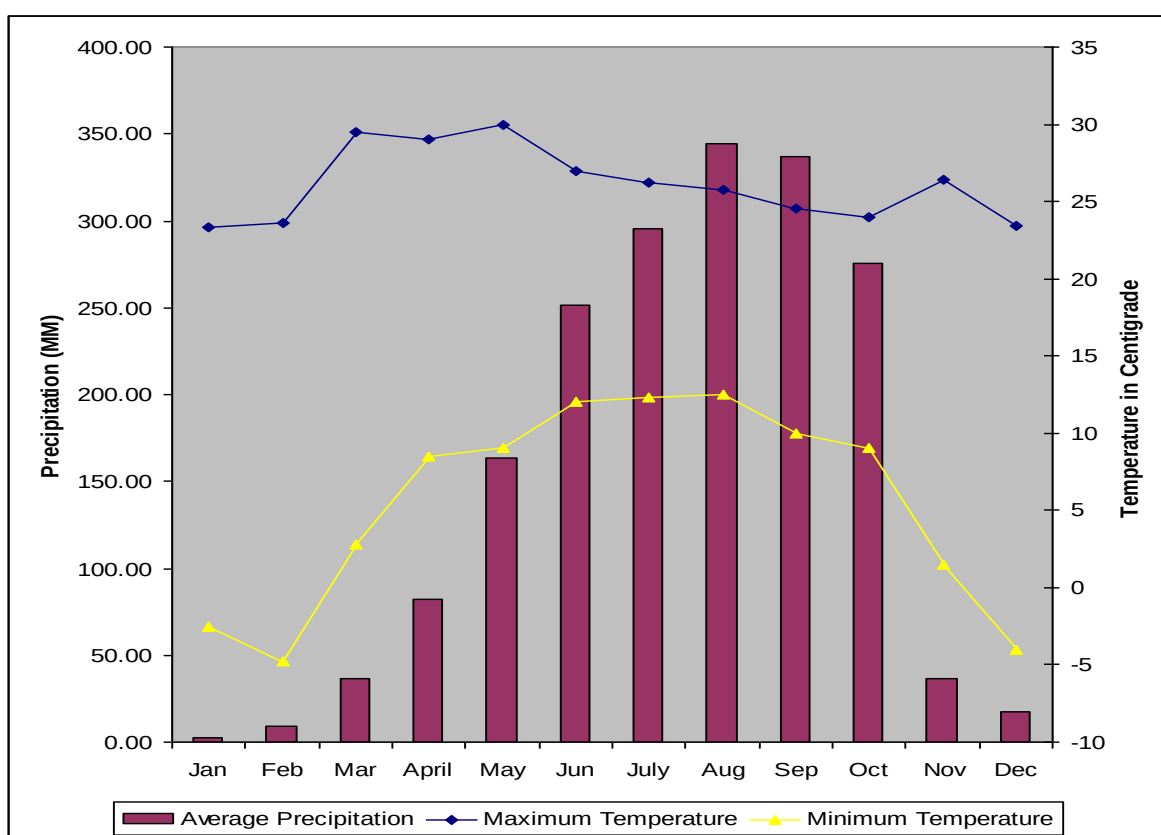


Figure 2 *Monthly rainfall and maximum and minimum temperature, Hakha, 2011*

The mountain land system is primary determinant in varied situation of weather, climate, tribal settlement pattern and their livelihood. Figure 3 shows the general features of the mountain land system. One could see a Chin Hill village or any settlement areas by taking into the features of this mountain system and it will help characterize the area concerned. In later chapters, brief description of mountain land system will be given wherever relevant with the aid of the GIS images.

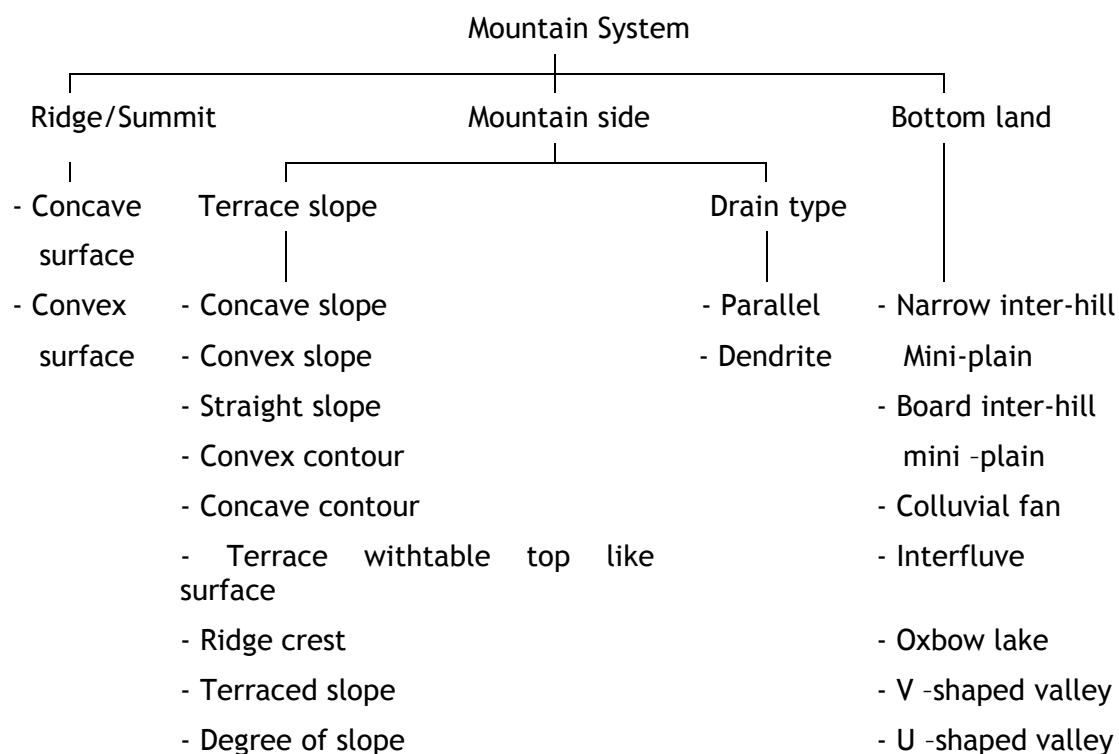
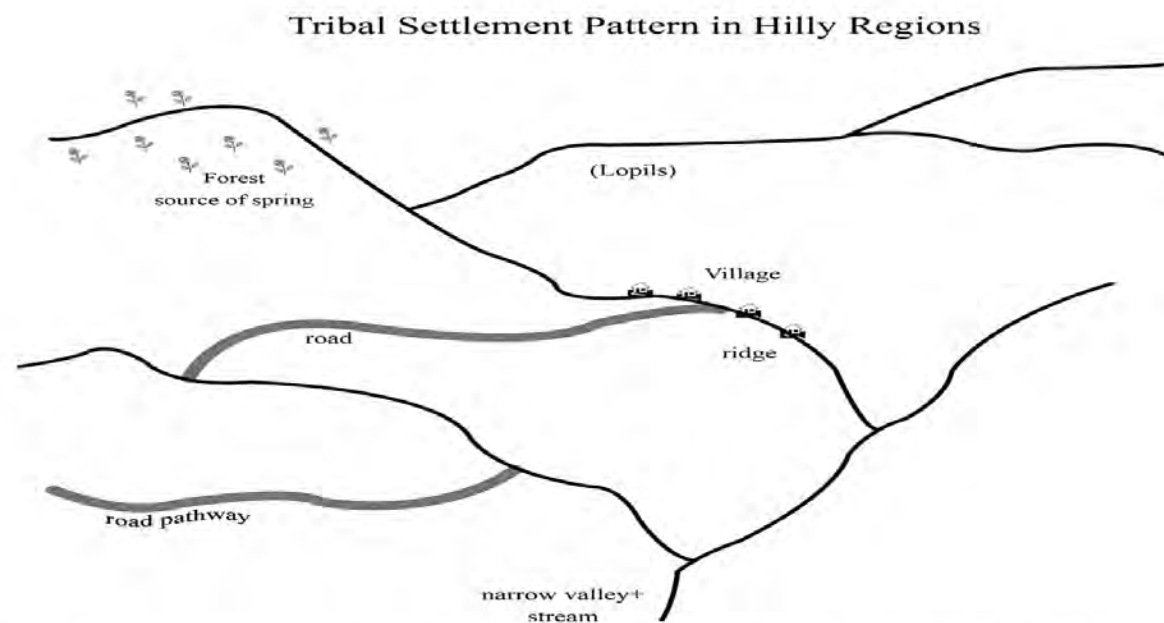


Figure 3 General features of mountain land system

2. Settlement Pattern

Sources of Chin settlement history are varied as oral, stone inscriptions, literature and archives. As oral sources, folklore, folksongs, hymns, and rituals had been interpreted for the early settlement of Chin in the absences of historical evidences. According to Professor Luce (1959), the Chin of the Tibeto-Burma Group, descended from western China and eastern Tibet into the south via the Hukong valley. Chin in the Chin Hill, Myanmar and Lushai in Lushai Hill, Mizo (Indian side) belong to the same group collectively known as Kukis. Evidences have been often quoted that the Chin of Myanmar first settled in Chindwin valley. Professor Luce suggested that the Chin settlement in the Chindwin valley began in the middle of the eighth century referring to the Pagan inscriptions¹. In thirteen century, Shan gained rising power in Upper Chindwin and Central Burma, and the Chins were pushed up to the hills. A vast majority of the Chin people moved over to hill regions of the present Chin State in Myanmar and Manipur State in India and the Chittagaung hill tracts in Bangladesh (L.H. Sakhong, 2009). In Myanmar Chin hills, the moving Chin split into different tribal groups speaking different dialects, with different tribal names. F.K. Lehman (1963) depicted that Chin in the north settled on the ridges and other in the southern Matupi Subdivisions, settle near river banks while some Kanpelet villages extend from a stream bed up a very steep slope onto a defensible spur.

¹ G.H.Luce, 1959. Chin Hills- Linguistic Tour (Dec. 1954), University project, Rangoon University



➤ Shifting cultivated plots are usually found on the elevated area ranging from 3000 ft. to 6000 ft. .
Going down from 3000ft to the valley bottom, there usually occur malaria- infested stream.

Figure 4 *Typical location of Chin village*

In the study area, Chin settlement pattern could be observed that the villages were established with orientation to secured and defensible position, access to farming and water sources. In the typical settlement diagram, villages are on the mountain spur with a good view to all cardinal points. Way above the village, there usually is mountain peak clothed with forest and source of mountain spring. Shifting cultivation (taun-yar) fields (Lopil²) are locating around the surrounding mountains and hills ranging from 3000 ft to 6000 ft. Going down to valley bottom of 3000 ft. to 1000 ft., there usually occurred malaria- infested stream and the tribal people in old days did not customarily lay out paddy fields or cultivate near stream banks (Figure 4). Lowland paddy cultivation was not their livelihood activity until the last 50 to 70 years ago³. Valley bottoms are also too narrow to allow the village settlement. Moreover, village, if it is located at the valley bottom would be far away to their Lopil fields to carry up and down of their farm outputs. Thus the Chin villages are generally up on hills. Malaria-borne mosquito (*Anopheles* mosquito) could not fly 3000 ft above sea level. However, 3000 ft. may no longer be the definite limit of safety due to the encroachment of global warming effect in present days.

In Myanmar, it has been often said that settlement pattern varies with respect to habitat of ethnic groups. The following upland ecosystems have been associated with settlement pattern of different ethnic groups.

² Lopil : The term “lopil” is used in Hakha, Falam, Tedim and Thantlang meaning shifting cultivation field rotated from one location to another within the boundary of their traditional land use right. The smaller divisions are called by the Chins as “lo” and will be referred to as “plots”.

³ Based on the documented reports on The Chin Hills by Carey, B.S. and H.N. Tuck (1987) Govt. Press, Rangoon pp. 212. and my survey findings (January -March, 2012)

Table 2 Upland Agro-ecological Systems in Association with Settlement Pattern of Ethnic Groups of Myanmar (common observation)

Elevation (Indicative approximation)	Crops commonly grown	Common settlers
6000 ft.	Apple / pear	Chin / Kachin
5000 - 6000 ft., steep slope	Maize, millet, buckwheat, avocado	Chin / Kachin
3000 - 5000 ft., steep slope	Tea, walnut, wheat, avocado, potato, maize, millet	Palaung *
Moderately high, < 3000 ft.	Paddy, maize, coffee, taro	Karen* */ Shan
Valley bottom, near stream bank	Lowland paddy, sesame, maize, pulses	Shan / Danu ***

* Palaung also do not usually take risk of mosquito. In day times they go down the bottom valley and work there and before dark they hurriedly go up the hill.

** Karen may adopt combination of permanent wet -rice mono-culture on bottom land and shifting cultivation for upland rice on adjacent forested hill sides.

*** Shan /Danu may probably possess indigenous medicine or herbs to keep cure of the malaria.

In the flat plain area of Myanmar, villages were originated near the rivers and the settlement pattern of the communities was clustered around the rivers. Later the settlement expanded not only along the rivers but also along the road transportation networks. In the settlement pattern of upland villages of Chin Hills, on the other hand, access to the transportation network was not the major factor and it was particularly true in the old days under the subsistence economy system. The defensible position, suitability of upland terrain and topographical surface unoccupied by any community may be the first selection criteria for settlement site of the tribes of pre-annexed times.

The author tempts to validate this assumption when he suddenly saw the terrain of Sihmuh, a remote village of Thantlang township after his team crossed three or four mountains with risk, fatigue and difficulties. The terrain near the village assumed a gentle slope, large and smooth surface upon which several plots in lopil are seen. The old village site was not seen due to relocation (Figures 98, 101 and 103 of Photos). Villagers said that it was established in 1880. For earlier settled villages, the located site will be in better position in terms of capacity for defence, proximity to running water and fields, presence of shelter from wind and accessibility. In the case of very old village such as Ramthlo, Falam, topographical surface of its lopil is relatively smooth and slope is gentle. In present days, the motor road from Falam to Hakha is passing by the village (Figures 88 and 76 of Photo section).

3. Upland Ecology, Households, Land and Land Tenure Bounded by Tribal Community Culture

In Chin society, land was a spatial term which symbolized identity, culture, traditions and spiritual value (Vanlalbruaia, 2009). To them there are two types of lands - village or settled area and general country side or home land. Both types include not only the village, fields, forest and water resources but also had spiritual implications. Maintaining a balance between people, their village and spiritual realm was required for the stability of their community.

Upland Ecology Community, Land, Household and Land Tenure Relation

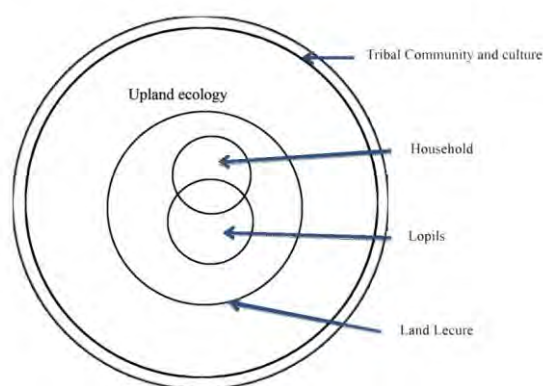


Figure 5 Hypothetical diagram showing land-man relationship was imbedded within ecosystem and tribal community culture

According to their customary land tenure, it was generally assumed that all land belonged to the community chief. If he claimed that “This is my land or my territory”, this does not mean that land was the sole property of the chief. He may be the keeper of their land rather than the sole landlord. The community under the stewardship of the chief had the right to use or share the natural resources which signified the mutual respect and interaction between the spirits, nature and people. This traditional concept of land gave birth to community ownership of land. Such community tradition and culture attempted to harmonize with the ecosystems of their land and bind together the households, land and shifting cultivation field (lopil) (Figure 5). It will be examined in later Chapters how and why these processes and patterns have been changed with passing time.

4. Location of Village in Relation to Forests, Taun-yar (Lopils) and Paddy Land

Chin villages are normally located on the mountain spur. There is a quadrant or circular belt of forest about half a mile away from the periphery of the village, keeping it a safe distance from the possible spreading forest fire. This forest belt is also generally protected allowing no villager to collect fuel or timber wood. Similar practice may be applied to the forest near the source of mountain spring on top of the mountain. If the outer circle is under the community forest, this zone is allowed for collection of fuel wood and timber. Taunyar (lopils) fields are lying in the periphery area of the community resources boundary (Figure 6). It will take one and half to two hours per foot-path trip from home to taunyar plots.

Typical location of Chin village in relation to forests and shifting cultivated plots (Lopil) in a given ecosystem.

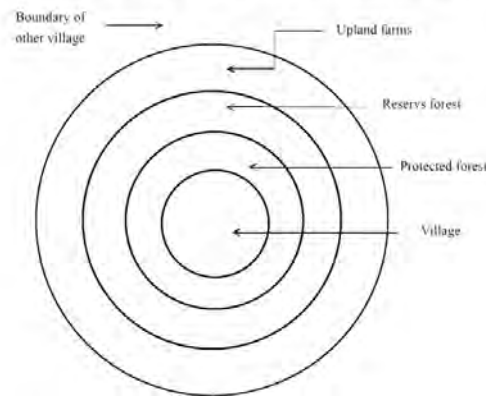


Figure 6 Schematic diagram showing village location in relation to forest and lopils

The lopils (shifting cultivation fields) are the integral part of the village settlement and walking distance between the two usually takes one to two hours or about 7 miles within. Over a period of half century, behaviour changes and livelihood diversification have led to the establishment of lowland paddy fields and orchard grooves. A particular case could be seen in Farrawn village, Thantlang Township (Figure 7).

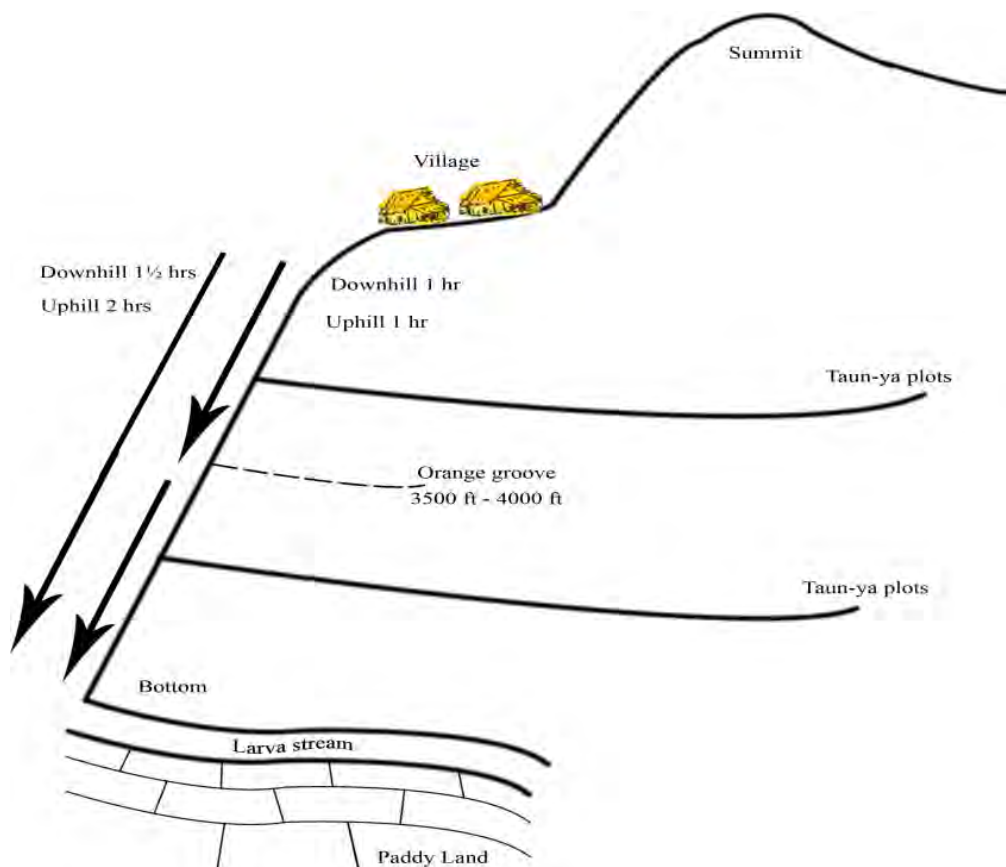


Figure 7 Walking distances between the village and the types of land
(Sketch of Farrawn village, Thantlang Township)

For a better understanding of the Chin settlement pattern, digital photo records and GPS - guided satellite images over the study villages have been taken. The satellite map of the Ground Truth data (Point 2), taken over Zathal village, Hakha Township, the village location could be clearly seen with nearby pine forest hill. The opposite side to the village and forest, there lies a large mountain range with moderate slopping on which several patches of taun-yar (lopils) plots could be noticed. Lopils and the village are not as close as that to the forest. Paddy fields are lying by the side of Boinu River running beyond the pine forest. It could be seen in the Ground Truth Point 3 satellite image. There is a broad inter-hill mini-plain. Zathal and the nearby village, on either side of the stream had customary access to the paddy lands in such a way that the village could work on the paddy fields occurring on the respective village side of the stream. The stream course in the inter-hills sometimes is running in semi-circle way leaving a wide flood plain beside the stream bank for the villagers on the corresponding side. If the next semi-circle turn of the stream leaves another flood plain beyond the corner of the inter-hills, this portion will be entitled to the opposite village of the former one. The digital photo record of Figure 79 could be matched with satellite map of Ground Truth Point 3. The river side is the natural boundary of the two villages for land access.

Figure 54 of Photo section and the satellite map of Ground Truth Point 20 have shown how the Chin villages (here Ngennung village for example) were established on the hill. Table-top like flat places are rare in the Chin Hills and the villages are typically established on the slope of the mountain spur with each house laid on the contour ridge.

The house front side rests on the near surface ground, probably beside the village road side, while the hind legs of the house go down the deep slope and the legs (timber post) must be long enough to touch the ground. If the perspective view of the whole village could be taken with a good camera, one can see that village houses are laid out in contour lines.

Growth and expansion of the villages and urbanization also point out bare hill tops and deforested slopes. Example is given as landscape near Hakha town (satellite map of Ground Truth Point 4). One can see easily and clearly such landscape from Hakha without the aid of the satellite map. But here attempt was made to keep record of the eye witness by supplementing with satellite map record. By comparison, the photograph record taken by Carry and Tuck (Volume I, Figure 17) (1932) could be seen for the situation of Falam landscape. At that time Falam was a big village and there was a thin vegetative cover in the surrounding area even on that time.

5. Farming Systems of the Study Areas

Chin villages of the study area could be characterized by mainly subsistence economy with low degree of commercialization. In old days, food crops grown are largely divided into four classes, grain, pulses, roots and vegetables. Grain comprises millet, Job's tears, maize, rice and jowari. Pulses include gram, peas, small bean, dhal (pigeon pea), *aunglauk* bean (sulphur bean or jack bean (*Canavalia ensiformis*)). Root crops include sweet potato, yams, turmeric and ginger. Vegetables include pumpkins, cucumber, onions, chilies, egg plant and wild varieties of spinach (Carey and Tuck, 1895). Northern Chin farming was done on steep, high altitude and cool monsoon forest area. The staple crop was not rice but maize although varieties of millet and hill rice were also grown. Bottle gourds, cucumber, onion, garlic and tobacco were grown in home gardens while cucumber was also grown in taun-yar fields (Lehman, 1963). Farming was largely diversified producing a large number of food crops to meet varied diet in the northern Chin.

Under the farming systems of the Northern Chin, all aspects of taun-yar or shifting cultivation, permanent paddy cultivation or orchard, home gardening, livestock raising, consumption and dietary habit, natural vegetation and resources management, land tenure, population changes and migration and market access will be thoroughly discussed. Farming systems profiles of three study villages from each of four townships are shown in Table 3a, 3b, 3c, and 3d. In each land use system, attention will be paid to the dynamics of changing process in response to the external agents.

6. Past and Present Situation of Taun-yar or Shifting Cultivation

The Northern Chin will be assessed in terms of the years of consecutive cultivation and fallow, elevation and settlement pattern, main crops, complementary crops, vegetation types, tillage or land preparation system, resources management practices, effects on vegetation pattern, effects on the soil fertility, market integration, indigenous knowledge, land tenure and equity issues.

Table 3 (a) summarizes the overview of the past and present farming systems in three sample villages of Hakkha township. Zathal was a relocated village due to the shortage of taun-yar lands (lopils) in their original Buanlung village. With the consent of the chief (landowner) of the Sakta village, Zathal villagers were allowed to open up their lopils adjacent to Sakta villagers' lopils. The village location and taun-yar lopils could be seen in the satellite image of GPS Ground Truth Point 2. Beyond the pine forested hill, Boinu River is running and beside it is mini plain land. It was bought from Sakta village chief and converted into bench-terraced paddy fields by Zathal villagers. The view could be clearly seen in Digital Photo 79 of Photo section, GPS ground truth Point 3. Initially there were 19 hamlets and over 15 years, their relatives and friends from the former villages came and join the new site. By 1960, the village grew to 30 houses and the number reached 82 in 2012.

Tinam village had been relocated two times. Former village site was at relatively lower position than that of the lopil plots and taun-yar fire spread to the villages in noon time and water was scarce and the whole village was burnt down. The government township administrative officers relocated them beside the road side on the way to Gangaw. Originally they have 7 lopils but one lopil was used for village location. Tiphul was the old village remained in the original site but over-grown households moved to new site, keeping both villages very close and sought the new taun-yar area.

All cases of three villages indicate that access to cultivated lands is the major driver to the movement, relocation, expansion or split of the villages and their settlement pattern. Land - man ratios (acre/head) are less than unity (0.21, 0.36, and 0.66). It will continue to adversely affect the future stability.

Paddy land area is few in Zathal and Tinam while the relatively large village of Tiphul has about 120 acres. Land use factor (R value) in taun-yar cultivation varies from 7.7 % to 16.7 % and the largest value reaches to 23.5 %. The larger the R value, the more stationary character of the farming system. If R exceeds 30, we can hardly speak of it as shifting cultivation. In the three villages, fallow period is still relatively longer in relation to cultivation period on the lopils. However, the fallow years become shorter now as compared to the previous 20 years in all three villages. If the fallow period becomes shorter than 10-year-cycle, forest regeneration could not have been sufficiently taken place.

Number of households working on lopils increased in Zathal and Tinam while it decreased in Tiphul because the latter village expanded paddy fields. Sizes of taun-yar field available to individual household are reduced in all villages due to increased households. Crop productivity in taun-yar expressed in maize yield per acre was varying from 375 kg to 625 kg in the last 20 years and it decreased to 234 kg to 500 kg at present.

Maize is major crop in taun-yar while paddy is pillar crop in mini-plain area or terraced irrigated fields all villages. Sulphur bean or sword bean is complementary to maize crop in taun-yar. In taun-yar cultivation, there are two types of land tenure: communal and private owned. Zathal village practiced communal land tenure with no ownership. The village chief with the assistance of the village committee allocates land to all households. About three family members (Village chief and his committee members) and those who have no terrace fields are considered to have priority in selecting fields to their preference in the lopil and the remaining fields are then equally assigned to all remaining households.

