CHAPTER 3

Context of Yamethin District

3.1 Geographical and topographical conditions

The Yamethin District, having an elongated shape from north to south, is situated in the central part of the Union of Myanmar. It is bounded approximately between Longitude 95° 35' E and 96° 42' E and Latitude 19° 25' N and 20° 47' N.

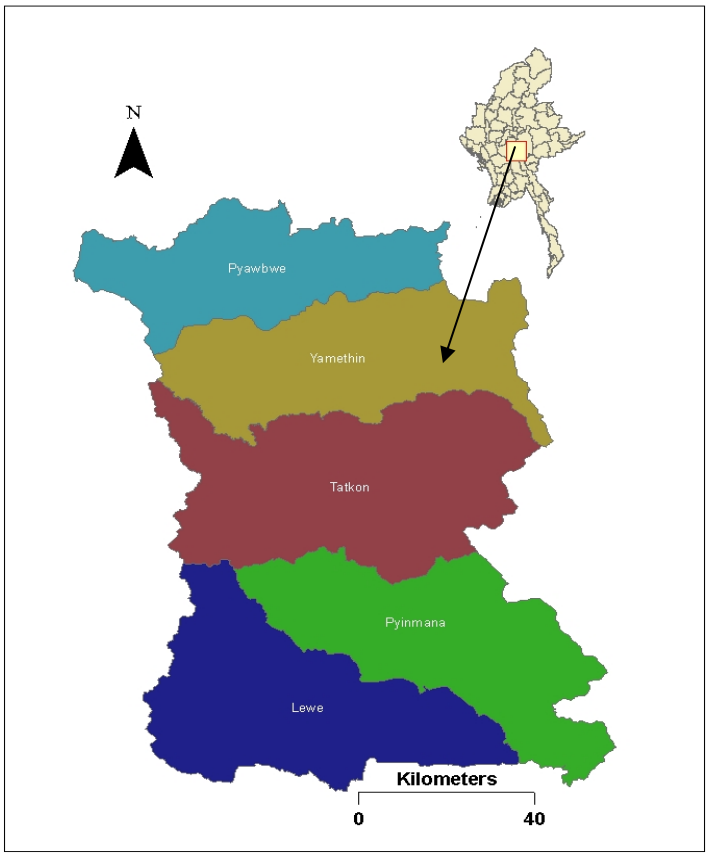

Figure 1. Location of study area, Yamethin District in Myanmar

Source: Department of Agricultural Planning, Myanmar

The district extends about 141 km form north to south and about 77 km from east to west. Total area of study area is about 108,828 sq-km or1,088,289 ha (Figure 1.) Meiktila is bound it on the North District, Southern Shan States on the east, Taungoo District on the south, Thayet district on the south-west and Magway district on the west-geomorphologically, the territory of the Yamethin District may be divided into the following regions.

(1) Rolling and gentle hilly region: This hilly region is a continuation of hills from the north and west occupying the northwest portion of the district. The whole area is rolling with an average height of 300-400 m a.m.s.l. The highest peak, which is found in the western part of this region, has an elevation of 420m a.m.s.l. Apart of this hill, the whole area has very gentle slope with numerous streams flow all directions.Geologically, the area as a whole belongs to Bago series made up of silty clay and soft sandstone. Siliceous, calcareous, ferruginous and sometime-carbonized fossil woods are found in the Bago series.

(2) The hilly region of Northern Bago Yoma: From the southern border of the above region down to the southern border of Yamethin district, the whole area is occupied by the hills of Pegu Yoma. The average height of that region is about 300 m a.m.s.l. Slopes of the hills are very gentle in this eastern portion. Steep slopes and narrow breadth of numerous streams, it is not possible to carry out cultivation and thick forest is the only natural vegetation on this mountainous region.

(3) The Central Alluvial Plain: It is level territory occupying the central portion of the district form north to south. It is wider in the north than in the south. The plain becomes a narrow strip south of Yamethin, wildness its space into the Pyinmana-Lewe area and then narrows down again southwards. In the south, the general level of the plain is reduced to 90-120 m a.m.s.l. and even to 76 m a.m.s.l in the extreme south like the hills near Pyawbwe and Yamethin, a separate low hill range raises at Thawatti and runs in a north-west direction up to Yonbin chaung.

