THE REPUBLIC OF THE UNION OF MYANMAR

MINISTRY OF AGRICULTURE, LIVESTOCK AND IRRIGATION

CO-OPERATIVE UNIVERSITY, SAGAING

A GEOGRAPHICAL STUDY ON THE SETTLEMENT PATTERNS IN SAGAING TOWNSHIP

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ASSOCIATE PROFESSOR (HEAD OF DEPARTMENT)

DEPARTMENT OF ECONOMIC GEOGRAPHY

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ABSTRACT

The study on Human Geography to some extent is difficult compared to Physical Geography. According to the nature of human beings, the study on human behaviour including their artifacts, mentifacts and sociofacts are complex. Among the various observations of Human Geography the specific study on settlement pattern is more and more complex. In this study the important township of Sagaing was selected as the study area and facts about the analysis on the settlement patterns were systematically collected and analysed. The analytical results show that three basic patterns of settlement such as compact, clustered and linear dominate in this township and some favourable situations can also be extracted for future sustainable development of the study area.

Keywords: Human Geography, settlement patterns

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INTRODUCTION

The term “Settlement” is referred to grouping of population into occupance units.Settlement may also be divided into rural and urban settlement. On the basis of form, two principal subdivisions of settlements may be recognized as the dispersed type and clustered type. Although rural settlement may be either dispersed or clustered, Urban Settlements are always clustered.

Types of Rural Settlement

(1) Clustered rural settlement

In many parts of the world; Farming people group themselves together in clustered settlements called villages. These settlements vary in size from a few dozen inhabitants to as many as 25,000 persons in large agrarian settlements called agro-towns. Farm villages are the most common form of settlement. These compact villages come in many forms.

Irregular clustering farm villages - developed spontaneously over the centuries, without any orderly plan to direct their growth.

The street villages, is the simplest of these planned types and consists of tightly clustered farmsteads lined up along either side of a single, central street, producing an elongated linear settlement.

The green village, is characterized by farmsteads grouped in an orderly fashion around a central open place, or green, which forms a village commons.

Checker board village is based on a gridiron pattern of streets meeting at right angles. Many farm villages occupy the most easily defended sites in their vicinity. These are referred to as “Strong-point” settlement.

(2) Dispersed rural settlement

In many other parts of the world, the rural population lives in dispersed, isolated farmsteads, often a mile or more from their nearest neighbours.

These include (1) peace and security in the countryside, (2) colonization by individual pioneer families rather than by socially cohesive groups (3) agricultural private enterprise, as opposed to some form of communalism, (4) Unit-block rather than fragmented into many parcels, as is typical in most farm villages, (5) rural economies dominated by livestock raising; (6) well drained land where water is easily available.

(3) Semi-clustered rural settlement

Some forms of rural settlement are neither clustered nor dispersed. They share characteristics of both, and may best be referred to as semi-clustered settlements. The most common type of semi-clustered settlement is the hamlet. Several clusters of farmsteads lie close to one another, sharing a common name and administration. These constitute what amounts to a loose irregular village. The row village is a third common type of semi-clustered settlement. In this settlement pattern, a line of farmsteads is spaced at intervals along a road, a river, or a canal.

The word "urban" is often used in place of such terms as town, city, suburb, and metropolitan area; but it is a general term and does not specify a particular type or size of settlement. The word "city" and "town" denote nucleated settlements, multifunctional in character, including an established central business district and both residential and non residential land use.

The Study Area

The Study Area " Sagaing Township" is located on the West Bank of the Ayeyarwady River in the Dry Zone of Central Myanmar. It lies between the north latitudes 21°52' to 22°13' and the east longitudes 95°37' to 96°03'. It has an area of 485.16 square miles (310,502 acres) and is composed of Sagaing Town Proper and 81 village tracts with 206 villages. The general elevation of the land surface is (250') above sea levels.