Table 3 a. Profiles of farming systems (past & present) in Hakha township

Sr.	Variables	Zathal		Tinam		Tiphul	
		20 years backward	2012	20 years backward	2012	20 years backward	2012
1	Village Tract		Sakta		Tinam		Tiphul
2	Year established	1946		Relocated in 1954		assumed to originate 400 yrs ago	
3	No. of households (HHS)	40	82	112	105	150	142
4	Population	200	447	668	587	NA	620
5	Total cropped area (acre)	NA	296.09		214	NA	130.35
6	Land-man ratio (acre/head)		0.66		0.36		0.21
7	Paddy acre	70	86.09	NA	49.25	70	121.35
8	Terrace acre			NA	44.85		
9	Orchard acre						
10	Shifting cultivation acre		210		119.9		100
11	Fallow period (years),	60	20	12	8	20	10
12	Cropping years, No.8	10	6	1	1	3	2
13	No. of Lopils	6	5	6	6	5	5
14	No. of HHs in shifting plots	40	82	50	70	150 HHs	120 HHs
15	Size of allotted plots in Lopil	3 acres	1 acre	3 acres	2.5 -3 acres	3 acres	2 acres
16	Crop productivity (yield)	375 kg maize/ acre	234 kg maize /acre	500 to 625 kg per acre maize	400 to 500 kg per acre	500 kg per acre	312 kg per acre maize
17	Land use factor (R)*	14%	23%	7.69%	11.11%	13.04%	16.67%
18	Crops grown	Maize, paddy, bean, sulphur bean	paddy, maize, vegetables	maize, millet, sulphur bean	paddy, millet, maize, vegetables	maize, millet, sulphur bean	paddy, maize
19	Management system for taun-yar (land assignmant or land entitled)	Village chief allocated lopil plots	VPDC Chairman and village committee allocate land to applicants; Nobody is allowed to rent the land unless he could cultivate;	Only village chief assigned lands; landless draw lots.	VCPD Chairman assign plots; Village elders assist; landless draw lots except 20 HHs with hereditary title for ancestral land..	Village chief assigned lands to all except hereditary title holders	3 Lopils are ancestral lands; 2 lopils are assigned by village chief to applicants by drawing lots;
20	Migration		Malay = 70; US = 17; Ausi = 10; Norway = 4		Malay= 50; US =50; Ausi = 20; Canada= 3; Mizo = 10		Permanent migration - Kalay = 45 HH; Hakha = 70 HH; 317 migrant workers to Malay
21	Elevation, ft (estimate)		6152 ft.		4520 ft.		5183 ft.

* R = [(C/C+F)] x 100 = %; Where C = years in cultivation; F = years in fallow period

In Zathal, every family could get land in lopil. A family could not rent his land if they could not cultivate. If they could not cultivate they surrender it to the village chief and the village authorities would assign back to applicant for taun-yar lands. There is ownership in paddy land. One can develop it or could buy from another landowner. If one wishes to develop a terrace field in village communal pasture lands, he could apply for it to the village chief with the term of condition that he will make a fence around his field and it is his own responsibility to keep away the animals from his plot.

In Tinam village, some parts of lopils are ancestral land occupied by 20 households. Except that land, the rest parts of lopils are communal land upon which the village chief assigned land to the villagers by letting them drawing lots. The same practice continued until today. The village elder and committee assist the Village Chairman in assigning lands to the landless households. Over 20 years, the number of households increased by annually 2 % with demand for taun-yar plots. When the village's lopil number decreased from 7 to 6, they have to expand the boundary of the lopil to be able to allot lands to everybody. With increase in household number over time, lopil boundaries will be accordingly expanded encompassing the marginal land on the mountain and all the lopil boundaries will come into contact with each other reaching a final limit. In expansion, lopil number will diminish from 6 to 5, from 5 to 4, etc. Fallow period will become shorter.

Although not all the plots in lopils are communal lands, the arrangement of taun-yar cultivation is collective at the village level. Every year in Tinam, assignment of lands to households take place usually in August - September. This is a village level meeting. After assignment of lands has been over, each individual household starts cutting and felling trees and plants in the respective assigned plots during the period from October to December. There may be pool of labour in cutting trees. In the past 20 years it took minimum 60 days to finish this task but now could complete it within 45 days. In the past farmers used axe but now knife or hoe is good enough. In Zathal, no large trees are grown but only tall grasses are present and hoeing is quickly done. Tinam villagers said that tree species are present as in the past but tree size in diameter becomes remarkably reduced. Taun-yar management system of Tiphul is similar to that in Tinam. A typical taun-yar field of Tinam village could be seen in Photo section Fig. 101 showing diversified crops such as field crops (pigeon pea) and vegetable plots near water source, taun-yar hut, and taro and tuba planting near by the hut. The old village and new small village of Tiphul could be seen close to each other surrounded by the respective taun-yar plots in Ground Truth Map (Figure GPS Point 11).

Among all villages, migration occurred annually at the rate of one-fourth to one-third portion of total population. Migration to Mizoram is short-term working in the off-season lasting 3 to 4 months. Work in Malay takes usually medium term duration.

Table 3 (b) summarizes the overview of the past and present farming systems in three sample villages (Phaizawl, Ramthlo, and Thanhniar) of Falam township. It includes large village such as Ramthlo with about 1300 population and small-sized village such as Thanhniar with 36 households. Agricultural land-man ratio ranges from 0.27 to 0.55. Taun-yar activities are limited in these villages. There is a great tendency to changing from shifting cultivation to permanent farming in Ramthlo and Thanhniar with the land use factor of 42.9 % to 83.3 % respectively. In Phaizawl, cultivation was shifted from one lopil to another but after 2002 the NGOs (GRET) started initiating the community development project and most taun-yar plots became permanent plots. There are only two shifting lopils one of which was privately owned by 4 households and the rest is communal taun-yar lands available for 10 households. The rest plots on hill side farming are permanent. On gentle sloping lands near the village permanent vegetables plots and grape vines are established having good access to water.

Table 3 b. Profiles of farming systems (past & present) in Falam township

Sr.	Variables	Phaizawl		Ramthlo		Thanhnar	
		20 years backward	2012	20 years backward	2012	20 years backwards	2012
1	Village Tract		Phaizawl		Ramthlo		Laizo
2	Years established	1700-1800		AD 1450		AD 1775	
3	No. of households	65	60	160	180	40	36
4	Population	NA	412		1299	NA	193
5	Total cropped acreage	NA	122		710.06		52
6	Land-man ratio (acre/head)		0.30		0.55		0.27
7	Paddy acre	NA	Nil		360.06		
8	Terrace acre	NA	33.75		31 acres by GRET; 21 acres by Govt.	0.5	
9	Orchard acre	NA					27.7
10	(Taun-yar) acre		78		350		
11	Fallow period (years),		5	9	4	12	5
12	Cropping years		1	3	3 (Hot area)/ 1 (Cold area)	6	1
13	No. of Lopils		10	7	4	1	1
14	No. of HHs allotted to taun-yar		14 HHs	320			
15	Size of all Lopils (acre)		60 HHs work	70 to 100 HHs			
16	Crop productivity (yield)		16.3 kg seed tuber to 163 kg potato yield	400 kg maize per acre	370 kg maize per acre	125 kg / acre of maize	250 to 300 kg maize /acre by fertilizer applied
17	Land use factor (R)*		16.67%	25.00%	20 % to 42.86%	33.30%	83.33%
18	Crops grown & livestock kept	wheat was introduced in 1930; Grapes were planted in last 10 years;	maize, wheat, grape, tomato, Local bean, garlic, onion, potato, mython	maize, millet, potato,	maize, paddy, potato, tomato, banana, garlic, onion, garden pea, mithon cauliflower,	Maize, bean, mustard, garlic,	Bean, maize, vegetable, mustard, onion, cauliflower goat pen
19	Management systems for taun-yar land assignment or land entitled	Shifting cultivation before 2002; Thereafter most lopils become permanent plots; Youngest son heritable;	51 HHs on permanent lopils; 14 HHs on taun-yar shifting plots; 7 HHs in vegetable plots;	There were 7 lopils but 1 lopil changed to permanent fields. In taun-yar, those who cleared jungle owned the lands until today. Those who did not till for 3 years, village chief reassigned it to landless who applied for it.	Six lopils are merged into 4 lopils while 2 lopils are assigned as grazing fields. Taun-yar firing is collective arrangement; Private plots are heritable;	heritable grand parents' lands	Taun-yar lands are changed into permanent vegetable garden lands of private owned
20	Migration		30 workers in Malay, Singapore, US, Mizo		150 to Malay & 139 to Mizo	went to Mizo in 1970	Mizo; Malay; permanent to Kalay & Falam
21	Elevation, ft (estimate)		5528 ft		5416 ft.		3756 ft.

* R = (C/C+F) x 100 = %

Where C = years in cultivation, F = years in fallow period

Taun-yar plots on the way to Phaizawl could be seen in digital photo records (Figure 93 and 94) of Photo section. Trees are cut at breast height in land clearing so that regeneration could be rapidly taken place. Satellite image of Ground truth point 16 indicates the location of Phaizawl with its vegetable fields on relatively gentle slope and taun-yar plots surrounding the village.

Ramthlo was expanded towards the foot of the high mountain and its old sister village (Dokthek) was left at road side. It could be seen in the Map of the Ground Truth Data Point 12. Near the old village site, there are terrace fields and taun-yar plots. In Photo section, Figure 88 indicates that former taun-yar fields were converted into permanent fields. Again in Photo section, Figure 76 indicates the convex valley in the V-shape slope of the adjacent mountain which has been converted into the terrace field by the government mechanization department. During our visit to Ramthlo, we have witness a very recent changing process of taun-plots into the terraced plots assisted by GRET -CORAD. It could be seen in Figure 87 of Photo section and Ground Truth map, GPS Point 12. In the vicinity of the recent terrace fields, one of the taun-yar lopils became the permanent fields. It occurred in 2007. The plots were grown to garden peas which were near harvest stage by the time of our visit. Some onion crop was seen as standing crop. In the fallow plots, the fields are seen as being covered by crop residues such as corn stover. The terrain of the land is not too steep but with gentle sloping (Fig. 88) in Photo Section.

As regards the taun-yar plot, fallow period is 4 years while cropping period is 3 years in *Lai lo* (warm field), and 1 year in *Zo lo* (cold area). Villagers of Ramthlo said that it is easy to clear the grasses in *Lai lo* lands while *Zo lo* lands are difficult to clear the grasses. Species such as *germany*, *laikin* and *laikindar* are grown in clumps. These taun-yar plots are not communal land and there is no drawing of lots in land assignment. There are 30 Households working on taun-yar lands as private -owned land. If somebody could not work on taun-yar lands for three consecutive years, the village chief assigns this piece of land to landless household. In the past, almost every household kept mithon. At that time grazing ground was wide enough. But after the government took over the nearby land for over 300 acres to establish an agricultural farm, grazing ground was lessened and only 10 households could keep mithon. There are 130 migrant workers going to Mizo for manual labourer such as hewing planks, porter, etc. About 150 people work in Malay as industrial laborers.

Table 3 (c) summarizes the overview of the past and present farming systems in three sample villages (Congthia, Farrawn and Sihmuh) of Thantlang township. It shows that Congthia possesses more paddy land than taun-yar land in contrast to the other two villages. Land form is favourable for Congthia. It is clearly shown in digital photo record of Figure 73 and 75 in Photo Section. On the way from Thantlang to Congthia, paddy fields in U-shaped valley in the inter-hills are well developed. On the way to Sihmuh village from Thantlang, mini-plain valley is formed beside the “Lahva” stream and farmers near Thantlang town had developed paddy fields. If the inter-hill basin is moderately wide and the meandering river or stream is passing through the basin, meander plain will be formed. The mini-plain beside the Lahva stream is the outcome of such a combination of terrain topography and series of horse-shoe-shaped stream course. It could be clearly seen in Ground Truth Map (GPS Point 10) and (Figure 74 and 78) of Photo Section.

On its way to Congthia from Kuhchah village, taun-yar plots could be seen as shown in Ground Truth Map (GPS Point 8). The slopes appear to be more than 30 %. In Sihmuh village, taun-yar slope is not too steep and not only maize but also upland rice are grown (Photo Section, Figure 102).

Table 3 c. Profiles of farming systems (past & present) in Thantlang Township

Sr.	Variables	Congthia		Farrawn		Sih Hmuh	
		20 years backward	2012	20 years backward	2012	20 years backward	2012
1	Village Tract		Congthia		Vanzang		Thangzang
2	Years established	Relocated in 1952		1855		1850 & relocate in 1950	
3	No. of households	70 (1960)	215	110	210		59
4	Population	NA	1012		870	NA	338
5	Total cropped area (acreage)	NA	338		405.4	NA	225
6	Land-man ratio (acre/head)		0.33		0.47		0.67
7	Paddy acre	NA	257.5		64.9		45
8	Terrace acre	NA			3.5	NA	
9	Orchard acre	NA			99.5	NA	
10	Shifting cultivation (Taun-year) acre	NA	80.5		337	NA	160
11	Fallow period (years)	15	10	15	11	12	12
12	Cropping years	1	1	2	3	1	1
13	No. of Lopils	15	8	11	11		12
14	No. of HHs allotted to taun-year plots	150 HHs	200 HHs		150		
15	Size of Lopils (acre)	2 to 3 acres per HH	One acre per HH	3	3		
16	Crop productivity (yield)	416 kg maize/ acre	333 kg maize / acre	750 kg maize/ acre	375 kg maize par acre		400 kg maize / acre
17	Land use factor (R)*	6.25%	9.09%	11.76%	21.40%	7.60%	7.60%
18	Crops grown	maize, common millet, sulphur bean	paddy, maize, common millet, vegetables	maize, sulphur bean	paddy, maize, orange, chilli, sunflower	upland paddy; maize, sulphur bean;	paddy, maize, sulphur bean, orange, potato, garlic, mustard
19	Management systems for taun-year (land assignmant) or land titled	Before 1948, Hereditary Chief owned all lands and assigned villagers with land rent of 6 kg maize per HH for 2 -3 acres;	VPDC Chairman and committee assign lands by letting vilagers to draw lot. Widows are exempted from drawing lots;	Communal lands were assigned to all villagers.	Some lands are privately owned; Communal lands are assigned by drawing lots; Due to Mu reserved forest, maize plots are reduced.	Lands are hereditary and cultivation was succeeded to heir children;	No heritable private lands; All lands are assigned by letting villagers draw lots; No land market but those who clear jungle could till it;
20	Migration		80 to Malay; 70 to other countries; 30 to Mizo; other to Kalay;		Malay - 150 ; US - 30; Mizo - 45		Mizo; malay; Us
21	Elevation, ft (estimate)		4343 ft.				4330 ft.

* R = (C/C+F) x 100 = %

Where C = years in cultivation, F = years in fallow period

In Farrawn village, about 100 acres of orchard (orange grove) were established besides the conventional staple crops in bottom paddy fields and taun-yar lopils Figure 6 (page 16). In Congthia and Farrawn, paddy is grown in bottom valley while in Sihmuh it is grown on both upland and lowland. It is known from the indigenous knowledge that cultivated lands of maize and paddy are mutually exclusive on the Sihmuh taun-yar. The soil where oak (Lai thing) trees are grown could be planted to paddy. Lands previously grown under wild plantain and banana, twine plants, trees with spines are suited to maize growing. Selection of taun-yar lands either for maize or upland rice is usually based on the types of vegetation grown.

By comparison, pair wise lists of plants with respect to crop preference are shown below.

Plants considered with preference to maize	Plants considered with preference to paddy
Hriang	Lai Thing (some kind of oak)
Wild plantain	Fathing (includes pine)
Inhlam (Alder) “ <i>Alnus nepalensis</i> ”	Thil Thing
Hlahling	Hrong Kham
Thal	Khuhlu
Hniarkar	Chawnkok
Faiceu	Thal
Vaurawng	Hriang

Plant names are recorded in local language most of which are not known in common English name or botanical name. Due to the linguistic diversity in Chin Hills, local plant names vary from one place to another. It may be necessary in later studies to systematically identify and list the plants name in common local, English and scientific languages for each agro-ecological area.

In Congthia and Sihmuh, management of taun-yar plots is similar. Prior to 1948 (Year of the country's independence) taun-yar lands were belong to the local chief who assigned the lands to villagers. For 2 to 3 acres allotted in lopil, the farmer had to contribute rent in terms of maize at the rate of about 6 kg seed. After 1948, the chieftain system was brought to an end and taun-yar land became communal property. There is no sale of land. Those who till the land could have access to land. If there are 50 households who want to till the taun-yar land, the lopil will be divided into 50 parcels. Lands are yearly assigned to villagers by the village chairman and committee by letting them drawing lots. However, village chairman, committee elites and widows have opportunities of selecting lands first and the remaining lands are subjected to drawing lots.

Preparation of fire brake and setting fire to the taun-yar fields are collective action. It is usually carried out in middle of March. In Farrawn, there are private-owned fields in lopil. The available communal lands are assigned to the landless households. In Congthia, grazing land are separately marked out and utilized. It is often outside the lopil. Other villages let the livestock in the fallow lands of lopil.

The land use factors (R values) are less than 10 % in most villages except Farrawn where R value increases to 21.4 %. In most cases, fallow period was shortened. Crop productivity is decreased by 25 % to 50%.

The lowland paddy fields are private-owned. Land acquisition was through a share of inheritance, use of own labour for land development, or purchase from the nearby village or those who are going to move to town from the same village. All villages devote to growing of staple crops such as rice and maize but Farrawn and Sihmuh grow commercial crops such as orange, potato, garlic, etc. Farrawn has shifted their focus from taun-yar farming to orange and orchard farming. But these two villages are 20 to 24 miles away from Thantlang. Access to market is costly.

There are 200 to 250 migrant workers from each village. Their destination are first Malay and then to the US and western countries.

Table 3 (d) summarizes the overview of the past and present farming systems in three sample villages (Laibung, Ngennung and Suangzang) of Tedim Township. In all villages at present time, the land-man ratio ranges from 0.14 to 0.25 which are generally much less than those in sample villages of other townships. As regards taun-yar in three villages, few pieces of lopil lands are ancestrals since 60 years ago and over years the succession of lands as private - owned plots spread to the whole lopils. It could be explained that initially there were few parcels of ancestral lands owned by only 30 households in the whole lopils. The village chief allowed his close relatives to select their preferred parcels in good portion of the large lopil. With increase in households in later decades, an heir had to seek the land parcel in the periphery area of the lopil. Finally the whole lopil were under possession of all related heirs. In accordance with the family succession cycle, land could be heritable.

Traditional succession system varies with respect to the tribe, village or family structure making it extremely difficult to generalize. Anyhow since it is not communal land it could be sold out or rented. In this connection, access to land may be difficult for the newly married and separated family. If they have no share of inheritance, they have to rent the land for any period of occupancy of land. In Laibung, there are 10 lopils in which all fields are privately owned. A landless household has to approach somebody for renting the land. The land rent is nominal with no excessive rate. Although land is under private access, the management of taun-yar cutting is collective system. A village level meeting regulates the time and methods of preparing taun-yar lands. Taun-yar firing is done in Laibung village but in another two villages, there is no practice of taun-yar firing. However it often encountered during our trip that grazing ground under forest cover had been set fire in several village sites. It was told that livestock keepers set fire the ground so that old grasses start regenerating new growth as soon as the rain falls.

Table 3.d. Profiles of farming systems (past & present) in Tedim Township

Sr.	Variables	Laibung		Ngennung		Suangzang	
		20 years backward	2012	10 years backward	2012	20 years backward	2012
1	Village Tract		Laibung		Vulvum		Suangzang
2	Year established	1918		1818		1880	
3	No. of households	NA	97		156	NA	196
4	Population	NA	730		1096	NA	1252
5	Total cropped area (acreage)	NA	99.5		183.65	NA	282.1
6	Land-man ratio (acre/head)	NA	0.14		0.17	NA	0.23
7	Paddy acre					NA	
8	Terrace acre	NA	15.5		65.95	NA	129.6
9	Orchard acre	NA	14		30	NA	26
10	Shifting cultivation (Taun-yar) acre	NA	84		117.7	NA	152.5
11	Fallow period (years)	10	7	10		8-	10
12	Cropping years, No.8	1	1	3		8	10
13	No. of Lopils	10	10	3			2
14	No. of HHs allotted to taun-yar plots		54 HHs				
15	Size of all Lopils (acre)		3 -5 acres/ HH	280			
16	Crop productivity (yield)	500 kg maize/acre	250 kg maize/acre		520 kg paddy / acre	500 kg maize /acre	250 kg maize /acre
17	Land use factor (R)*	9.10%	12.50%	23.08%		50%	50.00%
18	Crops grown	maize, millet, sulphur bean, coffee, potato	maize, paddy, potato, coffee	maize, paddy, sweet potato, taro, millet;	maize, paddy, sweet potato, garden pea, taro	maize, sulphur bean; local bean;	paddy, maize, garden pea, potato, garlic, onion, beans
19	Management systems for taun-yar land assignment or land entitled	Collective management in taunyar firing; lands were hereditary with private title;	Hereditary lands but somebody could rent it for cultivation; 1/3 HHs do not till taun-yar but permanent fields	3 lopils; 1 lopil is communal land; Second lopil had 20 % communal and 80 % private ; Third lopil -60 % communal and 40 % private - owned;	There is no taun-yar (shifting) plots; no usage of Lopil: water spring is available; permanent plots since 1930;	All HHs cultivate taun-yar; No drawing of lots; Hereditary lands mostly & communal lands only 10 acres;	Private owned plots are marked by stones; No drawing of lots; 2 lopils cultivated for 10 yrs alternatively
20	Migration		Malay - 35; US - 10; Mizo - 10	30 -40 to Mizo	100 - to Mizo		20 to Malay; 250 to Mizo;
21	Elevation, ft (estimate)		4613 ft.		4047 ft.		3248 ft.

* R = (C/C+F) x 100 = %

Where C = years in cultivation, F = years in fallow period

Formerly villagers in Ngennung grow rice in upland fields but the yield was low and could not give sufficient food to the family. They continued growing maize in permanent taung-yar fields or terraced fields. Maize is also well adapted to steep slope of the mountain side. In monsoon season, maize is planted and onion, garlic and vegetables are grown in cool season. In post monsoon season, rice bean may be grown. In former times, rice bean was grown for edible seeds and leaves and branches were thrown away after harvest of seeds. But now rice bean is primarily grown for compost and mulching for the onion crop which usually follows maize crop. Due to the effort and technology delivery of GRET and NGO, people in Ngennung become aware of the beneficial effect of residues of rice bean in mulching and soil enrichment.

Coffee is grown in Laibung but not commercial scale. It is grown as garden perennials in household compounds. Villagers are now considering coffee planting in their private taun-yar fields but they are lacking start-up capital. Growing of garlic, onion and vegetables in Ngennung irrigated terrace fields indicates that the village has been undergoing subsistence shifting cultivation to semi-commercial pattern of growing cash crops with maize and paddy in double cropping in terraced fields.

Fuel wood is usually obtained from private reserved wood lots in their own lopil plots. Severe penalty is imposed on those who trespass and cut the trees and fuel wood from the private wood lot. Customary rate of compensation is often a growing pig. Those who has no access to taun-yar plots or private wood lot has approached an owner with the present of one kilogram of fine sugar and ask for permission of cutting fuel woods. If the owner is kind enough he may give consent to him for cutting a certain amount of fuel wood.

Migration from three villages is often directed to Mizo for working 2 to 3 months. These three villages did not report migration to the western countries.

III. Evolution of farming systems & Livelihood Dynamics

1. Good Practices and Weaknesses in Taun-yar Farming

On the way to the study villages, it has been observed that taun-yar farmers do not cut large-diameter trees close at ground level but instead prune the branches or cut at at least breast height leaving the lower portion of tree trunk. Controlled burning is carried out leaving three or four large trees intact. These tree trunks give shoots after harvest of maize or rice. Tree trunks also serve as pole for aunglauk (sulphur bean). During fallow years, trees which were not cut and fell down regenerate quickly.

Preparation of fire break is carefully done. When tree cutting have been undertaken, fire breaks are collectively carried out in first step. It is usually done in January. If not satisfactory, it is again done in February. Bush and grasses at ground level are also cleared. The middle of March is the taun-yar burning in the whole Chin Hills. The third care is taken in making fire break just before burning in order to prevent fire spread to the settlement sites. In large lopil plots, all plots are not permissible to set fire simultaneously but sequentially. Forest nearby the water spring is also reserved keeping away from fire. Taun-yar trees are usually fuel wood trees and not as good as timber trees. It usually consists of oak and Thit-al fuel wood trees. Some tree trunks and branches are used for constructing fences in taun-yar plot.

On the way to Congthia and Sihmuh villages in Thantlang Township, vegetation succession has been observed in series of taun-yar fallows. In the first fallow year, imperata grass (*Imperata cylindrica*) starts growing. Next year, annual plants such as Germany plant, grass like cocklebur, etc. are growing. If the trees were left as tall stumps, these trunks start growing shoots. By that time, different types of oak plants start growing. Within four to five years, annual plants gradually disappear. Trees such as Costus or Thityar, Laithing, pines, Fathing, etc. become dominant in the successive years.

According to local knowledge, Hriang tree is capable of replenishing water around the trees. If there is water spring or well around such trees, water will not dry up and it is replenished by the trees. Local people call it water-releasing tree. Hriang or Inhlam (Alder) or Maibaw in Kachin language, is known as water absorbing tree. Trees are recorded in Figure 134 to 137 of Photo Section. Water around these trees is said to be depleting quickly due to the great water absorptive capacity of such trees. Many local people do not know the beneficial effect of this Alder tree. It is in fact nitrogen-fixing tree giving nutrient to the soil. This tree is seen growing in several parts of Hakha Township. In Thantlang, there is not much Alder tree. On the exit road to Thantlang from Hakha, Alder trees are growing in several patches. It appears that the trees are growing in the seep-sloping hill side. The forester Dr. San Win (presently as Director General of Forest Research Institute, Yezin) has written about this tree in one of his publications (U Saung, 2005). It is a fast-growing and adapted to 3000 to 7500 ft. elevation. It is nitrogen-fixing species. It is moderately drought and fire resistant and it possess vigorous coppicing power. The mattress of its spreading roots could help prevent soil erosion. Its leaf fall could enrich soil nutrients. The Naga hill tribes use this tree as a component of their taun-yar farming. Before they leave taun-yar as fallow, they grow Alder trees to keep growing during the succession cycle of vegetation (quoted by U Saung, 2005).

Taun-yar farming is done by those who have no access to capital but his family labour. Chin taun-yar farmers never use bullock or buffalo on their taun-yar tillage. It uses no external inputs but relies on natural inputs and human labour. It is the only small tools and knife with that the farmers cut trees, chop them, burn them and plant seeds in loosen soil with small hand hoes. Under the communal tenure, landless farmers have equal access to taun-yar lands. Taun-yar is a major livelihood and Chin way of living.

Man-hour requirement of maize and millet planting in taun-yar farm in Hakha township is recorded as below (based on per family labour);

- size of “lo” plot = 2 acres (seed rate : 40 condensed milk ticals or about 8.3 kg)
- Start cutting trees during intermittent periods from October to January = 2 laborers (husband & wife) X 20 working days or 40 labour days (from 8 am to 4 pm working hr./d) It includes fuel wood cutting, collecting and transport
- Making fire break 10 ft. width; 3 man-days
- Set fire on 15 March; 1 man-day; Complete burning & ash bed accumulation is very important for better plant growth.
- Plant maize seeds - Around 20 April; 15 labour-days
- Broadcast millet seeds in maize fields; seed rate - 15 ticals - 1 labour-day
- 1st Weeding - May - 40 labour-days
- 2nd Weeding - August - 60 labour-days
- Harvest millet - August; 20 labour-days

- Harvest maize 10 October; 40 labour-days (20 days X husband & wife)
- Hanging maize cobs for drying - 2 labour-days (hanging period - 3 months)
- Beat and thresh cobs , February; 5 days X 2 = 10 labour-days
- Carry from fields to village - 10 days beside all return trips after threshing
- Maize yield- 70 local cans (875 kg seed corn/ 2 acre)
- Millet yield - 30 local cans (about 375 kg)
- Consumption will be discussed in later chapter.

Walking distance from the village to taun-yar fields consume a great deal of time daily. Villages are usually kept away over a long distance from the lopils. The following is an example of daily access of the Chin people to lopils on foot path (single trip).

Table 4 **Village - Laibung, Tedim Township**

Name of Lopil	Walking distance (hour)
Thangtual	1
Saikhua	1:30
Singkang	3
Laumual	4
Benta	2
Leithum	1
Suang vim	1:30
Kaliang	2
Thawt	1:30
Saiwood	1

Daily access to taun-yar fields takes at least two to three hours encountering disadvantage in commercialization of farm products from taun-yar fields. Orange product from Farrawn village is less cost competitive due to extra cost of commodity transfer from farm to market center. High crop yield is occasionally achieved but taun-yar field crops yields are often low. It depends on the nutrient recycling of the natural vegetation and fallow cycle.