(4) The under mountain Alluvial-deluvial plain: This region is a long narrow strip which lies in a north-south direction between the Alluvial Plain of the west and

the Shan Plateau Mountains of the east forming like a terrace of a transitional zone between the lowland of the west and the high mountains of the east. The level of this plain is about 150-300 m a.m.s.l where one meets abruptly the steep slopes and escarpment of the Shan Plateau. It is covered with friable weathering products of alluvial-deluvial deposits brought down by the streams from the eastern mountains. Alluvial and deluvial deposits are characterized by light loam and some sandy layers. Underneath these layers, the predominating bedrocks are hard beds of granites which are generally coarse grained in texture often tending to be porphyritic. Along the eastern border of this region some granites outcrops are found.The rock are usually grayish sometimes a little brownish often weathering out to form a light grayish to light brownish sandy alluvium.

(5) The Shan Plateau: This region is about 900-1,060 m a.m.s.l. All over the region there are many high peaks just like Mindale Taung (1,059 m) in the north, Modi Taung (1,404 m), Myeni Taung (1,524 m) and Tinyu Taung(1,826 m) in the central portion and Kyetmawut Taung (1,237 m) in the south. There are varieties of rock such as shales, quartzites, mica-schist, grey and whitish limestone sometimes crystalline various metamorphosed products of impure limestone and tuffs (Thet, 2003).

3.2 Climate

Yamethin District is situated in the transition area of dry zone, where the yearly temperature is exceeds 22°C and average annual rainfall is generally between 500-1,500 mm isohyet in the mean annual rainfall map of the country. It is mentioned that the characteristics is typical of a tropical semi-arid zone. Classification on temperature regime was sub-tropical. The climate of Yamethin district is controlled by the monsoon circulation system. Mountain ranges run N-S and present effective climate are for the S-W monsoon in summer and the N-E monsoon in winter. Annual precipitation is 1,140 mm in 10 years average and distribution of precipitation in pre-monsoon, monsoon and post-monsoon is presented in table 1.

Table 1. Annual rainfall (2004) in the study area, Yamethin district, Myanmar

Months	Normal (10 yrs av)		2003 annual		2004 annual		(+) (-)			
							With normal		With previous year	
	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm
Pre - monsoon	26	360	28	365	22	360	-4	-10	-6	-20
Monsoon	27	385	16	152	25	305	-2	-92	+9	+120
Post - monsoon	23	395	18	346	20	249	-3	-121	+2	-52
Total	76	1140	62	863	67	914	-9	-223	+5	+48

Source: Yamethin District Agriculture office, 2005

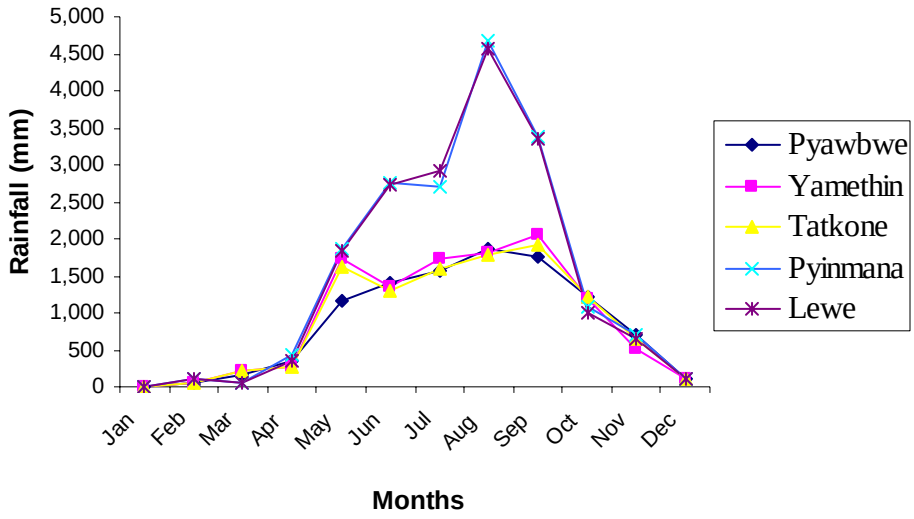

Figure 2. Monthly average rainfall (mm) in Yamethin District, 1994-2004

Source: Yamethin District Agriculture office, 2005

Distribution of monthly rainfall in 1994-2004 average is observed in Figure 2.Annual precipitation is less than 1,000 mm in Yamethin, Pyawbwe, Tatkon townships and more than 1,000 mm in Pyinmana, Lewe townships.

3.3 Soil

In the region of rolling and gentle hilly uplands which lies in the North West corner of the district, red brown savanna soils of light texture are dominantly found. On steeper slopes of the hills Primitive Crushed Stony soils together with red brown eroded savanna soils predominant and in lowland between the hillocks dark red brown savanna soils occur. Meadow soils are also found along the stream edge of this region and in the Thitson area.