Aim and Objectives

Main aim is to differentiate the types and patterns of settlement in Sagaing.The objectives of this study are:

- To study the status of the rural and the urban settlement in the study area.
- To examine the situation of rural and urban settlement in the study area.

Data Collection and Methodology

In collecting the population data, both primary and secondary data are acquired.

Primary data are collected from questionnaires, field observation and interviews. Climatic data is acquired from the department of Meteorology and Hydrology, Mandalay Region. Soil data is obtained from the Myanmar Soil Survey Department, Yangon.

Secondary data are collected from various departments, reference books, records, respective offices, and then the required maps and figures are selected from topographic maps and are obtained from aerial photographs.

In this research, the analysis, examination, assessments and comparison of settlement patterns of the townships are conducted by qualitative and quantitative methods. To analyze the settlement patterns and housing types of the study areas are conducted based on the official data, interviews and questionnaires.

To get the exact and modernized design, the tools of GIS will be adopted by the help of Geomedia professional 4.0 and Arc view 3.2 GIS softwares. To examine the relationship between rural and urban development and rural and urban expansion, the quantitative method and appropriate methods are used.

1. PHYSICAL FACTORS THAT AFFECT UPON THE SETTLEMENT PATTERNS

1.1 Location, Size, Shape and Boundary

Sagaing District is one of the (8) districts included within Sagaing Region, Sagaing Township and Myinmu Township are two of the three townships within Sagaing District of Sagaing Region (The three townships are Sagaing Township, Myinmu Township and Myaung Township). They are the two townships which are located on the southern most part of Sagaing Region and on the eastern part of Sagaing District. Both of the two townships lie between North latitudes (21°52') and (22°13') and between East longitudes (95°20' and 96°03'). Sagaing Township is bounded on the north by Wetlet Township, on the east and south by Madaya, Patheingyi, Tada-U and Ngazun Townships of Mandalay Region and on the west by Myinmu Township.The northern and western boundaries are land boundaries. On the east and south, the Ayeyarwady River flows as a natural boundary.

It has an area of 485.16 square miles (310,502 acres) and is composed of Sagaing Town Proper and 81 village tracts with 206 villages.

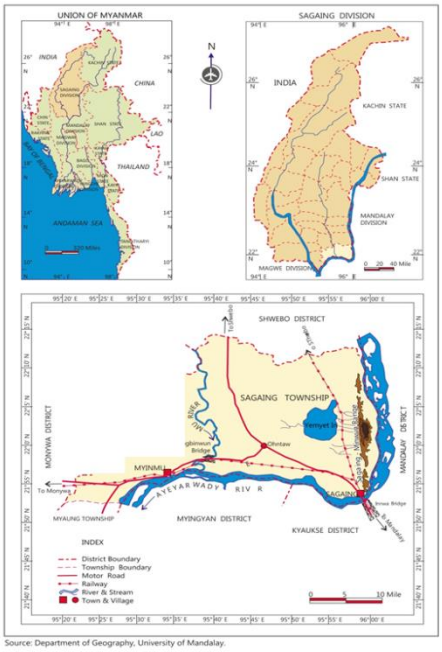
The area of Sagaing Township is (36.49) percent of the total area of Sagaing District. The township has a square shape. The general elevation of the land surface is (250') above sea levels.

1.2 Topography

Topographic structure of a region is one of the important factors among the many factors which influence and affect the differences in the settlement patterns and the changes in the growing increasing development of the rural and urban settlements. Generally, it is found that the settlements are thick in the river basin plain region where there are good agricultural enterprises and good transportational means, whereas in the hilly regions with rugged topography, the settlements are thin and dispersed.

Sagaing Township is situated in the Central Part of the Ayeyarwady River Basin. The Ayeyarwady Basin Region had been covered by the sea until the late Tertiary Period.

Map 1.1 Location Map of Sagaing Township



Source: Department of Geography, University of Mandalay.