Nutrient recycling pattern is not adequately understood among the development planners and community development workers although there are several studies on taun-yar cultivation worldwide. Burning is important tool in this system. Sanchez (1972) compiled the effect of burning on soil and nutrient recycling. Burning increased the infiltration rate and soil aggregate larger than 0.25 mm. Ash addition containing large amount of bases increase the pH of soil after burning. Nye and Greenland (1964) estimated that the ash contained about 5.3 ton Ca per hectare, 0.7 ton Mg/ha, and 1.6 ton K /ha in Ghana. Burning volatilizes most of nitrogen, carbon, and sulphur present in vegetation but it does not decrease organic carbon and nitrogen content of the top soil. Soil scientists found that organic carbon and total N increased after burning. Phosphorus in the top 5 cm layer of the soil increased by about four times and remained so for about six months. This P enhancement is a common phenomenon in the traditional cultivation of potato in southern Shan State as the author himself involved in this soil analysis in the last 15 years.

Sanchez (1972) found that the nutrient accumulated in secondary forests reaches maximum value at early stages of re-growth (up to 8 years). In this connection, Sanchez questioned that whether it is necessary to wait as long as 15 to 20 years or it is mainly a problem of ease of weed control. Burning crop residues every year may be equivalent to burning a year -old secondary forest. The question to be addressed is to reduce the chemical fertilizer requirement of crops by stubble burning and mulching (like coverage of rice bean residues onto the onion fields in Ngennung).

Taun-yar farming is considered notorious due to its effect on the accelerated deforestation and soil erosion in hilly areas and sedimentation process in rivers and stream in the low land areas. Under the low population pressure, taun-yar farming is an efficient soil management subsistence food production system. But under the changing context, ways and means should be sought how the system could be modified or improved. It will be discussed in later topics.

Taun-yar farming provides wide variety of foods: staple foods containing starch such as maize, rice, millet, taro, sweet potato; staple foods containing protein such as bean, sulphur bean, rice bean, bean leaves of all kinds; culinary foods such as onion, garlic, chili, etc; vegetables and protective foods such as mustard, cauliflower, pumpkin, bottle gourd, etc.; and collected foods such as honey, wild fruits, herbs, mice and other rodents. Taun-yar farming is also associated with home gardening. In Chin villages, every house is fixing with a small home garden, and beside it a pig pan on top of which is a chicken pan. A safe and secured small granary could be seen in home compound. Underneath the tall-legged house, the collected fuel wood is piled up neatly to meet the year-round need. Some of fuel wood is obtained from his taun-yar field.

2. Changing Process of Lowland Paddy Growing and Terrace Farming

The most noticeable feature of the Chin Hills terrain is the steepness of the slope. The deep valleys rise to the top of the ridges leaving but little level space even for the settlement of the villages. Stevenson (1943) wrote that a small plateau of few score acres between Khawpual and Botsung is the only naturally flat area in the whole Falam district. Speaking in terms of food security, there is not sufficient space for lowland paddy cultivation leading to an end result of rice deficit area in Chin Hills.

First, it will be examined to what extent the Chin land systems have created the space for lowland paddy. There are few river valleys in northern Chin Hills. A well known landscape is Timit valley, near Hakha. Different aspects of Timit valley are recorded in digital photo records of Figures 69, 70, 71 and 77 of Photo Section. If it is examined in the satellite image of Ground Truth Map Point 6, it is shown to be inter-fluve plain. It was formed on the relatively level area between two valleys and two stream channels of Timit River.

The junction of the two channels resembles a “Y” shape. At this intersected area, relatively wide alluvial plain was formed. In each tributary, the steam channels are sharply curved. It may happen that during bank- full floods, the two streams engage in lateral erosion and build deposits in a side ward direction, constructing a series of mini-alluvial plains. Over the next several years, it may bring about the channel scars such as oxbow lakes depending upon the uphill erosion and level of alluvial deposits along the stream banks. At present, rice fields fully occupy the plain. The time of paddy field development may be much later than the formation of alluvial plain assuming that ancient Chin did not undertake the business of wet land paddy cultivation.

Old records on rice cultivation at the time of annexation mentioned only for hill rice cultivation. Carey and Tuck (1895) noticed the Boinu river valley during their Chin-Lushai Expedition, 1889-1890 and they indicated the possibility of growing and irrigating rice successfully on the banks of Boinu River. Likewise, rice may be lacking in Timit valley at that time. Thein Pe Myint (1967), well-known Myanmar politician and writer, during his trip to Chin Special Division, did not fail to state that rice was cultivated in Timit valley by U Ral Hmung who was the former Minister for Chin Affair (around 1960, at the time of caretaker government of General Ne Win). Then the question is “Who first grow the irrigated rice in Chin?” The educated or elite group of Chin national who had exposure to lowland plain areas of Myanmar and upon their retirement or retreat back to Chin Hills, they took up the paddy cultivation, probably ahead of the local inhabitants.

Another case in Tedim Township proved this point. On the way from Tedim to Suangzang, our survey group crossed the Kaptel Bridge over the Manipur River. A table-top like alluvial plains are seen along the river. It is recorded in the Ground Truth Map of GPS Point 18 and 3-Dimension Map of 3-D Point 18/19. Manipur River flows in-between the two mountain ridges. At one place of mountain valley, the river turns U-shaped course and build up deposit immediately before U turn thus forming the alluvial terrace in elevated steps. It serves as ideal ground for terraced paddy fields. Moreover the topographical surface of the mountain spur right above the U turn assumes a table-top plain surface. Local farmers did not loose this opportunity. The land was best turned into paddy fields. It is noteworthy to learn that the first pioneer was U Hauk Lal Lan who was the Parliamentary Member during the rule of AFPFL Democracy Government around 1960s. When the General New Win took over the country in 1962 U Hauk Lal Lan served as Chin Special Division administrative officer (according to the key informants of the Suangzang village). He might receive some funding or support to develop paddy fields in terrace so that he could get hold of this opportunity. The nearby villages are Kaptel, Pakzang and Suangzang. As the land form is ideally suited to paddy cultivation beside the river, local farmers gradually followed suit. Paddy area began to expand in 1970. When the author checked the case with the Survey and Land Revenue Department (SLRD) at Tedim, it is found that the paddy land areas had been surveyed in 1977-78. The land (Kwin) was designated as 18/1 Kyainzang east. It was measured in scale 64 inches: 1 mile covering 30 acres consisting of 1299 small plots. Another nearby surveyed-area in Pakzang Kwin covered 15 acres consisting of 169 small plots developed in terrace. It was surveyed in 1986-87. The changing process is slow. The official designation and land record for permanent fields are much slower.

In Northern Chin there are not much river plains. As has been discussed in the previous topic, river side alluvial plains are found along the Boinu, Lahva, Timit and Manipur rivers but the alluvial areas are very small. In most cases, mountain ranges are narrow and rivers are straight or gently curving. River side paddy fields are also prone to heavy flooding during rainy season. Upon climbing up the steep mountain, one will encounter the temperature drop even before the termination of monsoon. The minimum temperature threshold at the time of paddy flowering is 10°C which usually coincides with paddy ripening period. If an attempt is made to escape cold temperature of 10°C around October by growing paddy earlier, then the single isolated flowering paddy field will be subjected to sparrow damage. Despite such constraints, local people continued their attempts to engage with paddy cultivation.

Dr. Bawi Hu, retired senior education officer who is also native of Zokhua, Hakha had recalled that wet land paddy cultivation was attempted in 1925 in his village by purchasing buffalo from Gangaw. It appeared that the attempt did not continue because after rice harvest farmer sold back buffalo. In 1964 Dr. Bawi Hu himself cultivated wetland paddy with buffalo. At present, there are 70 households out of 170 in his village growing wet land paddy.

U Do Thium, township SLRD officer, told that paddy land was established in 1952 at Sukhua village on the way from Hakha to Matupi. It was developed and registered for the village chief.

Dr. Lehman (1963) had stated that the independent Myanmar government adopted the national development scheme after 1948 which stimulated the increasing spread of irrigated rice farming in Chin proper implying that it is an importation of methods and tools, ploughs and harrows and draft cattle, not hitherto part of the Chin cultural landscape. He remarked that the new methods of rice farming did not seriously affect the overall Chin agricultural picture but it was practiced by few rich villagers who afford to buy animals and develop terraces.

U Van Thawng, Minister for Agriculture of Chin State Government, had told that there had been a power struggle between the Christian pastor and the village spirit priest, (be a man or woman who was *nat sayar*), during the period from 1950 to 1970 in his village, Tlangkhua, Thantlang. Chin adapted to taun-yar field works but when he went down lowland valleys and springs he became sick with chill and rigor. The village *nat sayar* spotted that he was seized by evil spirit and instructed him not to go down to the lowland valley. The pastor argued against the diagnosis but there were 9 *nat sayars* in the village and it was hard to overthrow their influence off the villagers at that time. During the period of animism, Chin people kept away the lowland valley due to fear of evil spirit of spring.⁴ The time when the pastor changed the mindset and belief of the spirit-worshippers, and introduction of quinine⁵ into Chin Hills would be one of the influencing factors for the changing process to wetland paddy cultivation.

During the FGD in Farrawn village, the reasons for not cultivating wet land paddy were listed that (i) people in old times wear no long-sleeve shirt nor long-pants exposing to mosquito bite and caught fever whenever they went down to wetland valley; (ii) staying on the mountain top was safe from enemies ⁶; (iii) people did not care to cultivate paddy fields; (iv) they could not afford to harness cattle for draught power and, without it, it was difficult to do foot-tread to achieve puddle tilt in paddy fields; (v) population was low and maize from taun-yar fields were secured and sufficient for their need of staple food.

During a visit to 73 years old villager in Congthia, he told that U Parden (from nearby village, Phaikhua) had seen rice farming in India and upon his return he attempted tilling paddy field by foot-tread and hoeing to achieve puddle and tilt. It was around 1950 -1955. In later years two villagers (U Htaun Kyaw and U Van Nawl) from the former village site of Congthia took notice of wetland paddy cultivation by bullock on their way to Gangaw in purchasing salt. They were inspired by this method and they selected a little bit level land, went to Gangaw again and learnt ploughing by buffalo and brought local Gangaw farmer to the village and continued learning. Then they adopted rice farming in low land. Similar attempts were made by pioneer villager of Farrawn in 1968. He bought the tame and well -trained buffalo for cultivating his field. Single growing of rice in the new area encountered the damage due to feeding by deer and wild pigs. Rice became the newly introduced feed for the wild animals. A single attempt failed. After 3 years, 6 households followed. In 1988, 15 households adopted irrigated rice cultivation. Then a required level of critical mass was accumulated and the practice of rice farming became established in Farrawn. At present time, 40 households work in lowland paddy fields.

4 Similar phenomena was observed by Stevenson (1943)

5 Quinine, anti-malaria drug was widely introduced in Myanmar after WWII but the drug might not be accessible to Chin Hills around 1960s.

6 In old days (pre-annexation period) there were tribal wars and raiding by another village in Chin tribal communities. Most villages had been established during such time and old memories might be told to later generations.

In Shan State and other upland regions, single -animal ploughing was adopted and it would be adaptable to the lowland valley flat areas. Selecting the appropriate site or village is the first requirement for Chin Hills. Then training of buffalo in single animal ploughing should be conducted and the method of training should be delivered also to the community. It is a pro-poor approach and patience should be taken since diffusion process in such case is usually slow.

3. Process and Pattern of Terraced Farm Development

Attempts had been made for adoption of terrace farms in Chin Hills as early as 1950s by the independent governments in succession. It was during those periods that the topographically ideal place near Kaptel and Pakzang, Tedim was developed for paddy terrace fields by local elite farmer as stated in the above topic. The terrace plan was spelled out in 1962 by the state departments but not being in a position of systematic implementation at that time. During our visit to Tinam, Hakkha, FGD throws some light on the fact that there was terrace building contest among villages in 1970s. Tinam village won the best performance by developing 80 acres of terrace farms. Township Ruling Party Chairman was native to this village. It was no wonder but the developed terrace farms were lacking irrigation channels and most of the farms could not have been grown to crops.

Bungtuah village, on the other hand, could develop wet terrace farm for only 17 acres but it was suited for paddy growing. Water source and build up of top soil in terrace plots had not been taken into account in former development works. Villagers from Tinam learnt that lower earth portion of the hill side should be first broken up and go upward excavating for terrace making. It was told that top soil layer will remain intact in successive cuttings soil from lower to upward slopping land. Throughout our survey, the earth cutting methods varied with respect to the top soil depth, presence of rock layers and slope surface.

There had been a long gap between the pioneer terrace farm development by few initiative persons and the inclusion of local farmers in widespread development. It had been claimed that terrace farms were developed in 1950s. But over 60 years, the achievement in terms of area coverage or number of farmers in possession of terrace farms is rather slow. The momentum of terrace farm development could be seen in case studies of the two villages.

Suangzang village is close to rice terrace farms beside Kaptel Bridge. Villagers may be stimulated by such development effects. In the process of changing to the permanent farms, villagers started improving their lopils. The fields are private -owned and have access to water. We have listed and recorded the periodical development of terrace farms by individual farmers. In Table 5 a, farmers now possess terrace farm and their average farm size is about 1.4 acres, varying from minimum 1 to maximum 3 acres. To achieve this amount, they were starting from developing terrace of about 0.25 acres. In other words, it took 45 years of effort to achieve the present acreage of about 2 acres of terracing. Each farmer could not devote to terrace building in every year. They had to cultivate taun-yar crops for their subsistence living. It took 4 to 5 years to save money necessary for terracing building. Slowly and slowly they make terracing in peace -meal effort or they may stop terracing a while for devoting their efforts in subsistence farming for their present livelihood.

Table 5 a. Year-wise built -up of terrace paddy fields by individual villagers of Suangzang, Tedim (acre)

Sr. No.	Farmer Name	1964	1970	1974	1979	1983	1987	1992	1997	2003	2010	Total
1	Farmer 1	0.25	1.00	0.50	0.25							2.00
2	Farmer 2	0.25		0.50		0.25		0.25				1.25
3	Farmer 3	0.25			0.50		0.25					1.00
4	Farmer 4	0.30		0.25		0.45						1.00
5	Farmer 5		0.20		0.30				0.50			1.00
6	Farmer 6	0.20		0.35				0.45				1.00
7	Farmer 7		0.20		0.10		0.25		0.20		0.25	1.00
8	Farmer 8	0.75		0.50				0.50			0.25	2.00
9	Farmer 9	0.50				0.50		0.50		0.50		2.00
10	Farmer 10	0.50			0.50		1.00		1.00			3.00
11	Farmer 11		0.25			0.75		0.25				1.25
12	Farmer 12	1.00		0.70			0.30					2.00
13	Farmer 13	0.25			0.75							1.00
14	Farmer 14		0.25			0.30		0.20			0.25	1.00
15	Farmer 15	1.00		0.70			0.30					2.00
16	Farmer 16		0.25		0.70				0.50		0.55	2.00
17	Farmer 17	0.25		0.25								0.50
18	Farmer 18	0.35						0.65				1.00
19	Farmer 19	0.70			0.60		0.30		0.40			2.00
20	Farmer 20	0.50		0.25			0.25			0.50		1.50
21	Farmer 21							0.30			0.50	0.80
22	Farmer 22				0.25		0.25				0.50	1.00
	Total	7.05	2.15	4.00	3.95	2.25	2.90	3.10	2.60	1.00	7.05	31.30

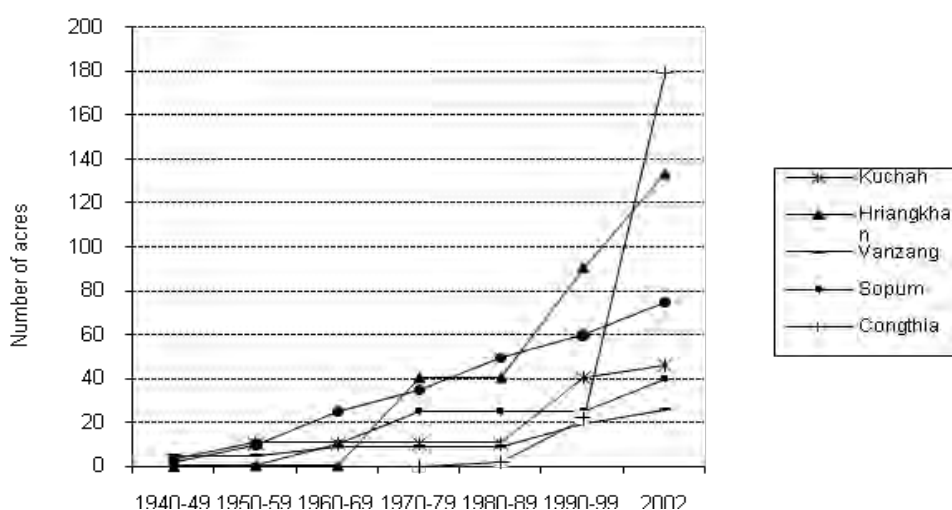
Again, Table 5 b shows that out of the sample 20 farmers, only one farmer initiated terraced-farm development in 1960-1962. In the next decade, five more farmers built up terrace in their farms. During the third decade (1981-1990) seven more farmers in addition to the former pioneers adopted terracing. Fifty percent of sample farmers followed terracing practice by 1990. The present decade (2001 -2010) marks the mass adoption of the terracing practice among all sample farmers. Acreage of terraced farms by individual farmers so far achieved are 1.15 as an average with 3 acres maximum and 0.5 acre minimum.

Table 5 b. Year-wise built-up of terrace paddy fields by individual villagers of Ngennung village, Tedim

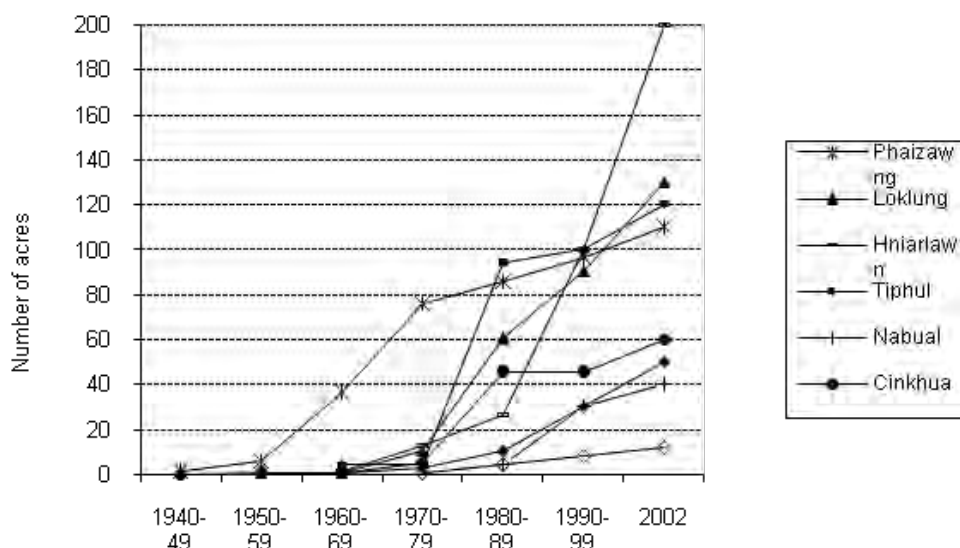
No.	Farmer name	1960 to 1970	1971 to 1980	1981 to 1990	1991 to 2000	2001- 2010	Present acre
1	Farmer 1	0.5 (1960) 0.5 (1962)	0.5 (1973) 0.5 (1978)	0.5 (1986)		0.5 (2005)	3.0
2	Farmer 2		0.25 (1975)	0.25(1982)	1.0(1994)	0.25 (2010)	1.75
3	Farmer 3				0.2 (1995)	yearly add	2.0
4	Farmer 4			0.1 (1987)	0.25 (1995) 0.15 (1998)	yearly add	0.75
5	Farmer 5				1.0 (1999)	0.5 (2002)	1.5
6	Farmer 6			0.25 (1990)	0.15 (1991)	0.1 (2008)	0.5
7	Farmer 7		0.25 (1980)			0.25(2005) 0.5 (2010)	1.0
8	Farmer 8					0.5 (2006) 0.5 (2010)	1.0
9	Farmer 9			0.25 (1985)		0.25 (2010)	0.5
10	Farmer 10			0.1 (1990)	0.15 (1991)	0.5 (2005) 0.5 (2010)	1.15
11	Farmer 11			0.15 (1990)	0.1 (2000)	0.25 (2010)	0.5
12	Farmer 12		0.5 (1980)	0.5 (1981)		0.5 (2010)	1.5
13	Farmer 13			0.5 (1985)	0.5 (2000)		1.0
14	Farmer 14				0.5 (1996)	0.25(2005) 0.25 (2010)	1.0
15	Farmer 15			0.25 (1990)		0.5 (2005) 0.25 (2010)	1.0
16	Farmer 16		0.75 (1980)			0.25(2005) 0.5(2010)	1.5
17	Farmer 17		0.75 (1979)			0.25(2005) 0.5(2010)	1.5
18	Farmer 18					0.25 2005) 0.25 (2010)	0.5
19	Farmer 19				0.25(2000)	0.25 (2010)	0.5
20	Farmer 20		0.5 (1980)			0.25(2005) 0.25 (2010)	1.0
	Total acre						23.15

GRET Project (Chin)⁷ also made a quantitative survey on the changing process of terrace farming in four townships in Northern Chin and the results are summarized in Figure 8. The initial starting period was about 1940- 1949 during which only one or three acres had been developed. The decades of 1950-1959 and 1960-1969 witnessed very slow development in acreage in all villages. Momentum was initiated during 1970-1979 in Lunmual in Tedim and Phaizawng in Hakha but it occurred after 1980-1989 in all other villages. In the present decade, the largest acreage of terraced farms achieved is Hniarlawn (200 acres) in Hakha, Congthia (179 acres) in Thantlang, Ramthlo (150 acres) in Falam and Phizaq (63 acres) in Tedim. The number of terracing in 2002 is no more than 50 acres in most of the villages.

Evolution of the terraces in Thantlang Tw



Evolution of the terraces in Hakha Tw



⁷ Data provided by Ms. Murielle Morrison, Project Manager, GRET- Chin, 2003

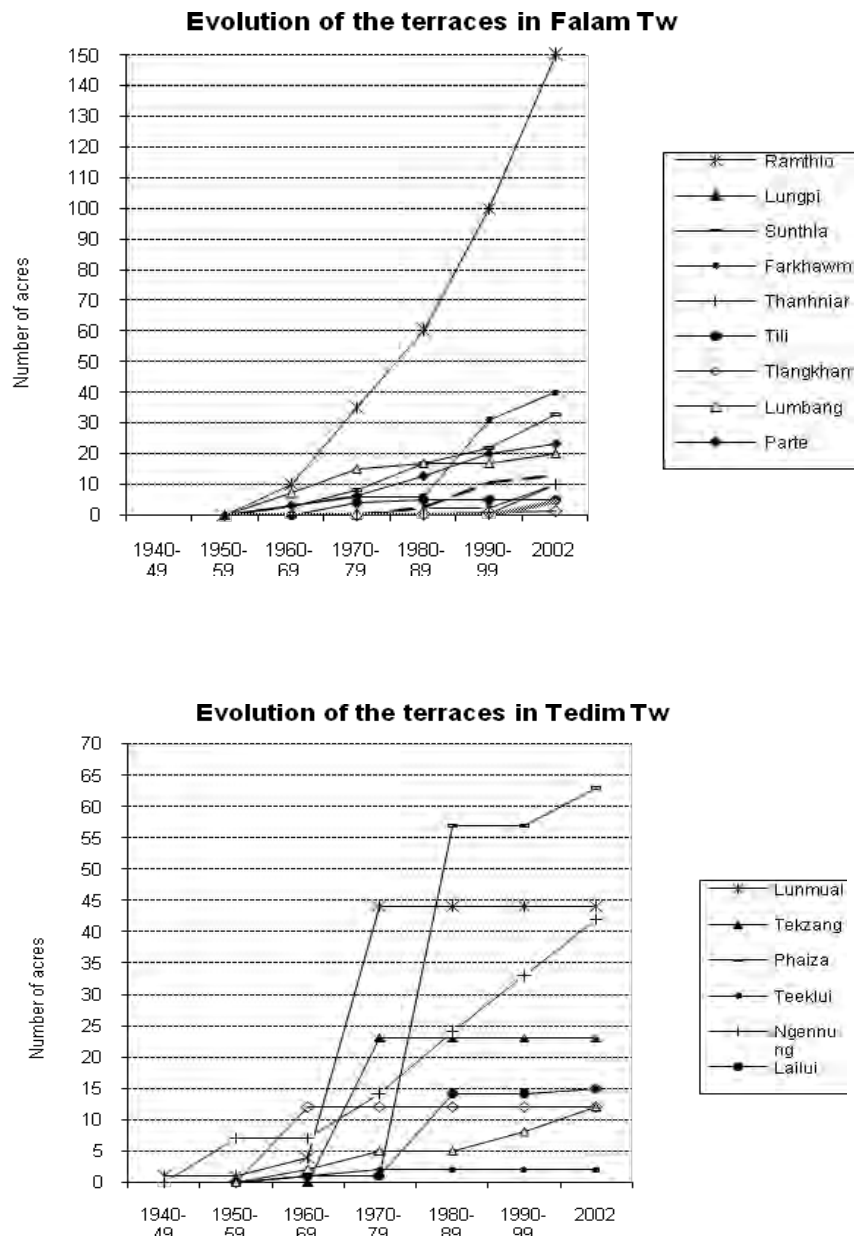


Figure 8 Yearly increases in acreage of terrace farms developed by villages in four townships of Northern Chin (compiled by Murielle Morisson, Project Manager, Gret Chin, 2003)

Terraced farm development has accelerated by the project assistance of the international NGOs such as GRET -Chin and international agencies such as UNDP ad World Food Programme (WFP). During FGD at Ramthlo village, assistance by GRET and WFP to farms and landless workers in terracing was explained as follow;

- In 2007, 33 households developed 8.5 acres of terracing. GRET project staffs assisted farms in designing and implementing the task while WFP borne the cost of rice (food for work programme) delivery to the workers and farmers of terraced farm development. It took 60 man-days for developing irrigable fields and 35 to 40 man-days for dry terrace fields. Three Kg rice was delivered to each worker per day. This assistance programme helped deliver 0.5 acre each to 33 households.

- ✚ Another 7.5 acres of terraced farms were developed for and by another 40 HHs. GRET jointly with WFP delivered 2 kg rice plus ks. 1000 to each worker per day. It took 1 to 2 days development work. Each household owns 0.5 acre of terraced farm.
- ✚ In third batch, 10.5 acres were developed for and by 70 HHs. In each working day, 3 kg rice was delivered. Each household own 0.5 acre. If the first household participated in this batch, it will own 1.0 acre of terraced farm.
- ✚ In fourth batch, 4.5 acres were developed for and by 7 households. It took 15 to 20 man-days per day. GRET delivered ks. 3000 to each working members per day.
- ✚ All these terraced farms were developed in Carvon/Vontel lopil.

Since more than international development agencies work in the Chin Hills, there are coordination of development works. When GRET work in terracing in a particular village, UNDP will not do the same job in that village but work in another activity to avoid overlapping. In old days, access to irrigation to the terrace fields were difficult but when NGOs and UNDP come in, there are delivery of PVC pipes to the beneficiaries making it an accelerated development in terracing.

In Ngennung village, one pioneer farmer initiated terracing in 1960s with the help of Extension Division of the Department of Agriculture. It was grown to wheat. In later years, developed terrace farms were grown to wheat and maize. Shifting cultivation plots were changed to permanent terrace plots. In monsoon season, maize was grown and vegetables and onion and garlic were grown as second crops in cool season. U Gin Khauk Kin, village pastor in about 1955 started growing garlic in a tiny plot. It was found successful and gradually expanded for growing in terraced farms. In old days, rice beam was grown for seeds and the residues and branches were thrown away. When GRET came in the village, the project demonstrated the effect of mulching by rice bean residues on crop yield. It also set up comparison between the terraced farm and non-terraced farm in maize yield. Villagers became aware of the beneficial effects of mulching and terraced farming on crop productivity.