In the hilly region of Bago Yoma which occupies the major portion of the eastern part of the district the predominating soil type is forest Yellow Brown soils followed by Red Brown Savanna soil and Red Brown Eroded Savanna soils. The latter type occurs in the northern part of this region and along the narrow valleys of the streams like Taungnyo chaung and Hyitye chaung, meadow soils are found. Primitive Crushed Stone soils also occur on the steeper slopes of the ridges.

In the central lower plain region the chief soil type found is Meadow soil with the exception of the Sinthe chaung valley along which the alluvial soil are found. In the extreme north of this region some patches of Meadow Gleyey strongly alkaline soils and Meadow Alluvial soil are found. On the hillocks near Pyawbwe the only soil type is Primitive Crushed Stone soils. In the northern and central portions of the undermountain Alluvial-deluvial plains, the Cinnamon soils occur throughout but in the southern portion, which is more rolling, Turffy Primitive soils are found.

On the mountains of the Shan Plateau, Shallow Mountainous Red Earth is found continuously. Very often the outcrop of rocks is seen on steep slopes and summits. In the extreme south, near Thawatti, stands a hill separately running in NW-SE direction. The soil cover here is Lateritic soils in combination with Forest Yellow Brown soils.

The above is the general picture of the soil cover of the whole territory of the Yamehtin District. In general that the rolling uplands in the north-west are covered with Red Brown Savanna soils and their eroded varieties and Primitive Crushed Stones on the steeper slopes; almost the whole of western hills of Bago Yoma is occupied by the Forest Yellow Brown soil; the central Low Plain has an extensive

cover of Meadow soils, Meadow Alluvial and Meadow Alkaline soils; the valley of Sinthe of Paunglaung chaung belongs to the Alluvial type of soil; the uplands of Alluvial-deluvial region is covered with Cinnamon soils and Turffy Primitive soils and that the mountains of Shan Plateau in the east are occupied by the continuous mountainous shallow Red Earth (Thet, 2003).

3.4 Water resources

Yemathin districts include rolling uplands and foothills of Bago Yoma in the west, central plain in the center and mountains of Shan Plateau in the East. The numerous streams are flowing down from different direction in all parts of the area. In the north, Chaungmagyi chaung, Thitson chaung, Shweda chaung and Nawin chaung are prominent. The most prominent stream in this district is Sinthe chaung which come from the western hills towards the plain where it flows to the south ward direction to join with Paung laung chaung that comes from the eastern mountains. Sinthe chaung, later known as Paunglaung chaung received many tributaries from west and east all along its way. The principal streams, which flow into the Sin The or Paunglaung chaung are Ngaleik chaung, Palwe and Yobin chaung and Yeni chaung.

All small and big streams in the territory are totally dry for the most part of the year. Even the Sin The chaung is almost dry in the hot season. Only after the rains on the hills, they are full of water flow down strongly a large quantity of suspended materials from the upper level and great erosion take place. However as these streams are entirely dry except for a short period after rains that the cultivated area in respect to irrigation purposes.

Thit son Dam, Kye ni pond, Kadin pond are irrigated purposes for Yamethin township, Thit son Dam, Kyauk Se reservoirs, Chaung ma gyi reservoir and Thettaw pond, Yin daw lake, Chaung Kauk stream are irrigation purposes for cultivated areas in Pyawbwe township. Mon chaung stream, Kinthar dam, Magyipin, Pwesar, Nyaung Kaing, Pataukkon lake are water resources for Tatkon township cultivated land and Yezin dam, Ngaleik Dam, Set Set yo, Baebaebaung, Sinlungansat, and Kyaukse are provided sufficient water for Pyinmana township cultivated land. Wetkamu, Nyopin, Madawpin, Sinohn, Kyogone, Thapyekon, Ela, Pin thaung, Ngaleik pond, Yeni water reservoir canals are irrigated sources for cultivated areas of Lewe Township.

Moreover farmers in the drier parts of the district have to depend on these ponds, tanks, and tube well and canals.

Irrigation is the important factor to get optimum yield from cultivated areas. A major constraint in summer time is shortage of irrigation water in cultivated areas. Soil conditions are favorable for second crops especially in summer rice areas. Farmers grow vegetables and floriculture on the island of stream and stream bank with receiving water from their own impermanent tube well. Stream has water flowing from June to November, in December to May, the stream dries up until the next rainy season. Farmers pump water from the stream to their cultivated farm (Thet, 2003).