Map 1.2 Index Map of Village Tracts of Sagaing Township

Sagaing Minwun Range is an important topographic feature within Sagaing District. This region is formed by Tertiary sediments. Between the river basins there are many mountain ranges and hills which are branches of Pegu Yoma (Bago Yoma). The mountain ranges are the anticlines which are formed by the tertiary and Lower Pleistocene rocks. Among these mountain ranges, Sagaing-Minwun range is the most important range within Sagaing Distinct of Sagaing Division.

Generally, the region of the townships of Sagaing can be divided into three divisions. They are: Sagaing Ridge or Sagaing Range Region on the east; the Lowland Region on the east of Mu River and the Lowland Region on the West of Mu River.

Sagaing Ridge or Sagaing Range Region on the east is situated in Sagaing Township and occupied (5) per cent of the total area of Sagaing Township. In the northern most tip it is known as Minwun Range and becomes highest near Taung Nyo village with a height of 600 feet above sea level. Near Yega village it continues to join with Sagaing Range. Sagaing Range becomes highest on the western part of Mingun Range with a height of 1,332 feet. It distinctly becomes lower towards Ayeyarwady River. It has also become a sandstone ridge with a North-South alignment.

Between the eastern part of Sagaing Range and the Ayeyarwady River riverine village tracts found re Thawtapan, Watchet, Arlaung, Myetaing, Chaungpauk, Letpan and Mazeli Chaung.

With the exception of Sagaing Range the Lowland Region on the Eastern part of Mu River is included totally in Sagaing Township. It is a lowland region between Sagaing Ridge on the east and Mu River on the west. This region covers over (95) percent of the total area of Sagaing Township. This region is generally above (250) feet above sea level.

Although it is known as the Low Plain Region yet there are many separate isolated hills and ranges such as Thitsagu Taung (747) feet, Chayadaw Taung (630) feet and Shwe Taung (500) feet. It gradually becomes lower until it reaches Ye -Myet In (Lake) Basin. On the north-western part of this Plain Region lies Thazin In (Lake). Mu River Basin lying on the West and Ayeyarwady River Basin which lies on the south are regions with the lowest land surface of this plain Region. As its height is below (250) feet above sea level floods occur annually from he annual floods of Ayeyarwady River and Chindwin River during the Rainy Season. After the flood season when the flood waters recede alluvial soils are being left on the surface of the Plain Region. These inundated lowlands are good paddy lands ("Le" mye) and dry crop lands ("Ya" mye) where paddy, groundnut, wheat and pulses can be grown.

By studying the topographic structures which are natural units dividing Sagaing and Myinmu Region, the socio-economic patterns and the settlement patterns can be generally depicted. In the land-locked interior region where water for agriculture or cultivation is not available or in the hilly regions where transportation is difficult and not easy, or in some years if the cultivation of crops fail, there will be a decrease in the economic development within the region. In connection with it, as a result, there can be changes in the settlement patterns and the house patterns too. The main occupation of the rural population of this region which lies in the Dry Zone Belt of Central Myanmar is agricultural enterprises (cultivation of crops). That is why, the availability of water for agriculture or cultivation of crops and good transportation are essential for the well being of the population of the region. If transportation is poor the patten of rural settlement will have a scattered and dispersed type of settlement.

As the lowland Plain Regions within Mu River Basin and Ayeyarwady River Basin are being flooded annually, the agricultural lands consisting of Paddy Lands ("Le" mye); Dry Crop Lands ("Ya" mye); Riparian Lands ("Kaing-Kyun" mye) are fertile and crops thrive well on these lands. Moreover as water for the cultivation of crops are available all the year round, winter crops can be conveniently and easily grown Furthermore as it is a plain region with good transportation, the socio-economic condition of the region is good. That is why, when this region is compared to the interior land locked dry region with poor transportation, the settlement pattern will be of an agglomerated or clustered type. As it is a thickly populated region the house patterns and house types will be ranging from moderately good to very good. Along the

railroads, motor car roads and along the waterways a long stretch of elongated linear village settlements can be found.