In present decade, the development of terraced farms become rapid and mulching and crop residues incorporation became well established practices. Villagers are growing cash crops such as garlic, cauliflower, and garden peas in cool season after the harvest of maize of monsoon season. The village possesses the advantage of natural spring in their fields. Two or three rice - fish fields are observed during our visit (Figures 80 and 81 of Photo Section). Ngennung village best illustrates the changing pattern from subsistence slopping farming to permanent terraced farming with irrigation devoted to cash crops as well as staple crop in their double cropping pattern. But the problems still remain.

Market information is lacking in the village. When the pioneer farmer started growing garlic, the market price was one kyat per viss (1.63 kg) of garlic. At present, the market price rose to ks. 1000. But in the last 2008, the price dropped to kyats 500 to 200 only. Some farmers set fire all their garlic. It becomes important that changing cash crop -based cropping pattern on terraced farming requires the market integration and market information. In this connection, the village gain mobile phone access due to the spill-over effect of the telecommunication advances of India and Mizoram lying in accessible wave range (Figure 115 of Photo Section). The village could take advantage of this opportunity.

Changing process of terracing required tremendous labour amount in Ngennung village. This point could be clearly seen in Photos (Figures 82 and 83 of Photo Section). Terrace steps were built with rocks and slabs and these rock steps are about the size of one man's height. One could imagine that digging the earth, cutting rocks, carrying and stacking layer by layer of rocks will consume a prolong and consistently large labour input. One poor farmer could not spend all his time and labour in doing this job. He will work in his regular field or somewhere else to feed his family. If by chance he could harvest a good crop in one out of three or four years, he could save a certain amount of money for stone-built terracing and devote his time and labour that could otherwise be used up in his regular livelihood activities. Thus the changing process by poor farms becomes a slow motion. It is in the present decade changing swiftly due to the project intervention of the INGOs.

It will be relevant here to briefly state the terracing project design and implementation in Guizhou Province of P.R. China (ed. Min-Jae- Kim and D.R. Stoltz, 1998, CGPRT Center). First, the project of local government identified the priority area for terracing using different criteria (land utilization situation, slope, poverty area, etc. There are five main types of terracing: changing dry slope field into terraced dry field, change dry slope field into terraced paddy field, change slope waste land into terraced dry field, change slope waste land into terraced paddy field and restore terrace destroyed by floods. In the Province, farmland is owned by village collective and private ownership is forbidden. Land tenure is obtained by signing contracts with the village collectives. The policy is "Those who contract, terrace; those who terrace, utilize; those who utilize, are benefited". The changing process is designed, assisted and monitored by the assigned committees.

Terracing has two kinds of costs. The first is material costs: explosives and detonators, drill rods, hammers and rock drills, cubic stones, electricity, machinery, diesel oil, spades, etc. The second is labour costs: project management, blueprint design, survey, masonry, land leveling, clearing stones, and gravels in fields, terrace wall building, etc.

From the project analysis in Pingba County, Guizhou Province, the total cost per ha was 6030 RMB Yuan or US\$ 710 of which labour cost is 71 %. From 1991 to 1995, the project completed terracing of 807 ha (1985 acres) covering 34 villages, 5796 rural households and 30319 persons. Terracing could expand the former cultivate area by 8 %. Farmers did not begin to produce net benefit until 6 years but in the seventh year, the break -even-point was reached. The grain yield increase after terracing was 16 %. In tenth year, the costs incurred could be paid back by farmers. Pingba County and Guizhou Province had a severe shortage of financing for terracing. The State investment played a catalytic role in terracing. The project analytic had recommended attracting foreign investors' attention including every kind of monetary organization while fund supervising and auditing were suggested to be strengthened and improved.

In Myanmar, the government launched the upland farm development schemes and it started in Chin State in 2002(8). According to the mandate of the Senior General of the SPDC military Government at that time, the Upland Farm Mechanization Project was initiated and the Department of Agricultural Mechanization (AMD) formed the task force with the Deputy Director General as head of the team and implemented in upland States. The objectives are to facilitate rural development and to transform the shifting cultivation to the permanent farming and stabilized livelihood of the local ethnic groups. IN Chin State, aid fund was provided Kyats 12,000 per acre to farmers who develop terracing for the period from 2002 to 2007-2008.

8 Interview with U Swe Win, Director, Upland Farm Development Project, AMD, Hakkha, 25 Feb., 2012

Table 6 ***Funding support for terracing in Chin State by AMD, 2002 to 2007-2008***

Township	Acres terraced	Amount of Kyats supported
Tedim	84.99	1,019,880
Tongzang	184.30	2,211,600
Thantlang	180.99	2,171,880
Falam	58.23	698,760
Hakkha	105.23	1,261,560
Mindat	21.69	260,280
Matupi	150.20	1,802,400
Kanpalet	22.95	275,400
Paletwa	53.00	636,000
Total	861.48	10,337,760

Number of area acreage was verified by the staffs of SLRD and AMD released the fund to farmers according to the norm. This support system was discontinued in 2008. The department then provided the machinery in terracing. The norm does not take into account how much cost is required per acre. The department allots 31 diesel gallons per acre (flat rate) for machinery use and it could be estimated that the department provides about Kyats 300,000 per acre including costs of lubricants and engine oil. There are 4 back hoes (TC 100) in operation. In their initial attempts, they developed the land on any possible sloping land without taking into account for water availability or elevation. There have been observations that their developed farms above 5000 ft could not grow rice. Most of the terraced farms are currently not utilized by farmers. The department personals also mentioned that farmers preferred ownership of the land rather than they need terracing lands.

The land developed by machine was only half-done (Figure 86 of Photo Section). Farmers need to do land leveling. He needs to remove stones and gravel. Bund formation will be also needed. Need assessment for terracing is first proposed from the farmer through Township General Administration Department which in turn relayed to the Township Agricultural Supervision Committee inclusive of AMD. Then the group go to the site for appraisal and upon approval, it was implemented first by AMD with machinery operation. In some case, the State Prime Minister pointed out the place to carry out land development for terracing. In some cases crop cultivation followed on the terraced farms. In terms of the terraced acreage, AMD stated the completion report as following in Chin State from Nov. 2002 to Feb. 2012.

AMD Machinery working	=	2748.67 acres
Farmers developed with AMD support	=	4366.07 acres
Total	=	7114. 74 acres

Some government staffs hold the general opinion that terraced farms thus far developed have not been cultivated in full extent and it will be more appropriate to further improve the former terraced farms so that farmers could pursue planting rather than develop new farms. It was mentioned that some local villagers did not really cultivate their lands but instead they relied only on remittance money from their sons abroad.

It is important to define real cultivators who will directly engage with farming. All these opinions indicated that the department concerned need participatory planning and efforts with the beneficiaries for effective implementation.

4. Legal Aspects and Land Registration in Permanent Farming Plots

The Lower Burma (Myanmar) Land Revenue Act, 1876 had been enacted even before the colonial government annexed the whole country. The British Government established the Revenue Settlement Department in 1879 to survey and measure farm lands, record cadastral “Kwin” maps (16 inches = 1 mile) and assessed land revenue from farmers. Land survey, records and revenue assessment had been extensively done in lower and upper Burma. Laws in force in Burma plain area were not applicable to the Scheduled District inclusive of Chin Hills. The colonial system applied direct rule to Burma proper area but indirect rule in hilly areas permitting the customary law and the autocratic role of village head (saopha) until the independence of the country in 1948.

Against such historical backdrop, Chin Hills land tenure system had been mixed up with the disposal right of the land by village chief, hereditary cultivation titles and communal land ownership by the village community as a whole. Since tribal livelihood relied almost exclusively on subsistence taun-yar farming in the past, the local community had no idea of land registration or grant of legal title of ownership or the official right to till land. But the changing process of taun-yar farming into permanent terraced farming or lowland paddy cultivation with commercial orientation has gradually affected the community outlook. Rich farmers who afforded development of permanent farming approached SLRD government staffs for surveying their lands, mapping and land registration.

Land survey in Chin Hills is quite different from that of plain area. In Yangon, Bago and other plain areas, cadastral “Kwin” map could be developed for an area of about 300 acres in which subdivisions of 1000 plots (holdings) could be made. So far this is said to be the biggest “Kwin” area. In Chin Hills proper, on the other hand, such a large tract of 300 acres “Kwin” in a site does not exist. About 50 acre-size of Kwin is said to be the biggest size. In most situations, 17 acres or at most 25 acres could be found as one “Kwin”. Measuring scale is 16 inches = 1 mile in plain areas but in the hill area, 32 inches = 1 mile scale has to be used⁹. Since the “Kwin” layout is scattered in small patches, land surveying and mapping are usually costly. According to the SLRD State officer, there is total number of 368 “Kwin” holding total 17,069 acres in the whole Chin State. These acreages will be almost covering lowland paddy fields and terraced farms. These are the permanent fields which could be registered as official holdings. But according to current practice of SLRD, non-permanent taun-yar lands could not be surveyed nor registered. The concerned staff may visit the taun-yar fields, take record of land position temporarily in his field trip note book for the purpose of revenue collection or to make report to his superiors. But the fields are not officially surveyed or mapped.

When the terraced farms are surveyed, the plots are not recorded as non-permanent holding but designated as Holding Number 1, 2, 3, etc. Name of the farmer is printed against this Holding number. The land revenue is assessed at the rate of Ks. 1.50 and Ks. 1.00 per year per acre for paddy and orchard crops respectively. These rates are not yet revised since the time of colonial days. After continuous payment of land revenue for 5 years, the terraced farm is listed as permanent Holding (Oo Paing). Farmer could hold the land as legal title of the right to cultivate it.

⁹ Interview with U Than Lwin, Head of the State Office of SLRD, Hakkha, 25 February, 2012.

Then the problem arises for the taun-yar land after the provision of the “Instruction for Duties and Rights of the Central Committee for the Management of Cultural Lands, Fallow Land, and Waste Land in 1991 by the SLORC, military government. The Central Committee shall permit the grant on application for granting right to utilize land of Vacant, Fallow and Virgin Lands to the business companies applied. Since that time up to June, 2010, over 1.89 million acres of cultural land, fallow land and waste land have been granted to the agricultural business companies. There are 127 companies already granted lands¹⁰. The Government agencies might consider “waste land” for any lands that is classified as agricultural but having no registered owner and currently left fallow. There is a risk that taun-yar land might be put under the category of “waste land” or “fallow land”.

Under the new democratic government, this wasteland instruction has been redrafted and proposed by the dominant ruling party to the Parliament and finally it was approved as The Vacant, Fallow and Virgin Lands Management Law in March, 2012. In this law, “vacant land and fallow land” means land which was done by the tenant before, and then that land was abandoned by the tenant in any reason. The Central Committee shall permit land grant for the following land area of vacant, fallow and virgin lands in relation to commercial agriculture, and livestock breeding purposes.

There is no legal protection for the status of taun-yar farmers. Under this new legal frame work, it implies that shifting cultivation (taun-yar plots) should be swiftly transformed into the permanent fields without leaving land as long fallow period in attempt to avoid land confiscation. But taun-yar farmers are mostly poor farmers lacking capital for changing process. Takahashi Akio (2011) is acceptable in saying that conversion of taun-yar into permanent upland and its ownership is linked with power which could be pointed out as one of diagnostic criteria of economic activities of Wealth Class A.

I will present my findings in later topic to which wealth class majority of taun-yar farmers belong to. If, in the future, infrastructure of Chin Hills will become improved, vacant and fallow lands might be commercialized by the forthcoming investors. There is a preceding example in Laos Hilly region where taun-yar farms are transformed into rubber plantation by encroaching Chinese investors and local Akha ethnic farmers become wage labourer. In some case, Akha farmers agree to share with investor 50 % of their profit from sales of latex. However many Akha farmers lost their rubber trees and plots prior to tapping latex as they continued to borrow money and rice on credit from the investor (Thongmanivong, 2000).

Table 7 *Type of land use in the whole Chin State (2011-2012)*

Sr.	Type of land	Area	Unit	% of Cultivated acre	% of Total Land area
1.	Land area	13,907	sq. mile		
		8,900,434	acre		
2.	Cultivated acre	343,755	acre		3.86%
	(a) Paddy	29,261	acre	8.5%	
	(b) Ya	1,192	acre	0.3%	
	(c) Stream bank	4,468	acre	1.3%	
	(d) Orchard	31,596	acre	9.2%	
	(e) Taun-yar	277,238	acre	80.6%	

¹⁰ Monitoring Report, Department of Agricultural Planning, Ministry of Agriculture and Irrigation, 2010

Sr.	Type of land	Area	Unit	% of Cultivated acre	% of Total Land area
3.	Reserved forest + Protected forest	1,453,545	acre		16.33%
4.	Other woodland	1,140,710	acre		12.82%
5.	Waste land	2,987,411	acre		33.56%
6.	Grazing land	8,040	acre		0.09%
7.	Area occupied under village	22,417	acre		0.25%
8.	Area occupied under town	3,283	acre		0.04%
9.	Rive ring, stream and water bodies	206,694	acre		2.32%
10.	Other	2,734,579	acre		30.72%
Total		8,900,434	acre		100.00%

source: SLRD, Hakkha

When the land use pattern (Table 7 provided by SLRD) in Chin State wise is examined, 80.6 % of total cultivated area was under taun-yar planting while paddy field and orchard fields represent only 8.5 % and 9.2 % of total cropping area. But total cultivated area constituted only 3.6 % of total state-level land area. This clearly points out that Chin State possesses extremely limited extent of cultivable land at present. Waste land and other (unclassified?) constitute about 30 % each of total land area. This waste land should be examined at least at a micro-water-shed level by employing GIS technology for its livelihood ad commercial potential taking into account the future population growth. Understanding of the land forms and topographical surface could help evaluate the present and future potential of land use pattern in the Chin Hills. Appendix Table 8 could be used as complementary information in investigating the potential extendable scope of arable land for setting up crop-cum -forest (or) agro-forestry farming for the next generation local poor landless households. Appendix Table 8 presents the estimated cultivated areas of different land use at the village level in each township.

Table 8 presents the land use and land availability in four townships of northern Chin State. In township wise, paddy land area is about 12 % to 14 % of total cultivated acres while taun-yar area accounts for 60 % to 70 % of total cultivated acres in the present year 2011-2012. Orchard area is the lowest in Thantlang Township as compared to other. It could be said that expansion of paddy land area including terraced farms has reached a level of 12 % to 14 % of total cultivated area over a period of half a century. The question is if there is possibility of moving forward to permanent farms from the existing taun-yar land or extendable scope of waste land.

Table 8. Types of land use on the basis of utilization in four townships in Chin State (area acres)

Sr.	Type	Thantlang			Tedim	Falam	Hakkha
		2009-2010	2010-2011	2011-2012	2011-2012	2011-2012	2011-2012
1	Current						
	Paddy field	4433	4564	4564	5,630	2,472	5,088
	Ya					374	95
	Alluvial island (Kaing)						
	Orchard	750	750	750	3,384	6,175	4,990
	Taun-yar	32,533	32,589	32,589	36,473	31,649	25,366
	Total	37,716	37,903	37,903	45,487	40,670	35,539
2	Net						
	Paddy field	4,388	4,519	4,519	5,630	2,472	4,817
	Ya					283	95
	Alluvial island (Kaing)						
	Orchard	750	750	750	3,384	5,931	4,985
	Taun-yar	32,533	32,589	32,589	36,473	31,649	25,366
	Total	37,671	37,858	37,858	45,487	40,335	35,263
3	Fallow						
	Paddy field	45	45	45			271
	Ya					91	
	Alluvial island (Kaing)						
	Orchard					244	5
	Taun-yar						
	Total	45	45	45		335	276
4	Reserved forest						
	Unclassified forest	1,286	1,286	1,286	159,656	84,459	314,521
	Protected forest						
	Degraded forest	54,792	54,792	54,792	296,533	29,485	70,636
	Virgin land	643,077	642,890	642,890	90,933	226,717	581,257
	Non-arable virgin	140,588	140,588	140,588	18,801	206,550	32,693
	Total	839,743	839,556	839,556	565,923	462,752	684,586
	Township total	915,175	915,362	915,362	656,897	544,092	755,664

Source: Department of Survey and Land Records, Chin State, Hakha.

5. Land Use Types in Relation to Wealth Classes in Sample Villages

The following tables (9.a to d) present the different land uses with respect to wealth classes of the respective villages. In Hakha Township, two villages were taken as samples. In Tinam, the average holding sizes of taun-yar field do not exceed 1.5 acres in all wealth classes. There are more number of taun-yar farmers in wealth class in C and less in Class A. The farmers of Wealth Class A devote more to paddy field and terrace field activities.

Table 9.a Number of different types of cultivated land held by different wealth classes – Hakha Township

Table 9.a.1, 2012, own survey, Tinam village

Wealth Class	Taun-yar (Acre)	Terrace (Acre)	Paddy field (Acre)	Number of Taun-yar household	Number of Terrace household	Number of Paddy field household	Average holding size of Taunyar (Acre)	Average holding size of Terrace (Acre)	Average holding size of Paddy field (Acre)
A	14	9.9	10.25	10	9	9	1.40	1.10	1.14
B	34.5	13.3	22.1	22	15	20	1.57	0.89	1.11
C	47.4	14.95	15.1	36	17	15	1.32	0.88	1.01
D	24	6.7	1.8	17	7	2	1.41	0.96	0.90

Table 9.a.2, 2012, own survey, Tiphul village

Wealth Class	Paddy field (Acre)	Low paddy field (Acre)	Taun-yar (Acre)	Number of Paddy field household	Number of Low paddy field household	Number of Taun-yar household	Average holding size of Paddy field (Acre)	Average holding size of Low paddy field (Acre)	Average holding size of Taunyar (Acre)
A	42.4	8.3	0	24	5	0	1.77	1.66	0.00
B	23.45	4.3	2.5	20	4	2	1.17	1.08	1.25
C	26.35	0	0.5	33	0	1	0.80	0.00	0.50
D	12.85	3.7	6	17	3	5	0.76	1.23	1.20

In Table 9.b, taun-yar and all other land uses of three study villages are private-owned. There is more number of taun-yar as well as terrace fields in higher wealth classes than in lower classes. The same is true for the holding sizes of taun-yar as well as terrace fields. Area of taun-yar field does not exceed 1.5 acres in all study villages of Falam Township. In Phaizawl & Thanhnai villages, ownership pattern of taun-yar and terrace fields are highly skewed to high wealth classes (A & B). But in Ramthlo, distribution of taun-yar fields are evenly distributed in class B and C and the area accumulated more in class A.

Table 9.b Number of different types of cultivated land held by different wealth classes – Falam Township

Table 9.b.1, 2012, own survey, Phaizawl village

Wealth Class	Taun-Yar (Acre)	Terrace (Acre)	Number of Taun-yar household	Number of Terrace household	Average holding size of Taun-yar field (Acre)	Average holding size of Terrace (Acre)
A	42.5	20.45	27	26	1.57	0.79
B	30.55	13	22	21	1.39	0.62
C	2.96	0.3	5	1	0.59	0.30
D	2	0	2	0	1.00	0.00

Table 9.b.2, 2012, own survey, Thanhniar village

Wealth Class	Taun-Yar (Acre)	Terrace (Acre)	Number of Taun-yar household	Number of Terrace household	Average holding size of Taun-yar field (Acre)	Average holding size of Terrace (Acre)
A	3.5	4.9	4	10	0.88	0.49
B	6.05	6.3	7	14	0.86	0.45
C	0.2	2.9	1	9	0.20	0.32

Table 9.b.3., 2012, own survey, Ramthlo village

Wealth Class	Taun-Yar (Acre)	Paddy (Acre)	Number of Taun-yar household	Number of Paddy field household	Average holding size of Taun-yar field (Acre)	Average holding size of Paddy field (Acre)
A	46.51	57.89	30	38	1.55	1.52
B	25.73	35.18	20	32	1.29	1.10
C	19.2	32.93	20	48	0.96	0.69

* Taun-yar fields are mostly private-owned

Table 9 c. indicates in the land use and ownership pattern of sample villages of Thantlang Township. In Congthia village, there is more number of taun-yar and paddy fields in Wealth classes C and D but the sizes of holding of paddy fields are larger in Wealth class A than in other classes. In Farrawn village, there are more number of households in Wealth class C and D working in taun-yar fields than in classes A and B. The latter classes have more orange grooves and paddy fields than that of other classes. In Sihmuh village, there is sharp trend in possession of paddy and terrace fields in terms of number of households and holding size. Paddy and terrace fields are more concentrated in Wealth classes A and B. Households in Wealth classes in C and D work more in taun-yar fields with relatively larger sizes.

Table 9.c Number of different types of cultivated land held by different wealth classes – Thantlang Tsp

Table 9.c.1, 2012, own survey, Congthia village

Wealth Class	Paddy field (Acre)	Taun-Yar (Acre)	Number of Taun-yar household	Number of Paddy field household	Average holding size of Paddy field (Acre)	Average holding size of Taun-yar field (Acre)
A	47	0	14	0	3.36	0.00
B	62.5	3.5	26	4	2.40	0.88
C	87.5	23	50	11	1.75	2.09
D	60.5	54	47	33	1.29	1.64
E	0	0	0	0	0	0

Table 9.c.2, 2012, own survey, Farrawn Village

Wealth Class	Taun-Yar (Acre)	Paddy field (Acre)	Orange Garden (acre)	Terrace (Acre)
A	6	2.5	16	0
B	30	33.2	35.4	0
C	161	20.7	31	3
D	132	8.5	16.6	0.5
E	8	0	0.5	0

Wealth Class	Number of Taun-yar household	Number of Paddy field household	Number of Orange Garden household	Number of Terrace household	Average holding size of Paddy field (Acre)	Average holding size of Taun-yar field (Acre)	Average holding size of Orange field (Acre)	Average holding size of Terrace (Acre)
A	2	5	9	0	3.00	0.50	1.78	0.00
B	19	11	34	0	1.58	3.02	1.04	0.00
C	56	12	50	2	2.88	1.73	0.62	1.50
D	57	12	40	1	2.32	0.71	0.42	0.50
E	5	0	1	0	1.60	0.00	0.50	0.00

Table 9.c.3, 2012, own survey, Sihmuh Village

Wealth Class	Taun-yar (acre)	Paddy field (Acre)	Terrace (Acre)	Number of Taun-yar household	Number of Paddy field household	Number of Terrace household	Average holding size of Taun-yar field (Acre)	Average holding size of Paddy (Acre)	Average holding size of Terrace (Acre)
A	12.05	46.55	0.5	14	12	1	0.86	3.87	0.5
B	24.05	11.6	0	15	8	0	1.60	1.45	0
C	21.8	1	0	10	1	0	2.18	1	0
D	19.2	2.55	0	14	3	0	1.37	0.85	0

In Table 9 d (1), distribution of number of taun-yar households and holding sizes with respect to wealth classes appears to be normal curve. Similar distribution pattern is found in Ngennung village. There is no communal land tenure in the study villages. In Suangzang village, the wealth class C works more on taun-yar farms while households in wealth classes A and B work more in irrigated terraced fields in terms of number and holding size.

Table 9.d Number of different types of cultivated land held by different wealth classes – Tedim Tsp

Table 9.d.1, 2012, own survey, Laibung Village

Wealth Class	Taun-Yar (Acre)	Terrace (Acre)	Number of Taun-yar household	Number of Terrace household	Average holding size of Taun-yar field (Acre)	Average holding size of Terrace (Acre)
A	3	1	2	1	1.5	1
B	8.96	3.48	8	4	1.12	0.87
C	42	3.9	35	13	1.2	0.3
D	16.17	3	21	6	0.77	0.5
E	8	2	8	4	1	0.5

Table 9.d.2, 2012, own survey, Ngennung Village

Wealth Class	Taun-yar (acre)	Terrace (Acre)	Paddy field (Acre)	Number of Taun-yar household	Number of Terrace household	Number of Paddy field household	Average holding size of Taun-yar field (Acre)	Average holding size of Terrace (Acre)	Average holding size of Paddy (Acre)
A	10.75	19.75	2	17	23	1	0.63	0.86	2
B	40.25	24.85	0	46	41	0	0.88	0.61	0
C	52.9	19.1	0	56	57	0	0.94	0.34	0
D	13.8	2.25	0	17	8	0	0.81	0.28	0

Table 9.d.3, 2012, own survey, Suangzang Village

Wealth Class	Taun-yar (acre)	Irrigated Terrace (Acre)	Non Irrigated Terrace (Acre)	Number of Taun-yar household	Number of Irrigated Terrace household	Number of Non-Irr. household	Average holding size of Taun-yar field (Acre)	Average holding size of Irrigated Terrace (Acre)	Average holding size of Non-Irr. Terrace (Acre)
A	38.5	48.1	12	25	29	8	1.54	1.66	1.50
B	19	21.25	9	15	21	7	1.27	1.01	1.29
C	76.25	13.75	22	62	15	20	1.23	0.92	1.10
D	17.75	2	0.5	21	3	1	0.85	0.67	0.50
E	1	1	0	3	3	0	0.33	0.33	0.00

Table 10 presents the household number and area acres in different land use (paddy, orchard and taun- yar fileds) categorized with respect to acre class (group). IN attempt to visualize the equity in distribution of land ownership, a Lorenz curve was drawn and illustrated in Figure 8.

Table 10. Distribution of household number working in paddy, orchard and taun-yar with respect to holding sizes classes, Tedim Township

Sr	acre group	paddy field		orchard		taun-yar		paddy field + either of (taun-yar or orchard)		paddy field + taun-yar + orchard	
		household	acre	household	acre	household	acre	household	acre	household	acre
1	< 2 acre	257	443	440	546	3,903	5,565	1,520	2,042	2,557	3,757
2	2 - 3.99	407	1,300	30	73	2,424	6,713	417	1,300	2,220	6,359
3	4 - 4.99	74	328	4	16	274	1,315	74	328	73	305
	< 5	738	2,071	474	635	6,601	13,593	2,011	3,670	4,850	10,421
4	5 - 5.99	52	263	5	26			52	263	30	157
5	6 - 6.99	142	896					142	896	9	58
6	7 - 7.99	27	199					27	199		
7	8 - 8.99	11	89					11	89		
8	9 - 9.99	5	46					5	46		
	5 - 9.99	237	1,493	5	26			237	1,493	39	215
9	10 - 14.99	7	80					7	80		
10	15 - 19.99										
	10 - 19.99	7	80	4	77			7	80		
11	> 100							1	410		
	Total	982	3,644	483	738	6,601	13,593	2,256	5,653	4,889	10,636

Total household = 15,211

Total acre = 34,264

Taun-yar farming is generally assigned equally to each household according to customary land tenure in Chin State although there is a tendency of private hereditary cultivation at present. Although paddy and terraced farming are moving towards to the private ownership but the holding sizes are still relatively small. Over all total cultivated lands, the distribution of different holding sizes are plotted to cumulative number of households working in different holding sizes and the curves come out as Lorenz curve. The straight line indicates perfect equity and the more the curve is deviated from the straight line the further it is from equity in land holding right. Distribution curve of land holding right in Monywa village is moving far away from the straight line while that of Tedim Township is staying close to the straight line. It could be said that within Chin State villages, there is a tendency of inequality in working in terraced farming and lowland paddy cultivation but if the Chin State equity status is compared to that of plain Myanmar area, Chin State retains relatively more equity in land use. Because the land use pattern is predominantly taun-yar cultivation in Chin State.