3.5 Demographic conditions

Population density of the district is 120 people per square kilometer. Most of the farmers are holding a small farm size, below 3 ha per household. In the survey area, 36% of farmer possesses less than 2 ha of land, 52% of farmers are holding 2-5 ha of farm size and 12% of farmers possesses above 5 ha of land. In the study area, average of household number is 5.8. Most of the farm operations are still relied on their own family labor and animal labor. Small farm machines like as hand tractors, water pumps, engines etc., have been introducing into farming. At present, Myanma Mechanical Farm Department (MMFD) provides mechanical tillage and other mechanical and technical assistance for farmers' fields. The current condition of population, number of village tracks and Land surface of five townships in Yamethin District are shown in the table 2.

Table 2. Demographic conditions in the study area, Yamethin District, Myanmar

Townships	Yamethin	Pyawbwe	Tatkon	Pyinmana	Lewe
Village track (km)	10	12	18	22	7
No. of villages	60	74	66	60	64
Population(,000)	236	268	219	285	242
Pop. density/sq.-km	110	164	86	141	101
Land area (ha)	216,767	165,362	258,605	205,203	242,352
Cultivated area(ha)	74,897	95,810	47,139	30,746	40,004
% of cultivated area	34.5	57.9	18.2	14.8	16.5

Source: Yamethin District Agriculture Office, 2005

3.6 Land use

The net cultivated area is 288,326 ha according to the Yamethin District Agriculture Office record. It is occupying 26.5% of the total land area in Yamethin District. The cultivated land is mostly found in the central portion of the district where the land is flat.

Based on the nature of land and farming methods, the current cultivated land is classified as paddy land /low land/ rainfed lowland (Le), dry land/upland (Ya), garden and orchard. Upland (Ya) occupy the largest portion of the district. The area under garden and shifting cultivation is very small. Central plain, both side of road and railway track is the lowland paddy field (Le) cultivated rainfed rice or irrigated rice. The many fertile banks of stream such as Sinthey Chaung, Chaungmagyi Chaung, Paunglaung Chaung, Yonepin Chaung are alluvial or "Kaing land" or Ya. A variety of crops such as maize, chili, groundnut, sesame, sugarcane are grown on "Ya" land of the region. Onions, tomatoes, maize and other vegetable are grown on "Kaing" or Stream bank areas. There are grape orchards; mango orchards and garden produce fruit like mango, papaya, zi (plum), and betel vine. Horticulture plantation is on the hilly areas that produce banana (Thet, 2003). The present land use condition in the study area is presented in table 3.

Table 3. Land use condition in the study area, Yamethin district, Myanmar

No	Description	Area (ha)	%
1	**Cultivated area**	**288,326**	**26.5**
	(a) Paddy land (le)	104,238	71.63
	- Irrigated	47,363	45.43
	- Rainfed	56,875	54.57
	- others	41,283	28.37
	(c) uplands (ya)	140,786	48.82
	- cultivable	137,761	97.85
	- uncultivable	3,025	2.15
	(d) Orchard/ Kaing/ Ya	2,019	0.71
2	**Virgin land**	**18,648**	**1.71**
3	**Forest**	**609,943**	**56.06**
4	**Uncultivable**	**171,372**	**15.71**
	Total land	**1,088,289**	**100**

Source: Yamethin District Agriculture Office, 2005

3.7 Farming systems

Rainfed lowland rice, cotton, sugarcane, chili, groundnut, maize, beans, tomatoes and vegetables crops are grown in the Yamethin district. Rice is mostly grown for local consumption. Major crops grown in the study area are rainfed lowland rice and sugarcane. Chili is surplus earner as intercrop with groundnut and cotton in Tatkon, Pyawbwe and Yamethin townships.

There are three seasons for crop cultivation; Pre-monsoon, Monsoon and Post-monsoon. The dominant cropping pattern is rice based cropping pattern. Most of the first crop is rice and second crop is summer rice. Cropping pattern is varied of changes of environmental factors and topographical factors.

Farmers establish the rice seedbed in June. Transplanting is done in July to mid-September and harvesting is done starting mid-October to the late-December. In sesame-rice- legume cropping system, Sesame is broadcasted after first shower in April. Normally farmers use early maturing varieties produced from Department of

Agricultural Research (DAR), so that sesame can be harvested in July. After harvesting sesame, rice fields are prepared for transplanting in July. When rice is harvested in December, farmers start to prepare the land for legumes such as black gram, green gram and chick pea as third crop.

In double rice system, especially under irrigation projects, farmers have to grow summer rice after rainy season rice. Farmers start to grow summer rice in February according to the schedule by irrigation. Farmers use direct seedling method and short duration varieties such as Shwe Thwe Yin, Thee Htut Yin produced from DAR.