1.3 Drainage

The main drainage includes within the townships of Sagaing is the Ayeyarwady River.

Ayeyarwady River takes its source from the northern most part of Myanmar and flows from north to south along the eastern bank of Sagaing Township, and forms as a natural boundary for about (25) miles. On the south-eastern most part of Sagaing Township near the town of Sagaing, Ayeyarwady river bends abruptly towards the West for about (23) miles, and near Nyaung Yin village which is (5) miles east of Myinmu town, it joins with Mu River.

Ayeyarwady River forms as a boundary on the south of Myinmu Township between Myinmu and Ngazun Townships and flows along the boundary for about (18) miles. Within this region Ayeyarwady flows meandering through the Alluvial Plain. During the Rainy Season the volume of water is big and thus floods occur on both banks of the river of the flood plains. As a result, the flood plains are covered with new alluvial soils which are being deposited annually after the receding waters of the floods. As the alluvial soils are fertile and agricultural crops thrive well on these soils the region becomes thickly populated. Hence clustered agglomerated settlements are found in this region.

Ayeyarwady River forms a natural boundary as it flows through the districts of Sagaing, Myingyan and Mandalay. Along the Southern most part of the study area, Nauk Kyee Kyun, Kywe Lu, Sin mye, Byetayaw, Sintat, Ngatayaw, Ywathitgyi, Pyitawtha, Ywama, Kaing Pyin, Minse, Paleta, Nyaungyin, Suppakone and Kywe Yike village tracts are found along the Ayeyawady Rivers.

Mu River is a tributary of Ayeyarwady River. It flows from north to south within Sagaing District and it flows into Ayeyarwady near the town of Myinmu. Mu River flows as a natural boundary between the townships of Myinmu and Sagaing for about (16) miles.

Although there are many lakes within the townships of Sagaing and Myinmu, “Ye - myet-in” or Lake and Kaung-hmudaw-in or lake are more important than the other lakes. Within Sagaing District, Ye-myet-in is the biggest lake. It lies between Mingun Taung (1,331) feet on the east, and Shwe-Taung-gon Taung (500) feet on the west. The rise in the highest water level of the lake occurs once in every (3) or (4) years. At the time when the maximum water level occurs, the length of Ye-Myet-in is about (14) miles and its width is about (4) miles. As the soil contains salt contents and as the salinity of the soil is high cultivation of crops and agricultural activities cannot be carried out extensively.

Kaung-hmu-daw-in (lake) lies on the west of the town of Sagaing and is connected with Ayeyawady River. “Ye-ga In” (lake) which lies (7) miles north of the town of Sagaing is formed by Sagaing Fault. It has an area of 125 acres and it produces natural (blue green) algae.

1.4 Geology

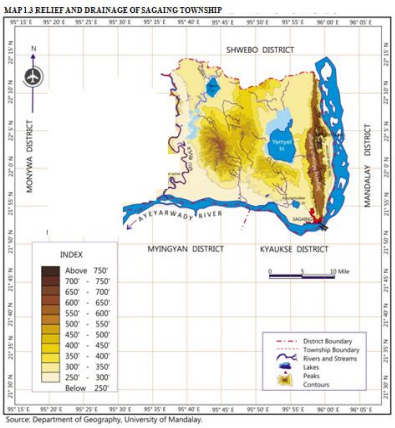
Geomorphologically the study area lies in the Central Cenozoic Belt between the Western Ranges and the Eastern Highland. The Sagaing and Myinmu townships lie in the northern part of the Central Cenozoic Belt. The two townships are largely made up of sedimentary rocks belonging to Upper Pegu Group and the Irrawaddy Formation. These sedimentary rocks are also covered by recent alluvium in the lowlying plain areas.