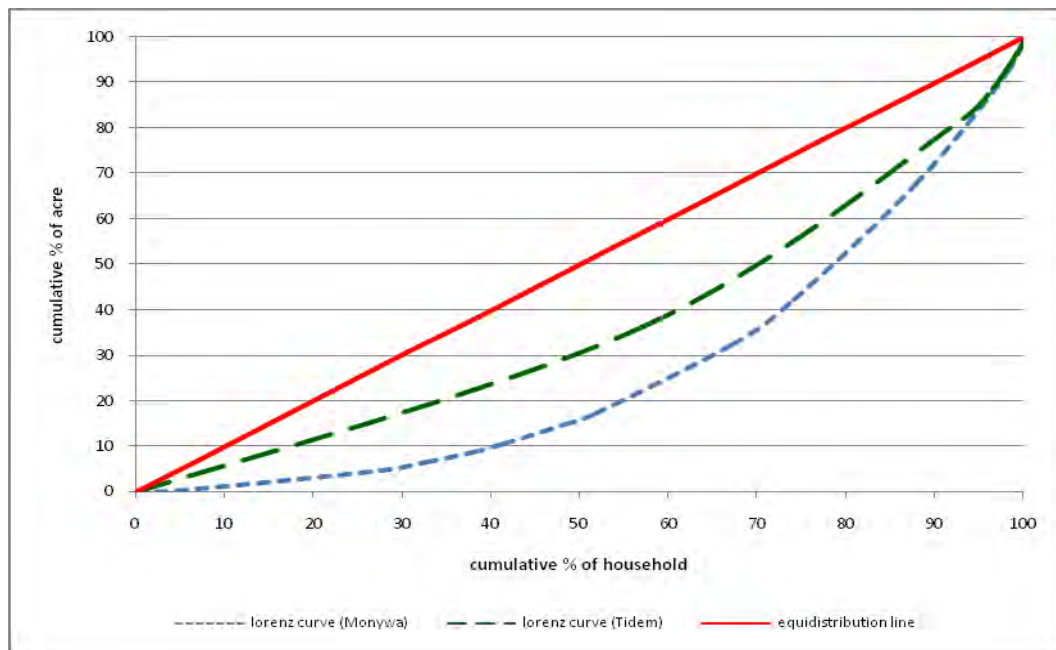


Figure 9 *Lorenz curves showing the extent of equity in holding agricultural lands (Comparative equity between Tedim and Monywa Township)*

IV. Food Security Attained by Different Livelihood Activities

1. Sources of staple food

In each study village, individual household interviews were conducted on what types and how much staple food were obtained from different sources of livelihood (taun-yar, paddy and terraced farming and off-farm job activities of the respondents). The results are compiled in Table 11 (a to d). In order to understand how many months of staple food requirement is met by different types of farming or jobs, the local units of the respondents are converted into the standard unit and then number of months the foods are obtained are calculated with respect to the family sizes. The summary results are seen below.

- (i) Taun-yar cultivation provides only 3 months in a year for most taun-yar farmers in all study villages
- (ii) Taun-yar provides traditional staple crop, maize but no upland rice.
- (iii) For those who rely on taun-yar cultivation with no other access to land, they rely on other livelihood incomes for 9-months food requirement.
- (iv) Low land paddy cultivation provides staple rice for the family requirement of 5 to 7 months and 9 months in one case.
- (v) Even a family works in both taun-yar and lowland paddy fields, this combination does not meet the annual requirement of staple food for the family. They have to seek other livelihood incomes for the remaining 1 to 2 months.
- (vi) For other livelihood incomes, household families in Zathal village extract pine resin from pine species (*Pinus khassia*), hewing timber, daily wage earning, and sale of livestock. In Tinam, other sources of income are horse-back transport and elephant foot yam and orchid collection in the forest. Horse back transport earns ks. 1000 per trip to and fro taun-yar and total income per year is about Kyats. 120,000. Orchid collection earns about ks. 100,000 from September to December. Selling two pigs could earn Kyats 200,000 a year. Daily wage rate is kyats 2000. Loan is sought from INGO micro credit scheme and Agricultural Development Bank (MADB). In Tiphul, some families go and work in Mizorum three trips a year and earn Kyats 700,000.

Most family rely on remittance money. One family usually obtained ks. 500,000 a year from their daughter abroad but now she gets married and no money is coming in yet. Yearly the average remittance money obtained by families is ranging from kyats 500,000 to 700,000.

Table 11 a. Number of months supplied for rice and maize from different livelihood sources, 2012, Hakha Township (own survey)

Township: Hakha, Village: Zathal

8 sample households primarily dependent on Taun-yar plots only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation		3	3
Other livelihood incomes	9		9
Total months			12

25 sample households working on Taun-yar plots, lowland paddy fields and terrace farms

Livelihood sources	No of months consumed		Total months
	rice	maize	
From lowland paddy fields & terrace farms	5		5
From Taun-yar cultivation		2.56	2.56
Other livelihood incomes	4.32		4.32
Total months			11.88

4 sample households working on both terrace farms and paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From lowland paddy fields & terrace farms	7.5		7.5
Other livelihood incomes	4.5		4.5
Total months			12

Township: Hakha, Village: Tinam

15 sample households primarily dependent on Taun-yar plots only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation		3.2	3.2
Other livelihood incomes	8.8		8.8
Total months			12

22 sample households working on both Taun-yar plots and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation		3.1	3.1
From lowland paddy fields	7.4		7.4
Other livelihood incomes	1.3		1.3
Total months			11.8

Township: Hakha, Village: Tiphul

6 sample households primarily dependent on Taun-yar plots only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation	2.5	1.3	3.8
Other livelihood incomes	8.7		8.7
Total months			12.5

15 sample households primarily dependent on lowland paddy fields only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From lowland paddy fields	9.93		9.93
Other livelihood incomes	2.06		2.06
Total months			11.99

27 sample households working on both Taun-yar plots and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation	0.85	2.77	3.62
From lowland paddy fields	7.07		7.07
Other livelihood incomes	2.30		2.30
Total months			12.99

Table 11 b indicates the number of months supplied for rice and maize from different livelihood sources in study villages of Falam Township. Permanent farming is a predominant livelihood in these villages. In Thanhniar and Phaizawl, terracing and permanent farming provides food for 9 months and 12 months respectively. In Ramthalo, farmers who rely on taun-yar farming could produce foods sufficient for 4 to 5 months and other livelihood activities seek for food for the remaining months. In Phaizael, there are maize grinder operated by hydro-powered grinder beside hand-operated motor and pastel by which maize is grinded to get powder and fried maize meal is consumed. In other two villages, maize is commercially fed to pigs which are sold out to market. Dietary habit changed in these villages.

Table 11 b. Number of months supplied for rice and maize from different livelihood sources, 2012, Falam Township (own survey)

Township:Falam Village: Phaizawl

1 sample household primarily dependent on terrace farms only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From terrace farms	5	7	12
Total months			12

10 sample households working on both Taun-yar plots and terrace farms

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation		6.2	6.2
From terrace farms	5.8		5.8
Other livelihood incomes			
Total months			12.0

Township:Falam, Village: Thanhniar

14 sample households primarily dependent on terrace farms only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From terrace farms	10.29		10.29
Other livelihood incomes	1.70		1.70
Total months			11.99

7 sample households working on both Taun-yar plots and terrace farms

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar Cultivation	0.29		0.29
From terrace farms	9.00		9.00
Other livelihood incomes	2.70		2.70
Total months			11.99

Township:Falam, Village: Ramthlo

4 sample households primarily dependent on Taun-yar plots only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar Cultivation		4.00	4.00
Other livelihood incomes	8.50		8.50
Total months			12.50

4 sample households primarily dependent on terrace farms only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Terrace cultivation	4		4
Other livelihood incomes	8		8
Total months			12

14 sample households primarily dependent on lowland paddy fields only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Terrace cultivation	6.9		6.9
Other livelihood incomes	5.1		5.1
Total months			12

2 sample households working on both Taun-yar plots and terrace farms

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation		5.5	5.5
From Terrace cultivation	3.5		3.5
Other livelihood incomes	3.0		3.0
Total months			12

16 sample households working on both Taun-yar plots and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation	-	2.06	2.06
From Terrace cultivation	7.18		7.18
Other livelihood incomes	2.81		2.81
Total months			12.05

10 sample households working on both terrace farms and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Terrace cultivation	2.65		2.65
From Low land Paddy cultivation	7.20		7.20
Other livelihood incomes	2.15		2.15
Total months			12.00

5 sample households working on Taun-yar, terrace farms and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar Cultivation		2.90	2.90
From Terrace cultivation	0.40		0.40
From Low land Paddy cultivation	6.20		6.20
Other livelihood incomes	3.40		3.40
Total months			12.90

1

Thanhniar village could have good productivity from terraced farming which largely devote on vegetable cash crops. The village is close to Falam market. Ramthlo is found to be quite diversified. The village has three classes of lands (taun-yar, terrace and lowland paddy) which alone or in combination produce different results in terms of food-supplying months. Terrace farming supplies staple food in terms of 0.4 month to 2.5 to 3.5 months of consumption. Lowland paddy farming produces staple food meeting the requirement of 6 to 7 months. In most cases, other livelihood activities have to meet the balance in food requirement. Other livelihood incomes are similarly earned as in the case of Zathal and other villages.

Table 11 c. Number of months supplied for rice and maize from different livelihood sources, Thantlang Township, own survey

Township:Thantlang, Village: Farrawn

35 sample households primarily dependent on Taun-yar cultivation only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar Cultivation	7.62		7.62
Other livelihood incomes	4.37		4.37
Total months			11.99

3 sample households working on both Taun-yar cultivation and paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar Cultivation	7.66		7.66
From paddy fields	4.33		4.33
Total months			11.99

11 sample households primarily dependent on paddy fields (terrace + lowland paddy field)

Livelihood sources	No of months consumed		Total months
	rice	maize	
From paddy fields	8.18		8.18
Other Livelihood incomes	3.81		3.81
Total months			11.99

Township: Thantlang, Village: Sihmuh

12 sample households primarily dependent on Taun-yar cultivation only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar Cultivation	5.58		5.58
From paddy fields	6.41		6.41
Total months			11.99

1 sample household primarily dependent on lowland paddy fields only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From paddy fields	4		4
Other livelihood incomes	8		8
Total months			12

13 sample households working on both Taun-yar cultivation and lowland paddy fields (including

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation	1.77		1.77
From Low land Paddy fields	7.54		7.54
Other livelihood incomes	2.69		2.69
Total months			12.00

Township: Thantlang, Village: Congthia

6 sample households primarily dependent on Taun-yar cultivation only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-yar cultivation	7		7
Other livelihood incomes	5		5
Total months			12

48 sample households working on paddy fields (terrace farms and lowland paddy fields)

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Paddy fields	9.12		9.12
Other livelihood incomes	3.00		3.00
Total months			12.12

8 sample households working on both Taun-yar and paddy fields (including terrace farms)

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun Yar cultivation	4.50		4.50
From Paddy fields	2.50		2.50
Other livelihood incomes	3.37		3.37
Total months			11.99

Table 11 C indicates the number of months supplied for rice and maize from different livelihood sources in study villages of Thantlang Township. Maize was largely replaced by rice in all these villages. Maize is planted in taun-yar plots of Sihmuh but it was fed to pig and chickens and small amount is consumed as afternoon snack food for households. In Congthia, only three households out of 46 sample households grow maize and the remaining grow rice. Therefore the number of months that food is consumed is stated as rice or rice equivalent. Among sample households in Farrawn, all taun-yar plots are grown to upland rice. Taun-yar productivity could be understood in terms of rice. In most villages, taun-yar fields produce staple rice sufficient to feed households for 7.6 months at most and 1.7 months at least. On the average, it produces rice for 5 months of consumption across all villages. Lowland paddy fields produce rice for 7 to 9 months of consumption but 2.5 months only in one group of Congthia. It is also true to say that livelihood combinations are necessary to meet the year round food requirement for the family.

Other livelihood income sources are daily wage earning, hewing planks, back yard livestock, migrant worker, orange groove, remittance, loan etc. Daily wage rate is ks. 2500. Hewing timber could earn Kyats 8,000 per day. Remittance could be expected for Kyats 400,000 a year. Selling one mithon could earn Kyats 350,000 to 400,000. Hired bullock and ploughing labour could earn Kyats 50,000 per season. Raising and selling pig could earn Kyats 200,000 a year. Loan could be obtained from MADB, PTDC or UNDP Kyats 50,000 to 100,000. These are the coping strategies to overcome the food shortage.

Table 11 d. Number of months supplied for rice and maize from different livelihood sources, 2012, Tedim Township (own survey)

Township: Tedim Village: Laibung

2 sample households primarily dependent on Taun-yar plots only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun Yar cultivation		5.5	5.5
Other livelihood incomes	6.5		6.5
Total months			12

5 sample households primarily dependent on terrace farms only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Terrace cultivation		5.6	5.6
Other livelihood incomes	6.4		6.4
Total months			12

20 sample households working on both Taun-yar plots and terrace farms

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation		3.9	3.9
From Terrace cultivation	3.2		3.2
Other livelihood incomes	4.3		4.3
Total months			12

Township: Tedim, Village: Ngennung

2 sample households primarily dependent on Taun-yar plots only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation	1	8	9
Other livelihood incomes	3		3
Total months			12

20 sample households primarily dependent on terrace farms only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation	5.65	5.55	11.20
Other livelihood incomes	0.80		0.80
Total months			12

1 sample household working on both terrace farms and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From terrace cultivation		6	6
From Low land Paddy fields	6		6
Total months			12

28 sample households working on both Taun-yar plots and terrace farms

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation	0.10	5.71	5.81
From Terrace cultivation	4.67	0.82	5.49
Other livelihood incomes	0.60	0.07	0.67
Total months			11.97

Township: Tedim, Village: Suangzang Village

24 sample households primarily dependent on Taun-yar plots only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation		2.66	2.66
Other livelihood incomes	8.83		8.83
Total months			11.49

5 sample households working on Taun-yar plots, terrace farms and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation		3.2	3.2
From Terrace cultivation	1.6		1.6
From Low land Paddy fields	5.2		5.2
Other livelihood incomes	2.4		2.4
Total months			12.4

6 sample households working on both Taun-yar plots and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation		3.33	3.33
From Low land Paddy fields	6.66		6.66
Other livelihood incomes	2.00		2.00
Total months			11.99

2 sample households primarily dependent on terrace farms only

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Terrace cultivation		3.5	3.5
Other livelihood incomes	8.5		8.5
Total months			12.0

3 sample households working on both Taun-yar plots and terrace farms

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Taun-Yar cultivation		4	4
From Terrace cultivation	1		1
Other livelihood incomes	7		7
Total months			12

2 sample households working on both terrace farms and lowland paddy fields

Livelihood sources	No of months consumed		Total months
	rice	maize	
From Terrace cultivation		2.5	2.5
From Lowland Paddy fields	5.5		5.5
Other livelihood incomes	4		4
Total months			12

Table 11 d. points out the number of months supplied for rice and maize from different livelihood sources in sample villages of Tedim Township. The role of maize as staple food remains important in all study villages of Tedim. Both taun-yar and terraced farms produce maize as well as paddy. Taun-yar plots produce maize from 4 to 5 months of consumption in Laibung, 5.5 to 8 months of consumption in Ngennung, and 2 to 4 months of consumption in Suangzang village. Only in Ngennung, paddy is grown in taun-yar plots to small extent.

Terraced fields are grown to paddy and produce food for 3.2 months of consumption in Laibung, 5.6 months of consumption in Ngennung and 1.6 months in Sungzang village. In Ngennung and Suangzang, lowland paddy had been developed producing rice sufficient for 5 to nearly 7 months of consumption. Provision of other livelihood activities up to food for 8 months of consumption in Suangzang could be explained by the fact that these are the average of the salary of village school teacher, income of village hair cutter, and wage earner from horse back transport.

2. Change in Dietary Habit over 20 Year- Period

Table 12 summarizes the findings of the food consumption questions on the present status and that off the past 20 years. The customary food consumed is maize, sulphur bean, millet, taro or sweet potato, vegetable and bean. Maize is the staple food. Maize had been and is still continued to be adaptable to taun-yar culture. Maize is also considered to be poor man's crop fulfilling his calorie need. In food basket, maize is cooked together with sulphur bean or pigeon pea. Sulphur bean is real poor man's crop. The plant is hardy and the seed could be stored well without deterioration. It requires little care in planting. Maize and sulphur bean are consumed at the ratio of 3 to 1 or 5 to 1 in most villages.

When rice is mostly substituted sulphur bean consumption is reduced or almost nil. Millet grain is also easily stored by hanging panicles in the house for a long time. The texture as food is also smooth. Pigeon pea is considered high value crop today as food as well as cash crop. But it could be grown once in every three years because of its photo-sensitivity which may be somehow related to days in February month. When pigeon -pea could be considered grown in designated year, the lopil plots are usually set large area for accommodation of land assignment to all households.

Taro or sweet potao is starchy foods obtained often from taun-yar plots or home garden plots. Mustard, pumpkin, cabbage or vegetables and fruit trees such as avocado are grown nearby the house. These are alternative food items in traditional food basket.

The differences in food costs in the past 20 years and present days are extraordinarily large, by the times of 3000 to 4000. There was no cash economy in old days. All the foods produced by every households consumed by themselves with not much surplus for sale. Monetary value of food items is difficult to record for old days diet. In present times, rice is bought outside, and cash value has been listed easily for most food items.

Table 12 Change in dietary habit, Chin Project villages

Pattern of food intake with costs indicating changes from the past 20 years to the present

in selected villages and townships, Chin State, 2012 (own survey)

Sr.	Township/ Village	family mem- ber	meal	20 years backward					February, 2012								
				food items	amount			rate (Ks.)	cost (Ks.)	food items	amount				rate (Ks.)	cost (Ks.)	
					tin	viss	pc.				tin	viss	kt.	pc.			
1	Tidem/ Laibung	4	1	maize	8			0.02	0.16	maize	8				33.33	266.64	
				sulphur bean	1			0.01	0.01	sulphur bean	1				50	50	
				potato		1		-	-	potato		1			500	500	
				kidney bean (substitute of sulphur bean)	1			-	-	kidney bean (substitute of sulphur bean)	1				100	100	
									0.17							916.64	
	Tidem/ Ngennung	4	1	maize	4			0.02	0.08	rice	5				66.67	333.35	
				millet	6			-	-	maize	6				33.33	199.98	
				taro		2		0.1	0.20	taro		1			500	500	
										mustard & cabbage				-	250	250	
									0.28							1283.33	
	Tidem/ Suangzang	4	1	maize				-	-	rice					-	-	
				millet				-	-	maize					-	-	
				corn				-	-	millet					-	-	
				sulphur bean				-	-	sulphur bean					-	-	
				taro				-	-								
				sweet potato				-	-								
					amount & prices not available						amount & prices not available						
2	Falam/ Phaizawl	5	1	maize				-	-	rice					-	-	
				sulphur bean				-	-	maize					-	-	
										sulphur bean					-	-	
										pea					-	-	
										tomato & potato					-	-	
					amount & prices not available						amount & prices not available						
	Falam/ Thanhnriar	5	1	maize	8			-	0.50	rice	8				-	700	
				pea	4			-	0.25	cabbage				4	-	600	
				soup (mustard or roselle)				-	0.10	chicken pea (or) chin pea	4				-	933	
										cooking oil			2.8		-	84	
										salt			50		-	200	
										ajinomoto					-	-	
										chilli					-	-	
									0.85							2517	
	Falam/ Ramthlo	5	1	maize				-	-	rice					-	-	
				sulphur bean				-	-	vegetables					-	-	
				millet/rice bean				-	-	oil, salt, chilli					-	-	
				salt				-	-								
					amount & prices not available						amount & prices not available						

viss = 1.63 kg; 1 tin = One can of condensed milk (New Zealand milk can);
1 kt = decimal system of 1 viss (1 viss = 100 kyat-ther or 100 kyat in weight measure)

Sr.	Township/ Village	family mem- ber	meal	20 years backward					February, 2012							
				food items	amount			rate (Ks.)	cost (Ks.)	food items	amount				rate (Ks.)	cost (Ks.)
					tin	viss	pc.				tin	viss	kt.	pc.		
3	Thantlang/ Congthia	5	1	maize	6			0.033	0.20	rice	5				150	750
				sulphur bean	2			0.0166	0.33	maize	3				50	150
				pigeon pea	1			0.05	0.05	rice bean	1				200	200
				taro (or)			1	0.1	0.10	pigeon pea	1				167	167
				sweet potato												
				loo			4		0.31							
								0.99							1267	
	Thantlang/ Farrawn	5	1	maize	5			0.02	0.10	rice	5				100	500
				sulphur bean	2.5			-	0.00	maize(pounded)	5				50	250
				cowpea	2			-	-							
										0.10						750
	Thantlang/ Sih Hmuh			maize				-	-	rice					-	-
				sulphur bean				-	-	maize					-	-
				millet				-	-							
				pigeon pea				-	-							

In the menu of all the respondents, it is surprising that meat was excluded. These are the foods from what they have produced. In every house, pigs or chicken are raised. In some villages, goat raising is noted in almost every household. They may serve as livelihood assets or saving box from which emergency cash could be earned, but not for the family's weekly consumption. Pigs are considered the great delicacy as food by Chin people. Pigs are killed in special occasions such as the highest compliment offered to the special guest, weeding, religious events, or sacrificial purposes (in the past time), etc. Hunting or fishing is done by some households.

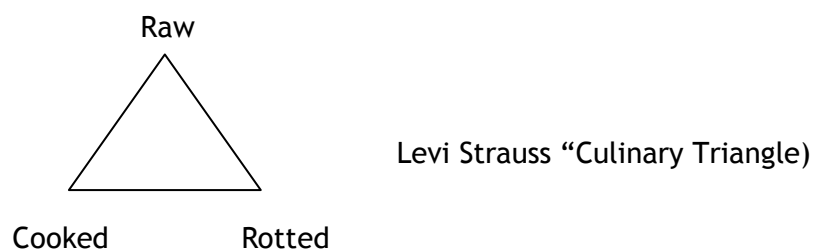
Fish culture ponds are now established in such village as Ngenug in Tedim. Mythons are kept as special asset. Milking was not done by the local people from mython or goat. The villages locating nearby road side are found with food shops where rice, chicken egg, small sugar bags, cooking oil, etc. are seen in the shelf.

Chin liquor is customarily made from rice or millet. It is often said that no event is complete without liquor. Kitchen utensils are commonly found steel pots and pans of Manipur from which people bought during their migrant labour. Large brass pots of old Indian made are also noted. In old days people tell use of earthen pots. Spoons or receptacles are commonly made from splitting the bottle gourd.

It could be said that Shans devour soybean while Chin consumes sulphur bean which is associated with shifting cultivation. It contains a hard seed coat and prussic acid (HCN), poisonous to people and animals. Sulphur bean is locally known as aung lauk (Figure 4 of Photo Section). The seed was boiled in water for nearly half day. Then it was soaked in running water for 7 days in the wooden trough with running water passing through the soaked seeds in it (Figure 19 of Photo Section). It was then drawn out of water, the seed coat was peeled off and the kernel was placed in earthen pot and let it fermented for 9 days.

Maize cobs were dried hanging in the kitchen (Figures 1 and 2 of Photo Section) and seed was grounded in wooden motor with pestle by two female household members (Figures 30, 31, 32 and 33 of Photo Section). These figures serve as evidence how much high value Chin people pay to maize and maize pounding home-made implements for their daily subsistence needs. Maize husks were then removed and it was ready for boiling. Pounded maize seeds in about 4 cans of the condensed milk was boiled and mixed with 2 cups of fermented sulphur bean. Taro or yam was boiled separately. At dining place, maize-sulphur bean soup was scooped by receptacle made up of bottle gourd and consumed it by household members (Figure 23 of Photo Section). Maize is the common ingredient with which pigeon pea or millet is usually consumed in various villages. The age-old dietary habit is still widely seen today in most villages of the Chin Hills.

Food is considered a product of culture. Levi-Straus (1964) explored the nature-culture relationship and explained the evolution of cooking techniques. In his “culinary triangle”, one point in the triangle - the raw - is contrasted with two other points - the cooked and the rotted. Cooking signifies a transformation through culture, but rotting is transformation by nature.



Traditional Chin food is cooked in a simple manner, typically boiled, stewed, smoked, steamed or fermented. The only cooking oil available was when a pig was slaughtered and its fat preserved in the form of lard, which was then re-heated for frying purposes. Most of the family could not afford to kill more than one pig in a year and have no means of preserving lard. Therefore household families had few occasions of using cooking oil. With force of globalization, food is now spicier and richer. Extraction of edible oil is sometimes carried out by pounding sesame seeds in the motor. Sesame seeds in about 6 to 7 cans of the condensed milk yields one half bottle of cooking oil. It is used in cooking meat but not every day for common households.

Cooking food in the past 20 years needed a great deal of wood fuel. It took at least half- night time to cook maize and sulphur bean. However traditional cooking usually fulfilled three-fold purposes (food, illumination and warmth). In old days houses were not built to insulate cold strong wind blowing after monsoon season. There was no pit saw to nicely hew the planks. People used axe to trim the planks which were not as good as today although it was made as artistically as possible in ancient times. The roof was not tin but made of thatch. Icy-cold wave creeps into the house. Around the fire place bamboo mat or mython skins were spread on which family sit. In order to keep warmth to the resting family in the shabby soot-begrimed house, fire place was kept alive all night long while it simultaneously illuminated, boiled the maize pot or sulphur bean pot. By next morning the pot was well cooked and the family had enough sound sleep given by warmth from the fire place. Food was also ready before going to taun-yar fields. Under such a Chin way of life, maize, sulphur bean, prolonged cooking style, plentiful wood forest, and fire place were inseparable.

Things are changing today. Wood fuel is scarce. Fast cooking becomes essential. Efficient cooking stove is mandatory. People now demand the prestigious rice. Changing pattern is from maize alone in the past to more rice with less proportion of maize today.

In the previous sections we have discussed the gradual development of lowland paddy fields and terraced fields. The attempts of paddy fields development were driven by demand for rice as staple food. The question is how such driver was generated.

Behaviour changes may be accounted first but it was difficult to measure. When and how much paddy land was developed? It may vary from community to community and one local to another. But generalization at the state level may not be far from truth. Do the people increase their income or do they work harder than before to earn money to buy more rice? What is the role of the government policy in promoting rice security? How much rice is flowing in the state and by what market channels? Are the infrastructure is now improving to permit cheap flow of rice? What are the roles of INGO, UNDP, WFP and others in attaining the food security of the local beneficiaries? How is about the parallel changes of cropping pattern in Kalay valley, the nearest rice supplying base to Chin State? Is rice availability inside or outside the system boundary fulfilling the need of growing population? If yes, how has been the equilibrium achieved? What is the Way Forward for a Sustainable and Responsible Livelihood? Although this study could not answer all the questions, attempts will be made first in meeting the set objectives of the present study and secondly to leave important issues for the next studies in relevant aspects.

3. Demand and Supply Situation of Rice in Northern Chin State

The rice cultivated land area is extremely limited in the Northern Chin Hills at village level, township level and State level. In the twelve study villages, paddy lands and taun-yar lands are in the ratio of 1:3 or more. It appeared that these twelve villages are in the dynamic process of changing from taun-yar lands to permanent lands (Table 3). But when we look at land availability ratio at the township level, the present access to paddy lands is 7 to 8 times less than that in working in taun-yar lands (Table 8). At the State level, low land paddy fields account for 8.5 % and taun-yar fields account for 80.6 % of total cultivable lands (Table 7). The existing land forms of the state offers little scope for paddy land development. Remoteness and limited infrastructure pose barriers to the local inhabitants from being able to expand the areas of commercial cash crops, vegetables and fruit growing. The present survival strategy is the dependence on the remittance money from the migrant workers of the remaining families.

Other sources of earning are cash for work programme of WFP, UNDP, GRET and other community development agencies. Kalay valley, a gate way to the Chin Hill is extending large tract of paddy land with surplus rice production. Rice is grown to about 81500 acres, about 53% of total cultivated lands in Kalay Township. According to the Agriculture Department of Kalay Township, rice self- sufficiency is 200 %, enabling to supply surplus rice to Chin Hill besides feeding its own population of about 303,558. The road from Kalay to the four townships of northern Chin Hill has been improving to enable rice delivery by truck transport in all seasons except occasional obstructions in rainy season. Taken into account this market channel, demand and supply situation of rice in four townships are examined. The results are presented in Figure 10 and Table 13.