In rice-legumes system, farmers grow only chickpea or black gram after rainy season rice because sesame is risky where rain is scarce in some regions. The schedule and cropping calendar for rice-based cropping systems are illustrated in figure 3. However, some non-irrigated area and dry areas are left fallow during the summer season. Some farmers grow small amounts of onion, flowers, eggplant, cauliflower and other vegetable in bank of streams.

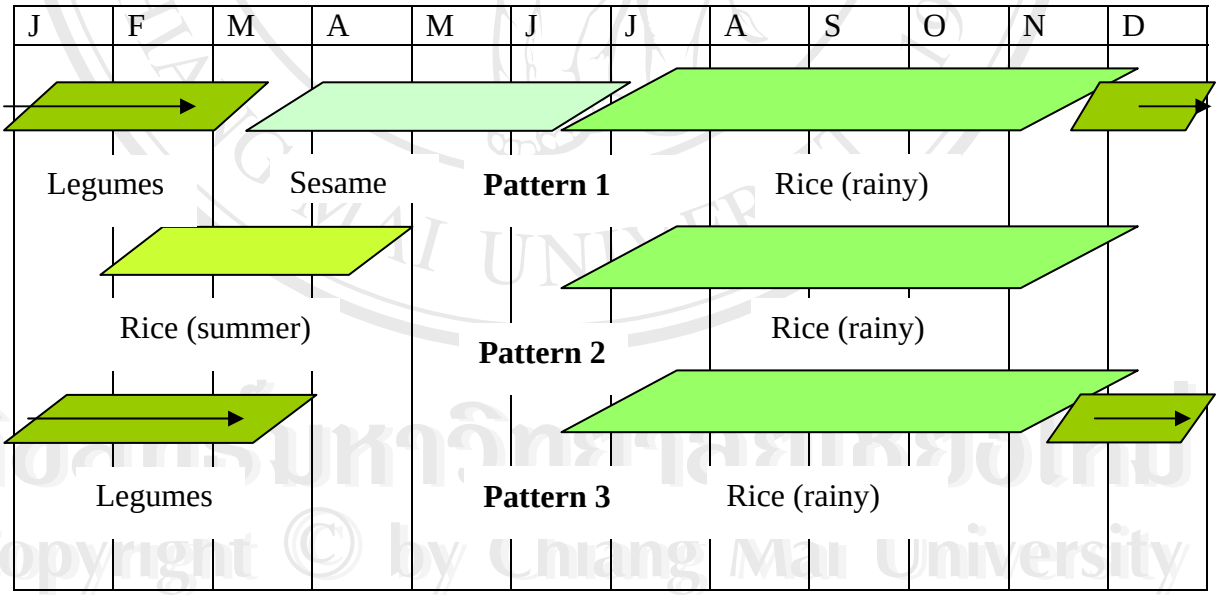

Figure 3. Major rice-based cropping patterns in Yamethin District

Source : Field survey (2005)

3.8 Environmental problem

The problem of land degradation is defined as a temporary or permanent decline in the production capacity of the land or its potential for environmental management. Some types of land degradation are salinization and erosion. Most types of soil degradation can be revered by adding nutrients to nutrient depleted soil (sulfur & zinc deficiency), reestablishing vegetation and reforestation.

Myanmar has not yet reached the high intensity of fertilizer and pesticide application in comparison to some Asia country like China, Thailand and Indonesia etc. Therefore, the environmental problems related to excessive chemical use are not yet a serious problem. But there are evidences of soil degradation, erosion, water logging, salinization, and soil fertility-depletion in some regions of Myanmar (Thet, 2003).

Myanmar can be broadly divided into the five region agro-ecological zones, namely (1) Ayayarwaddy, Sittaung valley, delta region and coastal regions; (2) western mountain ranges and Chin hill; (3) central dry zone (4) Bago Yoma; and (5) Shan Plateau, northern hill regions of Kachin State, and Tanintharyi Yoma. Depending on the different soil types, erosion and soil fertility-depletion are affecting sloping areas. Land degradation is found due to loss of vegetative cover in grazing and shifting cultivation areas.

Intensive use of land due to multiple rice crops per year has had both positive and negative consequences. In Myanmar, the common environmental problems in rice monoculture systems in both irrigated and non-irrigated land are salinity and waterlogging, and decline in soil nitrogen supplying capacity. Induced salinity problems are caused by excessive water use and /or poor drainage. Waterlogging fields in rainfed lowland and irrigated land have lower productivity levels because of lower rates of decomposition of organic matter, lower nitrogen availability and accumulation of soil toxins. The other commonly observed problem is sulphur deficiencies are due to lack of nutrient balance in fertilizer applied for sustaining soil fertility (Thet, 2003).