The oldest rock unit in this area is Sagaing Metamorphics. It forms a narrow strip along the eastern boundary of the Sagaing Township parallel to the Ayeyarwady River. The Sagaing Metamorphics can be divided into three rock units. The lower unit consists of hornblende gneiss. The middle unit contains forsterite-phlogopite marbles and diopside marbles. The upper unit comprises biotite gneiss, biotite-hornblende gneiss and amphilbolite. These units are named Hornblende-gneiss Unit, Marble Unit and Marble-Gneiss Interbedded Unit. These metamorphic rocks are interpreted to be metamorphosed from the Lower Paleozoic rocks.

The Sagaing-Mingun range, under the surface geological processes, is now covered with brown Savanna soil.

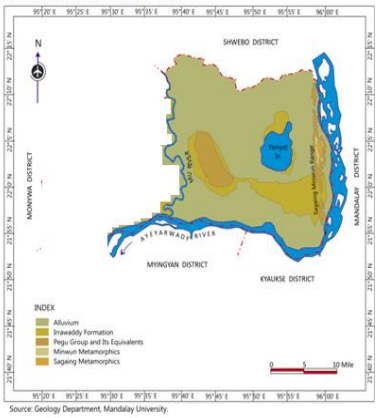
The second oldest rock unit is the Minwun Metamorphics. The Minwun Metamorphics is exposed in the southern part of the Minwun Range which runs parallel to the Sagaing Range. Its surface area is very small. It consists of garnet-muscovite schists, kyanite-muscovite schist, actinolite- schist and talc-chlorite schist. Blocks of laminated blue-grey limestone occur intermittently along the western fringe of the Sagaing Fault Zone. The Minwun Metamorphics are interbedded with white and grey marbles forming small mounds of hill in the west of the Mingun Range. The age of the limestone is interpreted to be Cretaceous in geologic age. The Minwun metamorphic rocks are found to be covered with turfy primitive soil and red brown Savanna soil.

The Peguan rocks are represented by Kyaukta Formation and Legyi Formation, The Kyaukta Formation is exposed in the northern part of the small Minwun Range to the west of the Sagaing Range, The widest extent of this unit is found to the west of Yega Lake.



MAP 1.3 RELIEF AND DRAINAGE OF SAGAING TOWNSHIP

Source: Department of Geography, University of Mandalay.



MAP 1.4 GEOLOGICAL MAP OF SAGAING TOWNSHIP

Source: Geology Department, Mandalay University.

The Kyaukta Formation consists of interbedded gritty sandstone, silty sandstone and shale. The lower member of Kyaukta Formation contains interbedded grey gritty sandstone, silty sandstones with conglomerate layers. The upper member contains interbedded fine-grained calcareous sandstones. The sandstones of this part are locally silty and mostly fine to medium grained, calcareous. Small-scale cross-lamination, current ripple marks and leaf imprints are fairly common in these sandstones.

The Peguan rocks are exposed as isolated patches where there are hilly areas apart from the Saganing Range. The areas of peguan rocks are covered with turfy primitive soils.

The Irrawaddian Formation dominantly comprises coarse-grained sandstones, fanglomerates and black clays. This formation is also subdivided into two members. The lower member contains fanglomerates with interbedded coarse-grained sandstones and black clays. The upper member contains massive-bedded sandstones. Large-scale cross-stratification is the striking feature of this sandstone. The Peguan rocks and Irrawaddian sediments were deposited under deltaic and fluvial conditions respectively. The Irrawaddy formation belongs to Upper Miocene to Pliocene age. These rocks were deposited under terrestrial conditions.

The Irrawaddian sandstones are most widely distributed in both Sagaing and Myinmu Townships. The Irrawaddian rocks are covered with a variety of soils, namely turfy primitive soil, red brown Savanna soil and irrigated dark compact soil.

The alluvial deposits are found along the Ayeyarwady River along the eastern boundary of the Sagaing Township and along the southern boundaries of the Sagaing and Myinmu Townships and along the Mu River in the central part of the study area.

Small outcrops of serpentinite are found along the Sagaing fault zone. Its emplacement may be Tertiary in age.