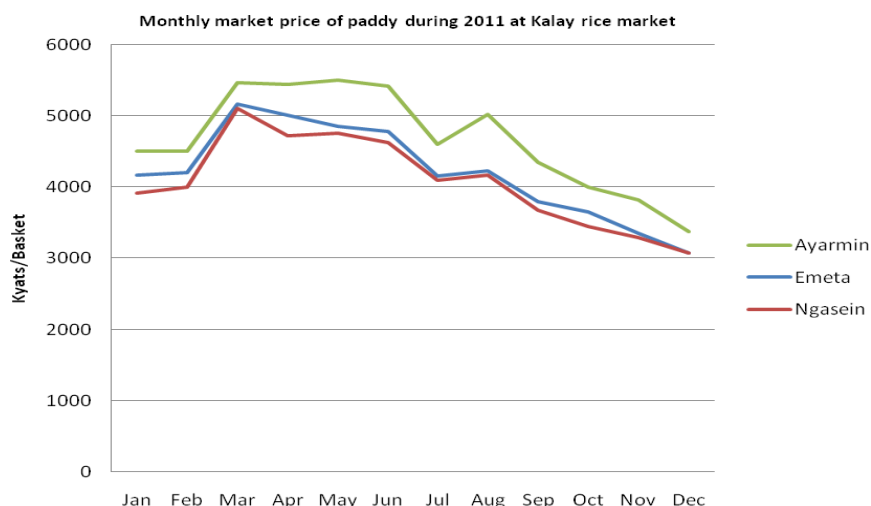


Figure 10 Monthly price movement of paddy in Kalay rice market, 2011
(1 bskt = 21 kg)

Table 13.a Paddy cultivation and production in four townships of northern Chin Hills

Sr.	Township	Wet Paddy			Taung-ya Paddy			Total Paddy Production (Basket)
		Acre	Yield/Acre (Basket)	Total Yield (Basket)	Acre	Yield/Acre (Basket)	Total Yield (Basket)	
1	Thantlang	4,189	60	251,340	13,003	36	468,108	719,448
2	Falam	2,469	60	148,129	4,150	36	149,400	297,529
3	Hakha	4,714	60	282,840	5,827	36	209,772	492,612
4	Tedim	5,540	60	332,374				332,374

Table 13.b Estimation of local rice production in four townships, 2011-12 (use MAS norms)

Sr.	Township	Total Paddy Production (Basket)	Seed Allotment (Basket)	Waste Component (Basket)	Seed + Waste (Basket)	Net Production (Basket)	Paddy in lb	Rice in lb	Rice in Kg	Rice Mt
		(a)	(b)	(c)	(d)	(a-d)=(e)	(e) x (46) = (f)	(f) x (0.6) = (g)	(g)/2.2 = (h)	(h)/1000 = (i)
1	Thantlang	719,448	20,504	30,864	51,369	668,079	30,731,653	18,438,992	8,381,360	8,381
2	Falam	297,529	8,480	12,764	21,244	276,286	12,709,138	7,625,483	3,466,129	3,466
3	Hakha	492,612	14,039	21,133	35,172	457,440	21,042,217	12,625,330	5,738,786	5,739
4	Tedim	332,374	9,473	14,259	23,731	308,642	14,197,538	8,518,523	3,872,056	3,872

Table 13.c Supply side of rice to four townships

Sr.	Township	Net Rice Production (Mt)	External Supply (Mt)	Total Supply (Mt)
1	Thantlang	8,381	1,449	9,830
2	Falam	3,466	2,020	5,486
3	Hakha	5,739	2,957	8,696
4	Tedim	3,872	5,003	8,875

Note: Detail calculation for external supply of rice could be seen in Appendix Table 5.

Table 13.d Consumption needs of four townships

Sr.	Township	total population of township	yearly per capita consumption of rice(kg)	township total consumption of rice for 1 yr. period (kg)	township total consumption of rice for 1 yr. period (Mt.)
1	Tedim	93345	180	16,802,100	16802
2	Falam	67296	180	12,113,280	12113
3	Hakha	53790	180	9,682,200	9682
4	Thantlang	51599	180	9,287,820	9288
	Grand Total			47,885,400	47885

Table 13.e Rice supply, demand and deficit still to be covered by maize

Sr.	Township	Total Rice Supply (Mt.)	Total Rice Demand (Mt.)	Total Deficit of Rice (Mt.)	% Deficit	Total Surplus of Rice(Mt.)	% Surplus
1	Tedim	8,875	16,802	7,927	47		
2	Falam	5,486	12,113	6,627	55		
3	Hakha	8,696	9,682	986	10		
4	Thantlang	9,830	9,288			543	6

In this estimation, rice productivity is assumed to be 50 baskets per acre (1050 kg per acre) from lowland paddy cultivation and 25 baskets (525 kg) per acre from taun-yar cultivation. This is a conservative estimate. Estimation of rice for direct consumption is estimated from paddy production applying the norms of the Department of Agriculture (MAS formerly). Per capita rice consumption is also estimated from the MAS norm. This may per adult consumption. Since we could not know the population structure, we could not derive the consumption need based on the age strata. That may be one source of inaccuracy.

The population of the township is estimated from the record of the respective township immigration department as of 2012. From such estimates, rice demand for each township is calculated and the result is shown in Table 9 e. Total rice supply consists of own production and purchase from Kalay. Based on the population estimate, the demand for rice is still exceeding supply side, showing deficit by 47% in Tedim, 55% in Falam, 10% in Hakha, and a surplus of 6 % in Thantlang Township. The deficits do not apply food shortage but indicate that local people consumed maize and millet.

Such consumption of other cereals are higher than the expected amount if we consider the number of months consumed for rice and maize in our study villages (Table 11). Value for the demand side will be more than the actual number because the migrant household members could not be subtracted from the total population. Migration is a determinant factor in Chin Hills and if this number could be taken into account, the deficit percent will become more realistic.

The total supply from Kalay to four study townships amounted to 11,429 mt of milled rice and the amount will be approaching ceiling figure of supply base from Kalay. Moreover if supply channel to Tonzang is taken into account the total demand for the northern Chin will nearly exceed the supply capacity of Kalay. There is occasional supply from Gangaw to Hakha but this amount is usually few quantity of high quality rice for luxury consumption of high-paid class. Moreover, the market surveys on the rice dealer shops in Kalay and Tahan indicate similar estimates on the amount of rice supply to Northern Chin Township, particularly for Tedim. Paddy price is moving normally with high price during the rainy season and declining price after paddy harvest in the cool season (Figure 13).

It appears that the demand from Chin does not affect the typical price movement pattern. Since the rice supply channel is flowing normally, it could be assumed that our calculation for supply side could give the best estimate. More data may be needed for estimation of migration (floating) population and young and adult number to best estimate the demand side. The present exercise indicates that (i) the northern Chin Hills have limited potential in paddy land; (ii) but changing process from taun-yar land to permanent farms still continues to take place; (iii) local consumption has shifted to more rice (iv) but maize has not been totally abandoned due to remoteness in most rural areas where cost of rice supply is high; (v) cash flow through sale of vegetables and fruits from hill side to the plain will be much less than the value of uphill flow of rice; (vi) migration for work will continue to expand to afford the purchasing power of the local people; (vii) domestic resource cost of the hill region will be higher than that of the Kalay valley for growing rice hence more effort should be directed to area expansion and productivity improvement of vegetables and fruit cultivation along with the infrastructural improvement.

V. Examination of the Population Dynamics and Land Cover changes

1. Population status and evolution

Population in the whole Chin state is estimated to be 533049 as of 2008, the density being 38.2 persons per sq.m. (Table 14) and among all states and divisions of the union, Chin state has the lowest population next to Kayah state. Average household size at the Union level is 5.2 while it is 5.9 in Chin state (IHLCA, 2007). The economic dependency ratio is also reported to be 0.42. Among four study townships, Hakha is the largest area wise but the lowest population and few numbers of villages. Its land form is appeared to accommodate few suitable areas for settlement (Table 14).

In attempt to see the population dynamics, the old records are reviewed and compared with the present year population in some villages. It is presented in Table 15. From the record of the 50th anniversary of Hnaring Catholic Mission, some villages of Thantlang Township and few from Hakha Township are compared for the number of households and population of 50 years ago and those with 2012 record from the current year's immigration department of the respective township.

Table 14 *The State level status of population, villages and elevation, Chin State*

Elevation, area, number of villages and population of each township in Chin State, 2008.

Sr.	Township	Altitude (ft)	Township Area		No. of Village	Population		Total Population
			Square Mile	Acre		Male	Female	
1	Tedim	5,667	949.69	607,803	127	43,743	47,454	91,197
2	Tonzang	4,799	969.73	620,628	73	11,802	12,463	24,265
3	Thantlang	4,962	1371.03	877,459	86	32,148	33,824	65,972
4	Falam	5,200	914.87	585,514	158	31,554	34,106	65,660
5	Hakha	6,120	1608.24	1,029,273	69	25,729	26,710	52,439
6	Cikha	2,597	390.63	250,000	31	5,109	5,071	10,180
7	Rihkodah	2,966	75.25	48,161	15	2,899	2,907	5,806
	Mindat District		7627.53	4,881,621	854			
8	Kanpalet	4,560	963.82	616,845	112	9,595	9,980	19,575
9	Paletwa	176	3127.04	2,001,304	401	45,261	45,851	91,112
10	Matupi	3,303	1906.41	1,220,101	120	24,608	25,972	50,580
11	Mindat	4,860	1219.86	780,713	196	21,663	22,583	44,246
12	Rezua	5,744	410.4	262,658	25	5,847	6,170	12,017
	Total		13906.07	8,900,459	1,413	259,958	273,091	533,049

Source: The Chin State SLRD, 23 April, 2008.

Of all 16 villages over 50 years, five changing process are noted: (i) increase in household number, (ii) decrease in household number, (iii) disappearance of the villages, (iv) splitting two villages from former one, and (v) no change in household number. The number of households slightly increased in 5 villages while it decreased in 3 villages. Five villages of the last 50 years are not found today. It may relocate and renamed or move somewhere else due to some critical reasons. Since the time of annexation, there were no evidences of tribal war. Or civil wars did not occur in Chin Hills as in the cases of Kachin, Kayin and Shan and Kayah states. Yet except for 5 villages, the major reasons for household numbers or population remaining stagnant or declining or lost over 50 years could be attributed to changes in supporting capacity of the land resources for maintaining the livelihood of the villagers.

Table 15 *Changes in village settlement, households and population (from 1960 to 2011), Lautu, Ha-ha*

Sr.	Township	1960*		2011	
		Name of Village	Number of household	Number of household	Number of population
1	Thantlang	Fanthen	120	203	1108
2	Thantlang	Hnaring (A)	180	200	1294
3	Thantlang	Hnaring (B)	120	140	847
4		Cepo	45	not found	
5	Thantlang	Sumgen	160	143	837
6	Thantlang	Khua Hrang	310	Khua 45 Hrang(A)	211
				Khua 82 Hrang(B)	427
7	Thantlang	Lau	25	51	262
8	Thantlang	Lawng thang thang	20	78	368
9		Lei Kang	105	not found	
10	Hakkha	Lei Pi	70	78	
11		Pintia	45	not found	
12		Sate	80	not found	
13	Thantlang	Thang Aw	210	157	937
14	Thantlang	Tisen	35	Tisen (A) 74	417
				Tisen (B) 40	233
15		Zing Man (Zua Mans)	10	not found	
16		Lailen	96	151	

Source: The 50th Anniversary of Hnaring Catholic Mission. Departments of Immigration, Hakha Township & Thantlang Township

2. Migration Dynamics

In these days, migration is a major factor of population dynamics. As a matter of fact, migration could be seen as a second nature of Chin people. It was started before 8th century in this country. There had been widespread waves of migration from the Szechun Province in southern China (Sangkima, 1992) by the group of stone-age people (known as Tibeto -Burman Family (Kunstadter, 1967). Out of this big family, some Chin tribes came to Burma through Hukong Valley between 4th and middle of 8th century AD (Luce, 1980) with their first settlement in Chindwin valley and with rising power of Shans there, second wave of migration had led Chin tribes to occupy on the hills on what we now call Chin Hills (Sakbong, 2009). Meanwhile continuous migration waves are thought to occur because Chin tribes are also found settling on the western side of Ayaewaddy River in Magway Region apart from the massive movement to Mizo of India and Chittagong Hill tracts of Bangladesh. In those prehistoric periods, there was no well defined territory or sovereignty, migration waves were moving in small groups headed by their chief looking for a better settlement. Now territory was defined and demarcated. Economic needs in home country become the pushing factor and wage gradients in other countries become the pulling forces for migration.

Table 16**Migration of Lautu tribe from Thantlang Township to different countries in the world recorded at 31.1.2009**

Sr.	Source Village	Destination Countries														
		USA	Australia	Norway	New-Zeland	Sweden	Denmark	Holland	Japan	Germany	Canada	Korea	Singapore	Malasia	India	Total
1	Hnaring (A)	11	4	5	2	-	-	-	-	-	-	-	-	83	-	105
2	Hnaring (B)	13	2	-	-	-	-	-	-	-	4	-	3	90	-	112
3	Khuhrang	4	5	6	-	-	-	-	-	-	-	3	4	66	-	88
4	Thangaw	17	10	-	2	-	-	-	-	-	-	-	1	60	-	90
5	Fanthen	11	3	-	-	1	3	-	2	-	-	-	1	112	-	133
6	Sumngen	10	13	2	-	-	3	-	-	-	-	-	-	58	-	86
7	Tisen (A)	-	1	-	-	-	-	-	-	-	-	-	-	21	-	22
8	Tisen (B)	-	2	-	-	-	-	-	-	-	-	-	-	5	-	7
9	Sentung	11	7	2	1	-	1	-	-	-	1	-	-	13	10	46
10	La-O	1	-	-	-	-	-	-	-	-	-	-	-	5	-	6
11	Leipi	7	4	-	-	-	1	-	-	-	-	-	1	33	-	46
12	Leikang	11	10	-	-	-	4	-	-	-	1	-	-	32	-	58
13	Sate	15	1	14	1	1	5	1	-	-	-	-	-	49	-	87
14	Hriangpi (A)	11	1	4	-	-	-	-	-	1	1	-	5	27	-	50
15	Hriangpi (B)	1	-	1	-	-	-	-	-	-	-	-	-	31	-	33
16	Lawng	2	-	1	-	-	2	-	-	-	2	-	-	5	-	12
17	Capaw	1	1	-	-	-	-	-	-	-	-	-	-	4	-	6
18	Pintial	-	-	-	-	-	-	-	-	-	-	-	-	10	-	10
19	Zuamang	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
	Total	126	64	35	6	2	19	1	2	1	9	3	15	706	10	999

Source: Lautu Thluaghuh (H. Lian Tial), May 2009.

After economic driving force had set in the first wave was directed to Mizo from Chin Hills. When Mizo statehood was attained, there were more development works and more manual jobs created. Previously exchange rate was 1kyat = 2 Ruppees but it became reversed after 1963 because Myanmar economy started declining. Chin people went to Mizo and worked as porters and hew planking worker One trip could earn them Rs. 50 or kyats 1000. Outflow was accelerated in 1972.

In 1990s, Malaysia economy started growing with expansion of its industrial structure and job seekers from Myanmar inclusive of Chin people created the second wave of migration to Malaysia. As of 2000, the cost of going to Malaysia was Kyats 400,000 and household had to sell cattle and buffalo and sold surplus paddy in combination with loan from MADB. The son worked and earned money after matriculation. With start up money, he went to Malaysia. In 2010, the cost of going to Malaysia went up to Kyats 1,000,000. By this time one migrant worker who had already worked in Malaysia made arrangement to borrow money for his relative so that the latter overcame the problems of high financing. From Malaysia, some went to the US, Australia or western countries.

Table 16 presents the migration flow to different countries from selected villages of Thantlang Township. There were about 1000 people migrated to Malaysia and several western countries from 19 villages. About 10 to more than 50 people were migrating from each village. It becomes a culture. Born in a Chin village, a young man/girl worked in taun-yar fields for his earlier survival. He worked hard to earn money. He passed his one-third of his life in his village. He may have chance to learn up to high school final or University College. If not, he may go to Mizo or Malaysia to work as labourer. If yes, then he migrated outside and worked in industrialized countries. Malaysia may be stepping stone to go again to the US for the university graduated worker. The cycle keeps going and the second generation of the migrant workers is born and stays in the advanced countries.

The impact of migration on the local community could be generalized as follows;

- (i) Remittance money could help meet the food security of his/her remaining family.
- (ii) The family could build a good house. Shelter security is almost as important as food security in Chin way of living.
- (iii) The family could donate large sum of money to their village church in the name of the remitter or on behalf of the family.
- (iv) During Christmas, some migrant worker sent one million kyats or one and half million money to the native village with which a grand feast was held by the whole village killing mython or several livestock in one or two days.
- (v) When some migrants saved enough money, they returned back the village, sold their properties and moved to Kalay, Yangon or other cities to permanently settle there.
- (vi) Increase in population in the village was then offset by migrating workers. Sharing resources in the village was at near equilibrium. It often happens that newly wed couples are seeking the living place in the village and returnee from a foreign country is looking for someone to sell his house.
- (vii) So far I learnt from the survey trips, there is no remittance money as contributing to the upgrading or development of the village middle school or high school. Chin parents are now focusing the school to help educate their children but the school badly needs strengthening effort besides the government inputs.
- (viii) In plain regions of Myanmar, it often happens that the village self-help groups pooled the money and developed the village to village road networks. Such a contribution will be beneficial to the remote villages of the Chin Hills.

3. Assessing the Carrying Capacity of the Land Resources

Population in Chin Hills could be said to be low by looking at the data of population density but it should be again assessed in terms of the carrying capacity of its land resources. If the land resources are highly productive and generate high value output, the land could support the high population in contrast to the low fertility land resources. In other words, if high value commodity appropriately produced from the available land resources, the locality could lessen the population pressure or could support high population to large extent. Supporting capacity of the four study townships is compared in the following summary table for which detail calculation is shown in Table 17.

Table 17 Supporting Capacity of the four study townships

Township	Actual rural population, 2011	Optimum population *	Area, Km ²	Population density /Km ²	Population pressure index I**
Hakha	27600	25704	4165	6.62	0.45
Thantlang	45400	27674	3550	12.7	4.98
Falam	49400	22984	2369	20.9	11.15
Tedim	80600	32543	2459	32.8	19.53

* Township wise derived population capable of being supported by the utilized land resources by assuming a constant income (equivalent to average household expenditure per head of the rural people in Yangon Region. It is a short term target of income level for Chin State study townships.)

** I = population pressure index = (actual population - optimum popn) / area, sq. km

The farm products assessed here are rice (both upland and lowland paddy) and maize. The selling prices are based on 2004 market prices since the Yangon household expenditure data are available only on 2004 as compiled by IHLCA, 2007.

Hakha is the largest area with lowest population resulting in lowest value in population density as well as population pressure. Falam possesses the smallest township land area with relatively high population resulting in high index value of population pressure. In this calculation, crop yield levels are assumed to be equal among townships. Therefore the size of crop lands and population number make a difference. But Tedim has no upland paddy area but it could farm a large maize growing area. Maize crop unit value is higher than that of rice price. Therefore high population pressure index is not because of the product value of its land resources but because its population is two to four times higher number than the rest of the townships. Its product value is greater than those of other three townships.

This exercise suggests that if supportable land resources could be enhanced in terms of its product value, the population pressure could be lessened. Upland paddy yield is low as well as the marketable price is declining. If we could use the comparative advantage of the optimum cropping pattern and marketing opportunities, we should consider better choice of crops adaptable to the existing land resources. Although rice is food security crop, relatively higher valued-crops should be grown as long as the rice supply is accessible.

Lowland paddy cultivation should be continued because of its appropriateness in most localities but a proper strategy should be sought as regards upland rice: whether suitable productive variety should be developed or suitable high value upland crops or fruit trees should be substituted. In the case of fruit trees growing, there must be accompanied with long term credit scheme until the productive years of the established orchard. The momentum of the fruit trees growing programme should be also parallel to the infrastructural development of the regional government and relevant development agencies. Under the new democratic government, it is expected that there will be a good co-ordination and co-operation between the INGOs and the government bodies for implementing the community development as well as regional development programmes. Within such frame work, the GRET-assisted community development measures could be eddectively taken.

Table 18 *Estimation of population and output values from major crops, 2011*

Proportion of urban and rural population in 4 townships in Chin State, 2011

township	urban population	rural population	total population	urban % of total population	rural % of total population
Hakha	26,233	27,557	53,790	48.77	51.23
Falam	17,885	49,411	67,296	26.58	73.42
Thantlang	6,240	45,359	51,599	12.09	87.91
Tedim	12,821	80,581	93,402	13.74	86.26
State level			533,049		

Source: Township Immigration Department (Hakha/Falam/Thantlang/Tedim)

Urban and rural population and population density in 4 townships in Chin State, 2011

township	male	female	total population	total rural population	area (sq.km)	population density (per sq.km) rural+urban	population density (per sq.km) rural
Hakha	26875	26915	53790	27,557	4165.324189	12.91	6.62
Falam	32340	34956	67296	49,411	2369.503395	28.40	20.85
Thantlang	25211	26388	51599	45,359	3550.952857	14.53	12.77
Tedim	46062	47340	93402	80,581	2459.686819	37.97	32.76
State level	259958	273091	533,049		36016.57075	14.80	0.00

Source: Township Immigration Department (Hakha/Falam/Thantlang/Tedim)

Estimated Output value from taun-yar and paddy land resources of 4 townships, Chin State based on 2004 crops' prices

Output		Hakha	Thantlang	Falam	Tedim	Remark
Paddy and Maize	(a)taun-yar paddy					
	Average yield basket/acre	36	36	36		
	Total Taun-yar acre	5,827	13,003	4,150		
	Total paddy yield baskets	209,772	468,108	149,400		
	Paddy price Ks./basket	1,370	1,370	1,370		2004 market price
	Total paddy value Kyats	287,387,640	641,307,960	204,678,000		
	(b)wet paddy					
	Average yield basket/acre	60	60	60	60	
	Total wet paddy field acre	4,714	4189	2,469	5,540	
	Total paddy yield baskets	282,840	251,340	148,129	332,374	
	Paddy price Ks./basket	1,370	1,370	1,370	1,370	2004 market price
	Total paddy value Kyats	387,490,800	344,335,800	202,937,004	455,351,832	
	(c)maize					
	Average yield basket/acre	33	33	33	33	
	Total maize acre	12,879	8,073	13,615	21,423	
	Total maize yield baskets	425,007	266,409	449,295	706,943	
	Maize price Ks./basket	1,720	1,720	1,720	1,720	2004 market price
	Total paddy value Kyats	731,012,040	458,223,480	772,787,400	1,215,941,100	
	(a)Taun-yar paddy (Kyats)	287,387,640	641,307,960	204,678,000		
	(b)Wet paddy (Kyats)	301,674,000	321,730,800	202,937,004	455,351,832	
	(c)Maize (Kyats)	731,012,040	458,223,480	772,787,400	1,215,941,100	
	Total (Kyats)	1,320,073,680	1,421,262,240	1,180,402,404	1,671,292,932	

source: SLRD

2004 crops prices are normalized value in accordance with the IHLCA household expenditure value (2004)

Table 18 **Estimation of the optimum population capable of being supported by utilized land resources**

Hakha Township

Household expenditure in Kyats including health care cost in Yangon Division (2004 survey):*	231,107
Total family member in the household = 4.5	
Total expenditure including health care cost per person in Yangon Division (2004 survey):*	51,357
P ₁ = region-wise derived rural population capable of being supported by the utilized land resources by assuming a constant income per person:	1,320,073,680
	25,704
Total income	1,320,073,680
Total rural population	27,557
Yearly income per person	47,903
Index of optimum population = (27,557 - 25,704)/4165.32=	0.44
Actural rural population density =	6.62

Thantlang Township

Household expenditure in Kyats including health care cost in Yangon Division (2004 survey):	231,107
Total family member in the household = 4.5	
Total expenditure including health care cost per person in Yangon Division (2004 survey):	51,357
P ₁ = region-wise derived rural population capable of being supported by the utilized land resources by assuming a constant income per person:	1,421,262,240
	27,674
Total income	1,421,262,240
Total rural population	45,359
Yearly income per person	31,334
Index of optimum population:	
45,359 27,674 17,685 3,550.95	4.98
Actural rural population density =	12.77

Falam Township

Household expenditure in Kyats including health care cost in Yangon Division (2004 survey):	231,107
Total family member in the household = 4.5	
Total expenditure including health care cost per person in Yangon Division (2004 survey):	51,357
P ₁ = region-wise derived rural population capable of being supported by the utilized land resources by assuming a constant income per person:	1,180,402,404
	22,984
Total income	1,180,402,404
Total rural population	49,411
Yearly income per person	23,889
Index of optimum population:	
49,411 22,984 26,427 2369.50	11.15
Actural rural population density =	20.85

Tedim Township

Household expenditure in Kyats including health care cost in Yangon Division (2004 survey):	231,107
Total family member in the household = 4.5	
Total expenditure including health care cost per person in Yangon Division (2004 survey):	51,357
P ₁ = region-wise derived rural population capable of being supported by the utilized land resources by assuming a constant income per person:	1,671,292,932
	32,543
Total income	1,671,292,932
Total rural population	80,581
Yearly income per person	20,741
Index of optimum population:	
80,581 32,543 48,038 2459.69	19.53
Actural rural population density =	32.76

* UNDP-IHLCA 2007: Household expenditure value (2004) for a projected improvement in rural population of Chin

4. Land Cover Changes

The GIS generated land cover / land use maps have been produced and the resultant products are shown in the separate file: Change map folder and excel worksheet.

Table 19.a Land Cover Changes of Northern Chin State (1990 - 2000)

Sum of AREA_ACRE		2000					
Land Use Type	1990	Closed Forest	Open Forest	Scrub/ Grass	Shifting	Agri (Le/Ya)	Water Body
Closed Forest	2285325.9	1700931.7	470902.5	68106.6	42224.8	3157.3	2.9
Open Forest	797429.1		573524.0	76323.2	121887.9	25689.2	4.9
Scrub/Grass	768070.7			506920.6	218449.1	42691.0	10.0
Shifting	140825.0			48147.8	92662.0		15.1
Agri (Le/Ya)	18816.8					18816.8	
Water Body	6627.3						6627.3
Grand Total	4017094.8	1700931.7	1044426.5	699498.2	475223.9	90354.2	6660.3

Table 19 b. Land Cover Changes of Northern Chin State (2000 - 2010)

AREA_ACRE		2010						
Land use type	2000	Closed Forest	Open Forest	Scrub/ Grass	Shifting	Agri (Le/Ya)	Water Body	No Data
Closed Forest	1700931.7	1322635.8	241495.2	104760.0	19020.9	3966.6		9053.2
Open Forest	1044426.5		783427.0	183450.6	48176.3	20134.9		9237.8
Scrub/Grass	699498.2			503780.6	159245.4	31253.7		5218.5
Shifting	475223.9			59818.6	413149.0			2256.2
Agri (Le/Ya)	90354.2					89983.5		370.7
Water Body	6660.3						6548.8	111.4
Grand Total	4017094.8	1322635.8	1024922.1	851809.8	639591.7	145338.7	6548.8	26247.8

Table 19 summarizes the land cover changes from 1990 to 2000 and from 2000 to 2010, ten year intervals. The area of the closed forest was 2.2853 million acres in 1990 but it decreased to 1.7 million acres with the rate of 25.5% in 2000. Then it continued to decreased 1.3226 milllion acres with the rate of 22.2 % in 2010. The area change from closed forest to open forest (1990 to 2000) was about 471,000 acres. From 2000 to 2010, the area change from the closed forest to open forest was 241,000 acres.