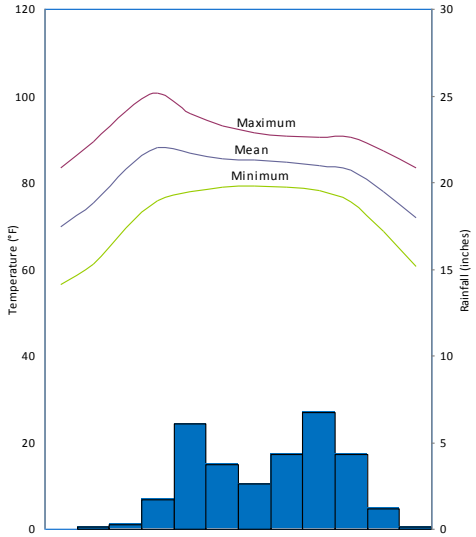
1.5 Climate

Climate is one of the physical factors which affect not only the physical landscapes but also the socio-economic conditions of a region. That is why; climate can create and improve the development of natural vegetation and soil. Moreover it can also control and influence land use. As it can indirectly influence especially the cultivable capability of agriculturalists or tillers of the soil, it can indirectly affect the settlement patterns of a region.

In the period from 1989 to 2013, the average annual mean temperature of Sagaing Township is 81.5°F and the annual average maximum temperature is 91°F and the annul average minimum temperature is 71.7°F.

The Sagaing Township is situated in the Dry Zone Belt of Central Myanmar. The main reason for the scarcity of rainfall in the Tropical Dry Zone Belt is because there are no high mountain ranges and topographical structures and atmospheric condition which can uplift the Monsoon Winds which comes from the south along Ayeyarwady River Basin, and the south-west Monsoon Winds which cross over Arakan Yoma (Rakhine Yoma).

Figure 1.1 Temperature and Rainfall Conditions of Sagaing (1989-2013)



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Average/ Total
Maximum Temp.	83.32	89.31	96.57	100.56	95.82	92.98	91.57	90.81	90.54	90.42	87.26	83.43	91.04
Mean Temp.	69.73	75.28	83.10	88.19	86.92	85.51	85.33	84.77	83.81	82.92	77.97	72.00	81.80
Minimum Temp.	56.42	61.27	69.63	75.83	78.01	79.05	79.09	79.03	78.09	75.43	68.70	60.55	71.75
Rainfall	0.00	0.15	0.24	1.72	6.07	3.70	2.60	4.34	6.73	4.32	1.15	0.16	31.18

Source: Meteorology and Hydrology Department, Mandalay

The winds which continue to cross over the Rakhine Yoma have little moisture-laden air. As the wind which blows from the upper height towards the lower slopes has lesser moisture

content as it blows downwards, it is not easy to cause rain. That is why it is one of the reason for the scarcity of rainfall in the Sagaing Township.

According to the rainfall data from 1989 to 2013, the normal rainfall of Sagaing Township is 31.18 inches.

According to the data for the temperature and rainfall collected during (1989-2013), from the Meteorological Stations of Sagaing Township receives Tropical Steppe Climate BSh (according to K**Ö**ppen's Classification of Climate)

1.6 Soils

Soil is an important resource of an environment. It is also a basic factor which determines the land use of any region. Settlement patterns are closely related to the agricultural land use patterns.

(a)Red Brown Savanna Soil

This soil type is found all over the whole of Sagaing Township especially on the higher parts of the land. It consists of sandy soils and sandy loams. This soil type can be sub-divided as Red Brown Savanna Soils. It is found along the undulating rolling topography of the central part of Sagaing Township.

As these soils are on "Ya" lands (dry crop lands), where cotton, groundnut and sesamum can be grown, by irrigating the land. If aid can be given to the people who are engaged in the agricultural activities, it will be beneficial to the people who are cultivating the land and a moderately agglomerated settlement can be developed here.

(b)Red Brown Eroded Savanna Soil

TheRed Brown Eroded Savanna Soils They are found on the higher slopes of the hills and especially on the slopes of the Eastern Hill ranges of Sagaing Township along the bank of Ayeyawady River.The soil consists of many stones and rocks. As the soil is not very fertile, development of agriculture is still slow and lacking, this region has dispersed settlements.

(c)Dark Compct Savanna Soil

Dark Compact Savanna Soils are found in the northern part of Ye-Myet-In and in the north- western part of Sagaing Township. The texture of the soil is heavy, sticky, clayey and compact. The colour of the soil is dark up to the depth of 60 " from the surface of the soil. From that depth the colour gradually becomes lighter and lighter.The land type is "Ya mye" (Dry Cropland) with heavy clayey soils. If this region is irrigated farming of crops can be successfully carried on.

(d)Meadow Soils ("Le" mye)

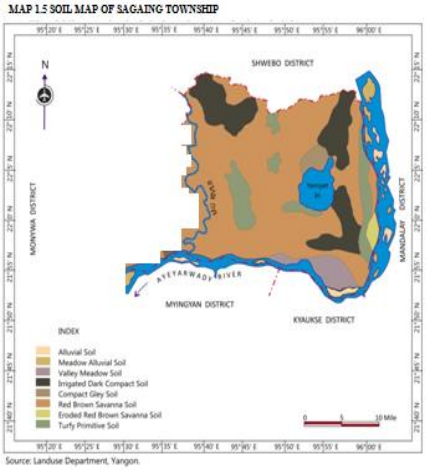
Meadow Soils are found in the basins of Ayeyarwady River and Mu River. There are two types of Meadow Soils. As alluviums are deposited layer upon layer of loam and alluvium, the fertility of the soil is good. The crop yield is good and high, and the agricultural activities and enterprises develop successfully on such soils.

(e)Primitive Crushed Stone Soil

Primitive Crushed stone soils are found along the Sagaing Ridge and on the higher portions of the hilly sections of Red Brown Savanna Soils.

(f)Alluvial Soil

Alluvial Soil is formed by the sediments which are deposited after the annual floods of the rivers. This type of soil is found on the eastern fringe and along the river basins of Mu River and Ayeyarwady River. As it is found only along the lowlands of the river basins. As new alluviums are deposited annually again and again it is not necessary to apply fertilizer on the cultivated land as it has become a very valuable land for crop cultivation. Groundnut, chilli, tobacco, banana and vegetables thrive well in this town. This is the region where there are thickly populated settlements.



1.7 Natural Vegetation

As the townships of Sagaing and Myinmu lie within the Tropical Dry Zone Belt of Central Myanmar, the main type of natural vegetation is Dry Forests. The Dry Forest can be divided as (a) Than-Dahat Forest and (b) Thorny Scrub Forest.

(a) Than-Dahat Forest

In Sagaing Township, Than-Dahat Forests are found on the hills of Sagaing Ringe and Minwum Range. The main species of trees which grow here are; Than (Terminalia oliveri);

Dahat (Tectora hamiltoniana); Sha [(cutch) "Acacia Catecku] Zaung Chan (Averrhon carambola) Zi (Zigyphus Jujuba); Nabe (Lannea grandis) Zipya [(Eastern goosberry); Emblica officiralis]; Shazaung (Euphoria meriifolia); Taw shout (Aurantiaceae, Limonia carnasa); Tayoksaga [(Frangipani; Plumena aeutifolia] and Tamar (neem tree) which are trees.

Nabu-Creeper plant (Vallaris solacacea); Monan (Azima Sarmentosa); Suboke (Acaue intsia); Su Yit (Asacca Penrata); Kalamyetsi balloon vine winter cherryi (Cardio spermum helicacabun) which are shrubs or bushes. Big trees such as Magyi (Tamarind); Kokko (Albizzia Lebbek); Tanaung (Acacia leucophloea); thabye [(Eugenia) → Eurgbenia Jambosa]; Letpan (cotton tree); Thitseint [(belleric myrobalan) Terminalia belerica)]; "Nyaung" Bo tree; and Toddy palm (Plamyra palm) are found in the flat regions.