The types of land use recorded by SLRD in 2011-12 (Table 4) shows that the area of the reserved forest and protected forest are 1,453,545 acres which is not far from the area of the remaining closed forest cover as revealed by the GIS-RS images. The land cover estimation is seen to be fairly good as compared to the total land use area recorded by SLRD of the Chin State.

The sequences of the land cover changes are seen to be “from the closed forest to open forest”, “from open forest to scrub/grass lands” and “then to shifting cultivation lands and agriculture lands”. Total acres of shifting cultivation land by ground survey of SLRD shows 277,238 acres in 2011-2012. The acreage estimated by GIS-RS method is over 600,000 acres for shifting cultivation and 852,000 acres for scrub/grass lands as of 2011-2012. Demarcation of the shifting (taun-yar) area by the GIS-RS method is difficult due to the prevailing fallow lands of taun-yar which may be taken as scrub/grass lands in the images. Again area of the land designated as agricultural (Le / yar) uses is shown to be about 145,340 acres which is about double of the SLRD record for le/yar/orchard lands. It may happen because the separation of taun-yar and le/yar lands are confusing due to the same colour images and it has been classified with basis on the slope percent in digital mapping process.

Anyhow, the major purposes of the application of GIS/RS methods are to best estimate the temporal and spatial changes of the land cover particularly forest cover in the whole Chin state from the standpoint of natural resources management. This exercise has fulfilled our objectives. It indicates that the closed forest cover had been lost by 45% during the period from 1990 to 2010. It was turned into open forest which was again changed to scrub lands. Detail changes at the village tract level are recorded in the Appendix Table (Land cover changes) for each township.

Land cover changes and losses are clearly displayed by the accompanying maps (1990, 2000, 2010, and 1990-2010). In the past 1990, there had been a display of densely closed forest cover throughout the State except for the interior strip lengthwise from the north to south of the state. These central mid-rib belts are also location of major towns and state city in all townships. Urbanization may affect the deforestation along the mid area of the whole state. The deep green area is seen in the south eastern corner of the state which is sharing the boundary of Yaw-Saw and Saytotetayar in Magway Region. This small corner still remains clad with forest cover until the present year (2010 map). Along the eastern border of the state, there is still green forest cover but the canopy density is decreasing from 1990 to 2010. The western border along the state is in severely declining condition. The growing business along the border of India-Mizo state and India-Manipur could be contributing factor to deforestation in the western Chin state. Chin taun-yar farmers regularly go out to Mizo state for working such as timber cutting, hewing planks, etc. to earn money. It goes without saying that pork meat is fried with pork fat extracted. The land cover changes maps of 1990 - 2010 clearly display the bare ground covered only with scrub and grasses throughout the whole state. Loss of forest cover had been particulatly starting from the mid-rib areas and spreading out to the western parts of the state.

If the community-based natural resource management plans are considered, it will be useful to examine the detail situation of land cover changes at village tract level which is attached with this report. Remoteness in the area has been often complained for lack of roads and infrastructure. Even after the roads and electricity have been built and installed, the natural resources management and conservation need to be ensured by the stablizing the livelihoods and strengthening the local governance. The village rights and duties to customary use of the land and forest resources should be well established. It will be discussed in later topics.

VI. Activities and Programmes of the Development Agencies and Local Initiatives for Livelihood Improvement and NRM in Northern Chin State

1. Development Agencies

Sustainable agriculture and natural resources management (NRM) programme of GRET had long been implemented in Northern Chin State since 1995. Until now the programmes involve livelihood improvement, grass root leadership training, awareness and designing of the participatory action research, slopping land agriculture technology, gender awareness, agroforestry, new agricultural techniques, (compost making, application of SRI method, terracing, irrigation and soil conservation, etc.), microfinance and loans, etc. Years-long participation with and leadership of GRET to the local community had brought about the establishment of the Chin Micro Finance Institution (built up from 1995 and operationally & financially self sufficient since 2003) and a local NGO, CORAD (Chin Organization for Rural and Agricultural Development, CORAD) which has been built up progressively for assisting the community development activities since 2004.

The activities of CORAD include terrace-wet and dry, irrigation piping system, irrigation canal lines, support to fishponds, fruit trees growing, cow and goat breeding, orchid culture, etc. Among the UN agencies and several INGOs present in Chin State, GRET-CORAD focuses on agricultural development and natural resources management in four townships.

Christian Theological Schools and Churches also play some role in natural resources management. Lailun Integrated Development Center was established in 2005 in Falam by Zomi Theological College. In the integrated farm, slopping land agricultural technology, improved culture of grape and wine processing, forest conservation, livestock breeding and networking activities were noted.

It is also found that environmental conservation activities are also initiated by the local community. Private personal initiative in this matter is worthy of note in Tedim town. In Lamzang village premise, a mountain where taun-yar cultivation did not make good benefit was abandoned and people excessively extracted fuel woods from this hill side. Finally the mountain was totally deforested. U Suan Pau, a prominent business man in Tedim discussed with the chairman of the village peace & development council for buying that mountain for community benefit. By consultation with the villagers, the chairman received the community agreement and sold it to U Suan Pau. The money was used for the whole village welfare. The deed was registered at the township SLRD office. The mountain covers about 500 acres. From the nearby water spring, water was tapped by constructing mini hydro power and the water pipe was installed upto the village for domestic use. He then hired four families to stay there in family guard houses and to protect the growing trees from being cut. The whole villagers make the fire break around the mountain. They were paid for their contribution. Over few years, the mountain became forested again. It preserved the water spring from which electricity was generated and distributed to nearby quarter of Tedim town.

There are some community initiatives in road building. Farrawn, village of Thantlang Township built the feeder roads from Farrawn to Tlangpi, Farrawn to Thantlang, Farrawn to Lungding, etc. extending up to 43 miles. These are the self-help activities. In Phaizawl, Falam Township, the community saved the money which was generated by the GRET-assistance programme and within two years they could accumulate ks. 200,000. The money was used as food for work and the villagers contribute labour in making the new road from the village to the highway roadside. They had been working for nearly two weeks (Figure IS 5 & 6, Photo & Captions Part 4). Similar cases are noted in other GRET- assisted villages during our survey trip.

The Union Minister for Environmental Conservation and Forest had contracted the private construction company for building the road in some townships of the Chin State as an auxiliary task of the State Guest Houses Construction Project. It could facilitate the transport and marketing of fresh vegetables from the interior villages to the town. Recent developments learnt that road construction from Hakha - Hmantaw short cut way could significantly improve the communication and transport within and outside the Chin state. As part of the Mizoram development strategy, a joint project of road construction between Tedim and Champhai, second largest city of Mizo is now under preparation phase. It will later serve as connectivity to the ASEAN inland highways.

2. The Government and Non-Government Activities for Crops Development

As far as agricultural development is concerned, the government agencies have been carried out succession of crops development projects. Terracing on the hills has been described in previous section. Mulberry growing and silk worm production was the earliest efforts driven by the concerned department. Initially the community had involved in this livelihood since the government agency provided the subsidies to the growers. Local farmers not only grew mulberry but also produced silk worms. It is climatically suitable but labour intensive. Later under the competition pressure of the Chinese production, the silk worm industry started falling around 2008. The domestic product was not either price or quality competitive against Chinese product. The local farmers switched off this business. Only the government agency is left engaging with the on-going business but the activities are kept in minimum. If there is private initiative, an assessment should be made how to strengthen the industry. Since the business is operated as the state-enterprise, it is basically an inefficient operation, not to the fault of the industry itself. There is only less than a dozen of the small and medium enterprises in the whole Chin State and if such a rural based industry has no opportunity for growth, the Chin Hills will have no way out to development.

Again the highest authorities of the former government had claimed that Chin State should be a “tea pot” of the country. Tea growing campaign had been launched in selected townships. The budget was allotted for Ks. 115.6 million from 2000 to 2010. Green tea and black tea processing factories were built under the military camps and the department of agriculture (Figure 119 of Photo Section). Initial target was 10,000 acres of tea growing within five years. The second- five year target was up to 20,400 acres completely under tea plantation. Since the mandate was going down from the top command channel, all the civil departments as well as military camps are putting effort to grow tea gardens. Myanmar Agriculture Service (MAS) sought the clones, cuttings and seeds, raised the nurseries and provided the seedlings to farmers as well as to all agencies involved. Unfortunately survival rate was too low. Seedlings are grown at the onset of the rain. After its establishment, it encounters frost and cold injury and after overcoming this stress, young tea seedlings pass through dry, windy and soil drought and by next monsoon season, it could not grow well. Survival acreage was verbally reported to be 1954 acres out of 20,000 planted acres. Poor Chins could not afford to wait for tea plants until productive season in the sixth year. Moreover Chin people are not habitual in drinking green tea as Shan or Palaung. Farmers’ participation is rather low.

In Tedim township near Kalay border, promising areas for tea growing are Dolluang, Theizang, Ngalzang, Koilam, etc. and these areas are wet and humid being favourable for tea plants. Hakha-based Nara Company had camped in this site for collecting tea leaves and erected tea processing facility. But due to lack of electricity, they could not run the operation.

U Zoraman, the retired Manager of MAS had put a lot of effort in commercialization of fruit trees culture throughout his career. He had gone to China for learning SALT technology but he could not have applied it. He brought from Korea four good varieties (scion) of pear and back at home seed farm (Cawbuk) he grafted with local vul (root stock) and it grew very well but did not bear fruits. Pear and apple will require chilling period which is relatively short in Chin Hills. Ripening period of apple also coincides with July-August of rainy season and the product quality becomes inferior. Canker disease is another constraint in apple and greening disease in orange growing. Irrigation is necessary during the flowering stage of orange grooves. Bokhara plum requires less irrigation water and it may be adaptable on dry terraced fields of 4000 ft. elevation. Some local growers attempt to plant the Japanese plum. It is tried in Cawbuk farm, Hakha under MAS. In this farm, GRET -CORAD is testing a pilot scale production of different varieties of orchid in collaboration with Cawbuk Farm of MAS (Figures 154 to 158 of Photo Section). It proves to be fruitful multiplication. After this pilot testing has given a good result, the commercial raising of orchid could be transferred to the local community. It will be of significant project for income generation as well as forest products conservation. The INGO "CARE" had promoted the production of elephant foot yam in southern Chin and its experience could be learnt for the development project of northern Chin Hills.

The replanting of pine seedlings are widely carried out by the forest department on the bare hills near Timit River, on the way to Thantlang. The activities could be seen in Figure 64 of Photo Section. One Baptist mission had come to Congthia, Thantlang in March 2012 and planted agar wood trees.

Commercial orchard growing is not new for Chin Hills. According to Lehman (1963), oranges and other fruits were introduced into Tedim by Chin officers of Chin Regiments of the Burma Army prior to WW II and there had been a good trade in fruits with Chindwin plain. After independence, the government injected agricultural loans for stimulating the growing of tea and coffee in parts of Chin Hills. Lehman reported that processing of tea leaves and coffee beans were problems and so was the transport of the product out of the hills to markets in Burma. Again the problems recycle today.

VII. Recommendations and Conclusions

Chin State has been often characterized among all States and Regions by the highest poverty gap ratio, highest occurrence of food deficits, poor road connectivity, low population density but lowest percent availability of cultivable lands and high percentage of waste and scrub lands, adherence to the shifting cultivation system, lack of rural based industries, and higher rate of out migration. In order to pull the local people out of these traps, fundamental problems will have to be addressed. The public goods such as infrastructure, roads and electricity should receive the priority agenda for development. Without this development framework, attempts to address the issues of community development, food security, natural resources management and community empowerment will give no significant impact on the local communities. The government bodies and the development agencies should participate in and coordinate the formulation of the development agenda and afterwards respective organizations and institutions will focus on their relevant tasks with their set targets. Assuming that these preconditions have been or will be met soon or in parallel manner, the following agenda are suggested as far as the sustainable livelihood improvement and farming systems development with better natural resources management are concerned to us.

1. Taun-yar cultivation is major livelihood of majority of farmers who are also poor (falling in wealth class C and below within the community). Taun-yar land use rights offer equity to those poor people in having access to lands. Changing taun-yar culture to permanent farming had been a prolong process for them. The prevailing assistance programme of GRET-CORAD serve well the needs of the taun-yar farmers in their changing process to permanent farming. Guidance in site selection, hands-on training on terracing, tapping water resources, methods of soil conservation or mulching with crop residues on bare soil, injection of food for work or cash for work, all these packages have good impact on the livelihood of the beneficiaries as well as natural resources conservation. But once the shifting cultivation systems change to permanent culture, communal land tenure will decay and property right issues will arise. If land market again emerge, sale, mortgages, and transfer of lands will often occur among the poor farmers. With the changing land tenure system in the country proper, it will become difficult to continue practicing the pro-poor communal land tenure system. Therefore the technical and financial assistance to the poor people in the changing process should be supplemented with the next assistance to capacity building for improving the economic viability of their farm enterprises, wise use of inputs, and ability to supervise their cash flow in their farms. This step will become essential in the changing process: maize-based subsistence shifting cultivation > rice-based subsistence farming > commercial small scale orchard or gardening business.
2. In adopting the agro-forestry system in the taun-yar lands, inclusion of nitrogen-fixing Alder trees should receive priority. It is little known to the Chin community and more study is necessary about this tree for better uses in natural resource management.
3. Maize - based pig farming system should be examined in terms of profitability, economic viability and resource management. If the conversion process from maize to pig fattening is found to be profitable, a proper mix-farming system should be adopted.
4. Research findings in Latin America have indicated that burning crop residues every year is equivalent to burning a year old secondary forest. It will be beneficial to reduce chemical fertilizer application by stubble burning and mulching (like coverage of rice bean residues onto the onion fields). Such simple practice should be encouraged to the community as much as possible.
5. Chin people remains as guardian of the country at the west gate. Again they should improve their culture as stewardship of the natural resources surrounding them. Resource management should be institutionalized. There should be village-based forest management in partnership with relevant authorities. It is important that the government should legally recognize "the customary user rights of Chin Hill people based on their good traditions. Village rights and duties to customary use of lands and forest resources should be prescribed. Within this frame work, there should be village production forest, village protection forest, village conservation forest and national conservation forest. It is important to build up the capacity of the communities to use and adequately manage natural resources, biodiversity assuring equitable environmental security.
6. The Agricultural Technical School had been established and operated at Lon pil village and the school graduates have well served the needs of the agriculture sector of Chin Hills as well as other parts of the country. But now the school was turned into Sericulture extension department which will be also in changing process. Accordingly, there should be a strengthened and reorganized agricultural school focusing on the slopping land agriculture technology and natural resources management. In old days in

Japan, children of farmers living in Shizuoka Prefecture near Mount Fuji often migrated out. Thus the local government established Fruit Trees Growing Training School and trained the young people offering a good standard certificate. Migration had been arrested by such intervention. At Falam there is a weaving school under the Ministry of Cooperative. It should be upgraded to offer good livelihood opportunities to local people. With such schools, there should be coordinated activities of the INGOs and local NGOs for integrated development programme.

7. Good Agricultural Practices should be offered to successful growers in attempt to enhance the competitiveness of the quality foods production. It should be aimed in advance for future market of the ASEAN free trade zone. Chin hill is ideally suited to organic food production.
8. It is learnt that some professor from the Department of Animal and Plant Science, University of Sheffield, UK have expressed great interest in improvement of mython breeding. There could be possible grant from the International Foundation for Science (IFS) to support the mython breeding and there is future prospect of building institution for mython improvement. The relevant agency, local NGO or personnel are suggested to extend contact with such institution.
9. The present momentum of INGOs assistance to terracing projects is rather slow. If there is a large funding possibility for sustainable land use improvement, large scale changing process of slopping lands into the permanent terraced fields should be considered. The lesson should be learnt by going to Guizhou Province, China and observe the terracing practices and changing process. It had been done 12 years ago. But it will be worthwhile to see the durability of the changed effects.
10. Dedicated efforts are necessary to develop the varieties of fruit trees such as apple, orange, pear, Japanese pear, grape, etc. Single effort in varietal selection is just a matter of chance and it may not give any guarantee to us. A time frame of at least five years is necessary for such development programme and it is important to ensure the budget allotment, sequences of specialist efforts, handing over of the findings and outputs to the successors, community capacity building process, etc. during the periods of consistent programme implementation.

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IX. REFERENCES

Carey, B.S. and H.N. Tuck. (1897): The Chin Hills, Vol.I., Firma KLLM Private Ltd, On behalf of Tribal Research Institute, Aizawl, Mizoram (1932 edition).

Lehman, F.K. (1963): The Structure of Chin Society, Illinois Studies in Anthropology No.3, Library of Congress Catalogue Card No. 63-10317, USA.

Luce, G.H.(1959): Chin Hills - Linguistic Tour, University Project, J.B.R.S. Vol. XIII, P-I, 1959.

Min-Jae-Kim and D.R. Stoltz (ed.) (1998), Economic Assessment of Selected Resource Management techniques in Marginal Upland Agriculture, Integrated Report and Proceedings of the Workshop Held in Seoul, Korea. May 20-22, 1998, pp 68 - 77.

Ruthenberg, Hans (1976): Farming Systems in the Tropics, Clarendon Press, Oxford.

Sakbong, L.H. (2009): The Origin of Chin, In K. Robin, Ed. 2009, Chin History, Culture and Identity. Dominant Publisher, New Delhi.

Sanchez, P.A. (1972): Soil Management under Shifting Cultivation System, In P.A. Sanchez (ed.), A Review of Soils Research in Tropical Latin America, Soil Science Department, North Carolina State University, Raleigh, N.C., USA.

Stevenson, H.N.C. (1943): Economics of the Central Chin Tribes, The Times of India Press, Bombay

Takahashi Akio. (): Swiddens, Rice Terrace and Malaysia Connections: Resource Use and Socio-economic Strata in the Chin Hills, Myanmar.

Thein Pe Myint (1967), Northern Trip (Special Division), Sar Pa Beik Man Press, Merchant Street, Rangoon (Myanmar Version).

Thongmanivong, Sithong, Fujita Yayoi, Khamla Phanvilay and T. Vongvisouk, (2000): Agrarian Land Use Transformation in Northern Laos: from Swidden to Rubber, In South East asian Studies, Vol 47, No.3 pp 330- 346.

Vanlalbruaia, H. (2009): History, Culture and world Review: The4 Traditional Ecological Knowledge of the Lusei, In K. Robin ed. 2009, Chin History, Culture and Identity. Dominant Publisher, New Delhi.

X. APPENDIX

Appendix Table 1 Survey Schedules in 12 villages, four study townships, Northern Chin State, 2012, Survey Team Leader U San Thein

Date	Village/ Town/ Places	remark
15. 2. 2012	Travel to Kalay from Yangon by plane, Kalay to Falam by car	Stay at Falam
16.2.2012	Visit to Thanhniar village	-- ,, ---
17.2.2012	Visit to Lailam Integrated Farm; interview with Pu van Kyi, 83 years, Rtd. State Education Officer, Falam	---- ,, ---
18.2.2012	Falam to Ramthalo, then to Hakkha	Stay at Hakkha
19.2.2012	Hakkha to Zathal	Stay at Zathal
20.12.2012	Zathal to Hakkha, Interview with Agric. Minister	Stay at Hakkha
21.2.2012	Hakkha to Tiphul	Stay at Tiphul
22.2.2012	Tiphul to Hakkha, Interview with GRET/CORAD	Stay at Hakkha
23.2.2012	Hakkha to Tinam	Stay at Tinam
24.2.2012	Tinam to Hakkha,	Stay at Hakkha
25.2.2012	Visit to State SLRD, MAS, Immigration, AMD	Stay at Hakkha
26.2.2012	Vist to Kyaw Boke Farm, Interview with Dr. Bawi Hu,	Stay at Hakkha
27.2.2012	Visit to State museum & library, interview with Forest Dept., Hakkha	Stay at Hakkh
28.2.2012	Hakkha to Thantlang	Stay at Thantlang
29.2.2012	Thatlang to Congthia	Stay at Congthia
1.3.2012	Congthia to Thantlang, Interview with Dr. Hmu Htan	Stay at Thantlang
2.3.2012	Thatlanng to Farrawn, Intervirw with Forestor	Stay at Thantlang
3.3.2012	Thantlang to Sihmuh	Stay at Thantlang
4.3.2012	Interview with Kil Tu , GRET- CORAD	Stay at Thantlang
5.3.2012	Visit to MAS, SLRD, Immigration	Stay at Thantlang
6.3.2012	Thantlang to Hakkha, Interview U Vanlian	Stay at Hakkha
7.3.2012	Hakkha to Ramthalo	Stay at Ramthalo
8.3.2012	Ramthalo to Falam	Stay at Falam
9.3.2012	Visit to Immigration, interview with GRET/CORAD	Stay at Falam
10.3.2012	Falam to Phaizawl, Phaizawl to Kalay	Stay at Kalay
11.3.2102	Market survey at Kalay, visit to MAS, MAPT	Stay at Kalaly
12.3.2012	Market survey	Stay at Kalay
13.3.2012	Kalay to Yangon by plane	Arrival at YGN

28.3.2012	Yangon to Mandalay by Air Mandalay; could not fly to Kalay due to taun-yar smoke; come back Yangon	Stay at Yangon
29.3.2012	Yangon to Kalay by Air KBZ, Kalay to Tidem	Stay at Tidem
30.3.2012	Tidem to Ngen Nung	Stay at Tidem
31.3.2012	Tidem to Suang Zang	Stay at Tidem
1.3.2012	Visit to UNDP, Tidem, interview with U Sawang Paun	Stay at Tidem
2.3.2012	Visit to SLRD, MAS, Immigration, Forest, Tidem	Stay at Tidem
3.3.2012	Visit to Saun Pi (apple farm), then to Laibung, to Kalay	Stay at Tidem
4.3.2012	Meeting with PM, GRET, market survey, meet U Zoraman	Stay at Kalay
5.3.2012	Kalay to Yangon by airplane	Arrival at Yangon

Appendix Table 2 Members of the Survey Team

Sr.No.	Name	Role	Duty Post	Phone
1	U San Thein	Team Leader	Yangon	01-580995
2	Thang Khomang	member	Tidem	070-50110
3	Phung Uk	,,	Matupi	0947172024
4	Chan Ceu	,,	Hakkha	070-21213
5	Thl tin rawl	,,	Falam	070-40529 070-40183

Appendix Table 3.a. Annual Precipitation, 2011, Thantlang Township

Sr.	Month	Normal		2011	
		Number of rainy days	Inch	Number of rainy days	Inch
1	January	1	0.36	1	0.36
2	February	0	0	0	0
3	March	2	3.04	5	3.06
4	April	4	3.3	5	2.48
5	May	11	7.89	19	12.78
6	June	21	11.66	24	12.2
7	July	22	11.72	24	11.2
8	August	21	19.95	25	14.56
9	September	18	12.46	21	10.76
10	October	14	10.37	20	11.76
11	November	2	0.56	0	0
12	December	1	1.24	0	0
	Total days/ inches	117	82.55	144	79.16
	Total days/mm	117	2096	144	2010

Appendix Table 3.b. Temperature and Precipitation from 2010 to 2012, Tedim Township

Sr.	Month	Temperature		Rainfall			
		Minimum	Maximum	2010		2011-2012	
				Day	Inch	Day	Inch
1	January	1	11	0	0	1	0.12
2	February	1	14	0	0	0	0
3	March	7	20	3	2.7	6	1.41
4	April	14	20	9	2.92	9	2.56
5	May	14	25	12	3.86	12	6.13
6	June	19	22	16	8.06	22	12.21
7	July	20	20	25	11.79	22	9.34
8	August	17	20	20	6.32	25	17.44
9	September	17	21	14	8.22	17	5.79
10	October	16	19	17	6.63	11	5.59
11	November	14	19	0	0	0	0
12	December	4	14	2	1.37	0	0
	Total			118	51.87	125	60.59

Source: Meteorology Department, Chin State.

Appendix Table 4.a. Household access to cultivated land in Hakha Township

Household access to cultivated land by village tract and wards

Ward - 8					
Village Tract - 30					
Village - 70					
	Taun-yar	Wet Paddy	Total cultivated acre	Household	Household access
Urban	1,674.0	1,044.0	2,718.0	2,801	0.97
Rural	8,929.5	3,670.0	12,599.5	4,994	2.52
Township	10,603.5	4,714.0	15,317.5	7,795	1.97

Sr.	Village Tract	Ward	Taun-yar in each Village Tract	Wet Paddy in each Village Tract	Total cultivated acre	Household	Household access
1	Hakha	Zay Haung	58	0	58	266	0.22
2		ZayThit	384	53	437	1120	0.39
3		Pyi Taw Thar	74	15	89	456	0.20
4		Kyaw Bok	353	85	438	213	2.06
5		Myo Haung	341	294	635	377	1.68
6		Myo Thit	464	597	1061	369	2.88
7		Kha La Ya 266	0	0	0	0	0.00
8		Sit Byu Har	0	0	0	0	0.00
Urban Total			1,674	1,044	2,718	2,801	0.97
1	Khuabe		96	147	243	87	2.79
2	Hniarlawn		496	205	701	171	4.10
3	Loklung		252.5	231	483.5	173	2.79
4	Tiphul		556	190	746	188	3.97
5	Chuncung		585	348	933	288	3.24
6	Hranhring		300	108	408	86	4.74
7	Zokhua		0	103	103	170	0.61
8	Bualtak		106	62	168	109	1.54
9	Malsawm		483	62	545	201	2.71
10	Tinam		647	122	769	281	2.74
11	Rinpi		353	46	399	102	3.91
12	Haiphai		290	0	290	128	2.27
13	Farrawn		215	126	341	172	1.98
14	Dauchim		583	89	672	199	3.38
15	Vanha		440	33	473	117	4.04
16	Ruan		442	0	442	69	6.41
17	Surkhua		114	92	206	290	0.71
18	Lungtar		604.5	90	694.5	154	4.51
19	Cangva		0	519	519	415	1.25
20	Sumsi		59	72	131	106	1.24
21	Lungrang		550	190	740	240	3.08
22	Phaipha (A)		203	124	327	131	2.50
23	Dumva		180	31	211	106	1.99
24	Sakta		612	239	851	303	2.81
25	Bungtuah		96	53	149	70	2.13
26	Khuapi		0	95	95	164	0.58
27	Buanlung		157	164	321	183	1.75
28	Dongva		300	49	349	117	2.98
29	Lungkhin		209.5	53	262.5	96	2.73
30	Leipi		0	27	27	78	0.35
Rural Total			8,929.5	3,670	12,600	4,994	2.52

Source: Survey and Land Records Department, Hakha Township.
Department of Immigration, Hakha Township.

Appendix Table 4 b. Household access to cultivated land in Falam Township

Household access to cultivated land by urban and rural Falam

		Paddy		Maize	Total	Household	Household
		Wet Paddy	Taun-yar	Acre	cultivated		
					Acre		
	Urban	0	0	110	110.00	1,742	0.06
	Rural	2468.82	4,150	13,615	20,233.82	6,079	3.33
	Township	2,469	4,150	13,725	20,343.82	7,821	2.60

Household access to cultivated land by each ward

Sr.	Ward/ Village Tract		Paddy		Maize	Total	Household	Household
	Ward/Village		Wet Paddy	Taun-yar	Acre	cultivated		
						Acre		
1	W	Cinmual	0	0	25	25	410	0.06
2	A	Fatau	0	0	10	10	400	0.03
3	R	Tianglo	0	0	60	60	462	0.13
4	D	Valai	0	0	15	15	470	0.03
	Total		0	0	110	110	1,742	0.06

Household access to cultivated land by each village

Villages & Village Tracts									
1	1	Airebual	Airebual	16.77	0	28	44.77	15	2.98
2	2	Bocung	Bocung	102.72	0	183	285.72	49	5.83
3	3	Bualkhua	Bualkhua	0	0	248	248	150	1.65
4	4	Bualmin	Bualmin	0	0	50	50	9	5.56
5	5	C.Zamual	C.Zamual	0	0	120	120	40	3.00
6		Congheng		0	0	135	135	45	3.00
7		Var Sa Khan		0.95	0	19	19.95	35	0.57
8	6	Cerhmun	Cerhmun	9.24	0	71	80.24	42	1.91
9		Khuarua		5.33	20	65	90.33	15	6.02
10	7	Congkua	Congkua	0	0	140	140	42	3.33
11		Vanniam		0	0	65	65	20	3.25
12	8	Congthe	Baikaul	0	0	18	18	25	0.72
13		Congthe		0	0	100	100	40	2.50
14	9	Darbo (Khuang)	Darbo	0	10	13	23	9	2.56
15	10	Darteti	Darteti	6.39	20	60	86.39	18	4.80
16		Khuanglung		24.5	20	80	124.5	18	6.92
17		Uisi		0	10	10	20	4	5.00
18	11	Duhmang	Zawllay	0	0	10	10	22	0.45
19		Duhmang		1.63	20	71	92.63	60	1.54
20		Zawlpi		0	8	19	27	13	2.08
21	12	Farkhawm	Farkhawm	0	0	92	92	41	2.24
22		Khuangmual		0	0	72	72	32	2.25
23	13	Hlawnmual	Hlawnmual	2.28	0	41	43.28	15	2.89
24	14	Hmawngkawn	Dolhkhel	20.15	148	90	258.15	50	5.16
25		Hmawngkawn (new)		29.46	227	150	406.46	35	11.61
26		Hmawngkawn (old)		0	0	0	0	40	0.00
27		Khuapisip		10.85	125	60	195.85	45	4.35
28	15	Hmunli	Hmunli	0	0	80	80	18	4.44
29		Tiangphai		0	0	18	18	7	2.57
30	16	Hrianghgnang	Hrianghgnang	12.78	0	91	103.78	55	1.89
31	17	K.Haimual	K.Haimual	5.93	0	50	55.93	16	3.50

31	17	K.Haimual	K.Haimual	5.93	0	50	55.93	16	3.50
32		Tualzeh		10.88	0	60	70.88	14	5.06
33	18	Khitam	Khitam	3.9	48	54	105.9	17	6.23
34	19	Khuadar	Khuadar	4.87	0	330	334.87	153	2.19
35	20	Khualei	Khualei	0	0	41	41	35	1.17
36		Tlangzar		0	0	29	29	30	0.97
37	21	Khualung	Bomba	1.1	13	80	94.1	24	3.92
38		Khualung		5.08	40	70	115.08	30	3.84
39	22	Khuangli	Khuangli	8.15	0	170	178.15	72	2.47
40	23	Khuapual	Cicai	13	0	50	63	8	7.88
41		Khuapual		104.57	0	470	574.57	125	4.60
42	24	Khuasum	Bualzawl	3.88	0	28	31.88	9	3.54
43		Khuasum		30.65	0	50	80.65	16	5.04
44	25	Khumzing	Khumzing	0	0	70	70	25	2.80
45		Simcing		0	0	30	30	20	1.50
46		Thanghluang		0	0	30	30	15	2.00
47	26	Khupleng	Haitui	0	0	0	0	4	0.00
48		Khupleng		0	37	30	67	6	11.17
49		Tidil		0	30	30	60	5	12.00
50	27	L.Hmunpi	L.Hmunpi	49.57	0	122	171.57	64	2.68
51	28	L.Zamual	L.Zamual	4.2	0	18	22.2	13	1.71
52	29	Laizawl	Auhmun	5.13	55	20	80.13	7	11.45
53		Laizawl		9.42	55	30	94.42	12	7.87
54		Palte		5.85	50	10	65.85	12	5.49
55	30	Laizo	Baila	0	0	22	22	20	1.10
56		Kalrawn		0	0	5	5	13	0.38
57		Laizo		10	0	169	179	52	3.44
58		Thanhnaier (Lower/S)		0	0	28	28	23	1.22
59		Thanhnaier (Upper/N)		0	0	24	24	22	1.09
60		Zalai		22.14	0	279	301.14	53	5.68
61	31	Lati	Kulzam	0	0	66	66	55	1.20
62		Lati		0	0	65	65	55	1.18
63	32	Lenhai	Lenhai	26.22	62	65	153.22	44	3.48
64	33	Lente	Lente	28.42	0	120	148.42	40	3.71
65		Nganzawl		9	0	105	114	40	2.85
66		Sumhrang		19.42	0	90	109.42	38	2.88
67		Vomthauk		0	0	35	35	22	1.59
68	34	Lianrih	Lianrih	0	0	110	110	30	3.67
69		Ngaizam		0	0	80	80	21	3.81
70	35	Locom	Locom	0	0	130	130	60	2.17
71	36	Losau	Losau	11.53	0	140	151.53	57	2.66
72	37	Lumbang	Lumbang	0	0	126	126	90	1.40
73		Parte		0	0	101	101	97	1.04
74	38	Lumte	Taungtak	0	0	20	20	0	-
75		Lumte		0	0	240	240	66	3.64
76	39	Lunghawh	Farso	0	0	30	30	30	1.00
77		Lunghawh		0	0	261	261	197	1.32
78		Thuphai		0	0	59	59	23	2.57
79	40	Lunkhua	Lunkhua	10.06	0	40	50.06	12	4.17
80	41	Mangkheng	Mangkheng	84.49	505	319	908.49	100	9.08
81		Tiphir		24.31	0	31	55.31	53	1.04
82	42	Murang	Khuaval	0	25	60	85	8	10.63
83		Murang		0	2	10	12	6	2.00
84	43	Ngalti	Cawmpi	2.19	20	10	32.19	8	4.02
85		Khiangrawn		5.7	20	15	40.7	12	3.39
86		Ngalti		5.2	120	30	155.2	26	5.97
87	44	Ngamual	Belawi	1	0	130	131	45	2.91
88		N.Hmunpi		0	0	130	130	44	2.95
89		Ngamual		0	0	100	100	35	2.86
90		Suangdo		1	0	120	121	30	4.03
91	45	Phaizawl	Phaizawl	0	0	122	122	51	2.39
92	46	Rallang	Lianduh	6.98	0	47	53.98	16	3.37
93		Rallang		15.66	0	85	100.66	27	3.73
94	47	Rallawn	Rallawn	8.07	0	145	153.07	40	3.83
95		Zomual		4	77	85	166	23	7.22
96	48	Ramthlo	Dokthek	23.55	0	86	109.55	20	5.48
97		Ramthlo		360.06	0	350	710.06	180	3.94
98	49	Relsing	Relsing	7.2	0	174	181.2	89	2.04
99	50	Rulbu	Rulbu	14.39	0	80	94.39	51	1.85
100	51	Saihmun	Saihmun	12.01	0	420	432.01	150	2.88

101	52	Satawm	Satawm	20.96	203	105	328.96	47	7.00
102	53	Seipi	Khiangzang	0.88	0	0	0.88	15	0.06
103			Seipi	48.92	97	160	305.92	40	7.65
104	54	Selawn	Leilet	154.07	85	135	374.07	58	6.45
105			Selawn	6.9	15	15	36.9	5	7.38
106	55	Sim/Dihai	Sim/Dihai	1.2	0	130	131.2	61	2.15
107	56	Simzawl	Lungbum	0	0	58	58	38	1.53
108			Simzawl	0	0	151	151	80	1.89
109	57	Singai	Singai	18	200	110	328	30	10.93
110			Tiangkawi	0	147	150	297	25	11.88
111	58	Sunthla (new)	Sunthal (new)	10.05	0	97	107.05	12	8.92
112			Sunthal (old)	37.16	0	10	47.16	79	0.60
113			Hlaimual	0	0	8	8	9	0.89
114	59	Taal	Taal	2.19	0	142	144.19	45	3.20
115			Thlanrawn	62.53	0	212	274.53	80	3.43
116	60	Taisum	Taisum	0	0	119	119	74	1.61
117	61	Thlancing	Thlancing	0.93	0	10	10.93	2	5.47
118	62	Thungthul	Thungthul	69.11	0	53	122.11	46	2.65
119	63	Tiah dai	Lungtar	1.58	0	40	41.58	27	1.54
120			Tiah dai	8.92	0	68	76.92	35	2.20
121	64	Tibual	Bualte	7.32	95	70	172.32	24	7.18
122			Tibual	8.87	126	87	221.87	30	7.40
123	65	Tili	Tili	9	0	108	117	38	3.08
124			Tiangkhan	2.57	0	93	95.57	37	2.58
125	66	Tilum	Lawitlang	4.7	10	5	19.7	6	3.28
126			Lotharawn	17.86	50	30	97.86	15	6.52
127			Lumte	0	10	5	15	6	2.50
128			Tilum	5.56	90	50	145.56	15	9.70
129	67	Tisen	Tisen	0	0	10	10	52	0.19
130			Wai Lu Wun Sa Khan	0	0	85	85	190	0.45
131	68	Tiangzawl	Bualhrei	3.84	63	50	116.84	9	12.98
132			Fartlang	5.17	25	25	55.17	8	6.90
133			Hmuntha	14.04	72	55	141.04	18	7.84
134			Tiangzawl	11.15	87	65	163.15	25	6.53
135			Zawite	7.87	61	55	123.87	20	6.19
136	69	Tlahmun	Tlahmun	14.09	127	150	291.09	51	5.71
137	70	Tlortang	Tlortang	0	20	60	80	17	4.71
138	71	Tlorzan	Tlorzan	0	90	40	130	27	4.81
139	72	Vangva	Vangva	44.84	0	80	124.84	42	2.97
140	73	Webula	Kawifang	0	0	65	65	22	2.95
141			Kimniang	0	0	25	25	23	1.09
142			Kimnunchaung	305.04	0	20	325.04	23	14.13
143			Mualzawl	0	150	110	260	30	8.67
144			Nimzawl	0	10	30	40	23	1.74
145			Webula	13.11	0	220	233.11	60	3.89
146	74	Zalang	Ralum	3.86	0	170	173.86	25	6.95
147			Zalang	0	0	136	136	34	4.00
148	75	Zathlir	Khengkang	1.83	0	45	46.83	13	3.60
149			Zathlir	8.16	0	53	61.16	46	1.33
150	76	Zatual	Par Mun Chaung	111.89	0	0	111.89	34	3.29
151			Zatual	70	80	120	270	50	5.40
152	77	Zawlnu	Kelkawng	0	0	18	18	25	0.72
153			Sialsih	0	0	78	78	30	2.60
154			Sihtui	0	0	75	75	27	2.78
155			Vazang	1	0	49	50	38	1.32
156			Zawlnu	6.66	0	85	91.66	48	1.91
157	78	Zo/Dihai	Bungzung	0	0	20	20	6	3.33
158			Zo/Dihai	1.13	70	80	151.13	20	7.56
159	79	Zongte	Haimual	0	40	30	70	10	7.00
160			Hnahthial (old)	0	150	40	190	23	8.26
161			Hnahthial (new)	0	0	0	0	18	0.00
162			Ngailan	120.51	30	20	170.51	12	14.21
163			Thipcang	0	60	50	110	15	7.33
164			Zongte	3.52	120	60	183.52	38	4.83
165	80	Zultu	Zultu	0	0	90	90	33	2.73
Total				2,468.82	4,150	13,615	20,233.82	6,079	3.33

Source: Survey and Land Records Department, Falam Township.
Department of Immigration, Falam Township.

Appendix Table 4.c. Household access to cultivated land in Thantlang Township

Household access to cultivated land by urban and rural Thantlang

Ward - 3 Village Tract - 37 Village - 86	Paddy		Maize	Total	Household	Household
	Wet Paddy	Taun-yr	acre	cultivated Acre		
	Urban	275	0	256	590	1,163
	Rural	3,914	13,003	8,073	27,547	8,370
	Township	4,189	13,003	8,329	28,137	9,533

Household access to cultivated land by wards and villages

Sr.	Village Tract	Sr.	Ward/Village	Paddy		Maize	Total	Household	Household
				Wet Paddy	Taun-yr	acre	cultivated acre		
1	Myoma		Ward (1)	154	0	125	297	342	0.87
			Ward (2)	63	0	58	125	534	0.23
			Ward (3)	58	0	73	168	287	0.59
	Urban Total			275	0	256	590	1,163	0.51
1	Aibur	1	Aibur	145	45	260	500	179	2.79
2	Belhar	2	Belhar	0	310	150	481	87	5.53
		3	Tluangram (A)	0	140	50	199	43	4.63
		4	Tluangram (B)	18	210	88	324	78	4.15
3	Bungtlang	5	Bungtlang	14	195	20	246	100	2.46
4	Congthia	6	Congthia	232	117	74	441	190	2.32
		7	Kuhchah	45	105	60	224	63	3.56
		8	Phaikhua	71	28	4	116	62	1.87
5	Dawn	9	Dawn	0	354	20	394	198	1.99
		10	Ralpel	8	215	9	246	103	2.39
6	Fanthen	11	Fanthen	78	0	520	651	203	3.21
7	Hmawngtlang	12	Hmawngtlang	171	0	47	227	130	1.75
		13	Leitak (A)	33	0	25	78	23	3.39
		14	Leitak (B)	134	0	48	201	71	2.83
		15	Zipi	66	0	45	135	57	2.37
8	Hnaring	16	Hnaring (A)	44	107	168	358	200	1.79
		17	Hnaring (B)	43	179	114	375	140	2.68
		18	Hmunlipi	52	296	109	492	110	4.47
9	Hriangkhan	19	Hriangkhan	49	285	110	464	128	3.63
10	Hriphi	20	Hriphi (A)	81	160	40	301	72	4.18
		21	Hriphi (B)	214	210	110	561	171	3.28
		22	Zabung	48	115	40	216	40	5.40
11	Khuabung	23	Hlamphei	36	108	14	180	54	3.33
		24	Khuabung (A)	0	117	83	210	45	4.67
		25	Khuabung (B)	33	162	169	341	82	4.16
12	Khuahrang	26	Khuahrang	122	0	793	1532	250	6.13
13	Lailen	27	Lailen	7	196	238	468	151	3.10
		28	Lau	1	76	41	139	52	2.67
14	Lawngtlang	29	Lawngtlang	0	77	67	160	78	2.05
		30	Ngalang	2	150	103	275	86	3.20
15	Lulpilung	31	Lulpilung	0	135	15	156	50	3.12
		32	Vomkua	39	215	55	317	67	4.73
16	Lungding	33	Lungding	39	302	30	393	124	3.17
17	Lungler	34	Bungkhua	12	286	6	323	127	2.54
		35	Lungler	13	352	9	398	185	2.15
18	Lungzarh	36	Arcirh	17	67	85	170	33	5.15
		37	Hmunthar	55	35	36	136	39	3.49
		38	Khuafo	30	121	47	207	65	3.18
		39	Lungzarh	57	141	108	327	73	4.48
		40	Sihcang	5	130	675	813	60	13.55
19	Ngaphaipi	41	Fartlang	30	33	21	158	61	2.59
		42	Khuapilu	0	85	23	176	34	5.18
		43	Lungcawite	21	99	93	219	92	2.38
		44	Ngaphaipi	3	185	113	327	135	2.42
20	Ngaphaite	45	Inhmunpi	7	92	125	237	25	9.48
		46	Lungcawipi	8	55	59	128	65	1.97
		47	Ngaphaite	7	50	236	317	93	3.41

21 Saikah	48 Ruabuk	1	270	21	308	89	3.46
	49 Ruakhua	8	124	29	180	55	3.27
	50 Saikah	21	190	0	230	67	3.43
22 Salen	51 Salen	13	370	72	481	130	3.70
23 Sialam	52 Banawhtlang	0	54	12	66	11	6.00
	53 Hmunhalh	45	135	55	245	55	4.45
	54 Sialam	0	133	45	185	76	2.43
24 Surngen	55 Sentung	19	0	70	122	49	2.49
	56 Surngen	27	0	260	349	143	2.44
	57 Tisen (A)	30	15	75	149	74	2.01
	58 Tisen (B)	22	50	50	152	40	3.80
25 Thangaw	59 Thangaw	58	112	333	663	157	4.22
26 Thangzang	60 Fungkah	23	320	53	419	136	3.08
	61 Sihhmuh	45	104	56	225	55	4.09
	62 Thangzang	79	350	53	501	124	4.04
27 Thau	63 Thau	48	350	100	529	150	3.53
28 Thlualam	64 Thlualam	27	190	90	335	73	4.59
	65 Vambai	10	200	3	241	63	3.83
29 Tikhungtum	66 Tahtlang	81	150	45	301	103	2.92
	67 Thinghual	39	80	60	191	78	2.45
	68 Tikhungtum	44	165	80	305	78	3.91
30 Tikir	69 Tikir (A)	0	154	95	262	63	4.16
	70 Tikir (B)	0	0	0	0	44	0.00
31 Tlangkhua	71 Aibuk	2	3	23	31	12	2.58
	72 Tlangkhua	73	300	35	427	150	2.85
32 Tlangpi	73 Tlanglo	66	275	28	384	105	3.66
	74 Tlangpi	86	436	50	589	251	2.35
33 Tlangrua	75 Tlangrua (A)	51	260	80	403	98	4.11
	76 Tlangrua (B)	68	209	80	369	67	5.51
34 Tlangte	77 Mualkai	126	100	110	348	88	3.95
	78 Tihbual	45	140	105	297	72	4.13
	79 Tlangte	50	85	160	307	85	3.61
35 Vanzang	80 Farrawn	73	286	25	469	186	2.52
	81 Sopum	119	170	140	462	92	5.02
	82 Vanzang	56	251	122	458	107	4.28
36 Zaangtlang	83 Zaangtlang	0	293	2	309	158	1.96
37 Zephai	84 Vuangtu	82	205	30	335	140	2.39
	85 Zephai (A)	250	116	22	409	202	2.02
	86 Zephai (B)	37	18	49	174	70	2.49
Rural Total		3,914	13,003	8,073	27,547	8,370	3.29

Source: Survey and Land Records Department, Thantlang Township.

Department of Immigration, Thantlang Township.

Appendix Table 4.d. Household access to cultivated land (Tedim Township)

Household access to cultivated land by village

Ward - 5 Village Tract - 55 Village - 127	Paddy	Garden	Taun-yar	Total cultivated acre	Household	Household access
Urban	Data not availed				2,042	-
Rural	5,539.56	1,758.75	21,422.50	28,720.81	12,412	2.31
Township	5,539.56	1,758.75	21,422.50	28,720.81	14,454	-

Sr.	Ward/ Village Tract	Sr.	Sr.	Village	Paddy	Garden	Taun-yar	Total cultivated acre	Household	Household access
1	Cikawlan Ward								682	-
2	Myoma								452	-
3	Lawlbawl Ward						Data not availed		596	-
4	Laylone Ward								312	-
5	Kha La Ya (269)								-	-
	Urban Total								2042	-

Household access to cultivated land by each village

1	Saizang	1	1	Saizang	0	70	565	635	400	1.59
		2	2	Phaileng	0	25	35	60	53	1.13
2	Vongmual	3	1	Vongmual	0	3	107	110	69	1.59
		4	2	Tampi	0	3	80	83	27	3.07
		5	3	Thenzang	0	3	90	93	18	5.17
3	Khiangzang	6	1	Khiangzang	0	2	70	72	17	4.24
		7	2	Dimzang	220	5	10	235	142	1.65
		8	3	Mawnglang	0	3	50	53	44	1.20
		9	4	Taaklam	0	1	90	91	48	1.90
		10	5	Kimlai	1409.46	7	77	1493.46	58	25.75
4	Suangpi	11	1	Suangpi	0	258.42	370	628.42	181	3.47
		12	2	Dimlo	4.85	60.6	300	365.45	105	3.48
5	Dimpi	13	1	Dimpi	0	25	244	269	178	1.51
6	Bumzang	14	1	Bumzang	0	3	60	63	51	1.24
		15	2	Khuadai	1.7	3	35	39.7	24	1.65
7	Kahngen	16	1	Kahngen	2	3	50	55	41	1.34
		17	2	Aipha	0	3	56	59	13	4.54
8	Thangzang	18	1	Thangzang	0	3	105	108	76	1.42
		19	2	Zozang	0	1	45	46	22	2.09
9	Tualmu	20	1	Tualmu	8	2	45	55	29	1.90
		21	2	Mawngken	2	1	55	58	38	1.53
10	Gamngai	22	1	Gamngai	12.14	5	300	317.14	130	2.44
		23	2	Haimual (or) Gelzai	28.04	2	45	75.04	85	0.88
11	Lailui	24	1	Lailui	0	10	168	178	119	1.50
		25	2	Tualzang	1.21	0	193	194.21	95	2.04
12	Teeklui	26	1	Teeklui	0	3	347	350	130	2.69
13	Haupi	27	1	Haupi	13.1	47.55	435	495.65	109	4.55
14	Sezang	28	1	Sezang	0	95.33	340	435.33	165	2.64
15	Lamzang	29	1	Lamzang	16.93	25	300	341.93	196	1.74
		30	2	Gawngmual	0	0	163	163	79	2.06
16	Lailo	31	1	Lailo	28.75	8	315	351.75	193	1.82
		32	2	Tuilangh	0	0	278	278	178	1.56
17	Vulvum	33	1	Vulvum	10.94	20	234	264.94	128	2.07
		34	2	Ngennung	12.61	30	300	342.61	150	2.28
18	Kaptel	35	1	Kaptel	130.41	20	950	1100.41	517	2.13
		36	2	Lunmual	46.38	6	84	136.38	72	1.89
		37	3	Hiangawn	0	0	20	20	8	2.50
19	Tuipi	38	1	Tuipi	43.5	5	110	158.5	88	1.80
		39	2	Pangzang	4.65	5	88	97.65	14	6.98
20	Laitui	40	1	Laitui	3.95	16	848	867.95	719	1.21
21	Tuitawh	41	1	Tuitawh	21.92	17	230	268.92	89	3.02
22	Muizawl	42	1	Muizawl	6.67	19	188	213.67	108	1.98
23	Muallum	43	1	Muallum	23.87	10	225	258.87	95	2.72
		44	2	Mualnuam (A)	0	1	35	36	10	3.60
		45	3	Mualnuam (B)	10.1	5	120	135.1	56	2.41
		46	4	Gawsing	20.97	5	160	185.97	60	3.10
24	Cingpikot	47	1	Cingpikot	26.52	16	170	212.52	120	1.77
		48	2	Tuiciniui	13.43	7	123.5	143.93	78	1.85
		49	3	Tongsial	1.43	7	96.5	104.93	59	1.78
25	Tuithang	50	1	Tuithang	30.85	5	794	829.85	419	1.98

26	Tungzang	51	1 Tungzang	101.39	5	653	759.39	284	2.67
27	Anlangh	52	1 Anlangh	168.14	10	738	916.14	171	5.36
		53	2 Lezang	70.5	5	70	145.5	125	1.16
28	Gamlai	54	1 Gamlai	103.5	10	255	368.5	99	3.72
29	Suangsang	55	1 Suangsang	22.8	4	230	256.8	79	3.25
		56	2 Ngalbual	20.47	3	210	233.47	83	2.81
		57	3 Lalta (or) Philnaak	23.17	3	191	217.17	42	5.17
30	Thalmual	58	1 Thalmual	28.56	4	334	366.56	140	2.62
31	Phaiza	59	1 Phaiza	55	5	239	299	171	1.75
32	Buanli	60	1 Buanli	25.74	6	163	194.74	87	2.24
33	Bukphil	61	1 Bukphil	147.26	11	224	382.26	129	2.96
		62	2 Pharthlang	74.25	10	150	234.25	59	3.97
		63	3 Ngente	69.2	10	200	279.2	76	3.67
34	Dampi	64	1 Dampi	66.27	10	150	226.27	69	3.28
		65	2 Thinglei	129.48	15	350	494.48	129	3.83
		66	3 Tuisanzang	52.3	0	100	152.3	56	2.72
35	Tuidil	67	1 Tuidil	13.45	13	216	242.45	64	3.79
		68	2 Haimual (New)	6.89	14	145	165.89	56	2.96
		69	3 Haimual (Old)	147.55	11	240	398.55	107	3.72
36	Zimpi	70	1 Zimpi	34.1	10	90	134.1	43	3.12
		71	2 Zimte	38.38	10	95	143.38	40	3.58
37	Kawilam	72	1 Kawilam	7.51	10	74	91.51	18	5.08
		73	2 Vutbuak	16.49	10	100	126.49	35	3.61
38	Suangphei	74	1 Suangphei	0	11	123	134	85	1.58
39	Heilei	75	1 Heilei	0	27	273	300	246	1.22
40	Suangzang	76	1 Suangzang	115.13	26	428	569.13	185	3.08
		77	2 Sialtuai	0	11	100	111	49	2.27
41	Pangsak	78	1 Pangsak	0	8	130	138	88	1.57
		79	2 Langzang	0	7	125	132	80	1.65
		80	3 Zangtui	0	9	125.5	134.5	88	1.53
42	Pakzang	81	1 Pakzang	144	17	195	356	147	2.42
43	Thuklai	82	1 Thuklai (Htuklai)	0	10	50	60	94	0.64
		83	2 Pumva	0	10	30	40	31	1.29
44	Khuasak	84	1 Khuasak	0	10	80	90	66	1.36
		85	2 Taingen	0	10	68	78	34	2.29
		86	3 Hiangzing	0	10	75	85	43	1.98
		87	4 Lophei	0	26	70	96	34	2.82
45	Buanman	88	1 Buanman	0	12	65	77	39	1.97
		89	2 Voklak	0	12	62	74	83	0.89
		90	3 Bekan	0	12	45	57	36	1.58
		91	4 Duhmang	0	15	78	93	33	2.82
46	Limkhai	92	1 Limkhai (Zo)	0	30.35	90.5	120.85	94	1.29
		93	2 Limkhai (Bum)	0	10.4	45.5	55.9	45	1.24
		94	3 Leidawh	0	17.4	85	102.4	51	2.01
47	Dolluang	95	1 Dolluang	0	3	119	122	24	5.08
		96	2 Zozang (Lower)	843.16	2	0	845.16	283	2.99
		97	3 Zonuamzang	389	3	0	392	72	5.44
		98	4 Thangsang	334	3	0	337	42	8.02
		99	5 Mualnuam	0	2	126	128	16	8.00
		100	6 Mainuai	83.93	27	0	110.93	84	1.32
		101	7 Tanzang	0	3	70	73	14	5.21
		102	8 Tuivial	0	8	367	375	94	3.99
		103	9 Suangdawh	0	4	283	287	43	6.67
		104	10 Vando	0	0	0	0	0	0.00
		105	11 Mualzang	0	3	201	204	69	2.96
48	Vangteh	106	1 Vangteh	0	70	580	650	354	1.84
49	Phunom	107	1 Phunom	0	16	100	116	62	1.87
		108	2 Phunom (Ngal)	0	16	62	78	53	1.47
		109	3 Thungnual	0	16	60	76	82	0.93
		110	4 Zung	0	16	60	76	68	1.12
		111	5 Sozang	0	16	68	84	34	2.47
		112	6 Phunom (Dim)	0	20	80	100	38	2.63
50	Mualbeen	113	1 Mualbeen	0	8.5	210	218.5	249	0.88
		114	2 Zangzawl	0	5.3	50	55.3	39	1.42
51	Buan	115	1 Buan	0	49	122.5	171.5	121	1.42
		116	2 Dakdung	0	11.9	41.5	53.4	47	1.14
52	Pimpiph	117	1 Pimpiph	0	5	204	209	100	2.09
		118	2 Tuizang	0	13	116	129	50	2.58
53	Laibung	119	1 Laibung	0	5	106	111	112	0.99
		120	2 Tuisau	0	9	175	184	76	2.42
		121	3 Akluai	0	0	26	26	37	0.70
54	Theizang	122	1 Theizang	0	24	98	122	105	1.16
		123	2 Khaikam	51.56	3	0	54.56	126	0.43
		124	3 Mualpi	0	4	35	39	46	0.85
55	Ngalzang	125	1 Ngalzang	0	10	125	135	50	2.70
		126	2 T.K.Suangpi	0	15	158	173	81	2.14
		127	3 Suahlim	0	3	20	23	25	0.92
Rural Total				5,539.56	1,758.75	21,422.50	28,720.81	12,412	2.31

Source: Survey and Land Records Department, Tedim Township.
Department of Immigration, Tedim Township.