(b) Thorny Scrub Forest

They are found on lands with poor infertile soils along the car roads and railroads where cultivation of crops does not flourish. Within the townships of Sagaing the vegetation of the Thorny Scrub Forests are "Nwecho" (Liquorice); Shazaungpyathat (Euphorbia trigona); Kinbun (Acacia Cocimma); Hsintone-ma-nwe Moonseed Vine (or Tinospora Cordifolia); "Mayo"; and "Padaing" (angel's trumpet); or Datura alba) which are small scrubs or bushes are found.

2 NON-PHYSICAL FACTORS THAT INFLUENCE UPON THE SETTLEMENT PATTERNS

The settlement patterns are one main key point of the continuous thriving and flourishing settlement of human beings. The settlements of people are varied according to the size of settlements and the activities of the different works carried on by the settlers. Settlement patterns are directly related to population structure and demographic conditions of the study area. Moreover population distribution and population densities can influence the settlement patterns of a region.

2.1 Total Population and Population Growth

Data for population of the Study area is shown in the census report during the British Colonial period from (1891-1931). During the 40-year period the increase in population was (5,838) persons and the average rate of population increase per year was (0.89) percent. During that period the increase in population of Sagaing Township was (4,188) persons. The average increase rate for Sagaing Township was (0.88) percent.Similarly the population growth rate

within Sagaing Township during the first decade was (0.09) % , the second decade was (0.77) % , the third decade (from 1911 to 1921) was (0.77) % and the fourth 10-year period (decade) from (1921 to 1931) the population growth rate in Sagaing Township was (1.75) % respectively. By studying the above facts it is found that the increase and growth of population during the British colonial period was not stable.

After the independence according to the Census Reports, collected in (1973), the total population in the Sagaing Township was (190,297) persons. That is why during the 42-year period from (1931-1973) the growth or increase in population of the study area had increased to (251,698) persons and the average growth rate of population per year was 6.50 %. In Sagaing Township during (42) years the population had increased to (176,170) persons. So, the average increase or growth of population per year for Sagaing Township was (6.38) % per year. The average growth rate was (2.00) %. Similarly the population of Sagaing Township had increased to (43,209) persons. and the average rate of increase in population per year for Sagaing Township was 2.00%.

According to the Census Report of 2013, the population was (277,931) persons in Sagaing township. During 122 years (from 1891 to 2013) the population had increased to (262,392) persons and had increased (26) times and the average increase or growth rate per year was (2.85) per cent in Sagaing Township.

Table (2.1) Total Population and Population Growth of the Study Area

No	Year	Period	Population	Growth	Growth rate
1	1891		9939		
2	1901	10	10,039	100	0.1
3	1911	10	10,937	898	0.8
4	1921	10	11,858	921	0.8
5	1931	10	14,127	2269	1.8
6	1973	42	190,297	176,170	6.4
7	1983	10	233,506	43,209	2.0
8	1993	10	248409	14903	0.6
9	2003	10	261747	12838	0.5
10	2013	10	277931	16184	0.8

Source: Immigration and National Registration Department, Sagaing

2.2 Population Distribution and Density

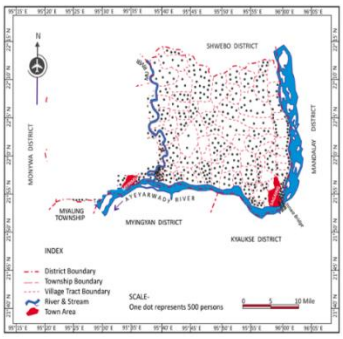
2.2.1 Population Distribution

In studying the population distribution of the study area according to (2013) Census Report, the total population of Sagaing Region was (6,028,581) persons; and Sagaing District

was (753,551) persons. That means the study area had (7) % of the population of Sagaing Region and about (57) percent of the total population of Sagaing District. In Sagaing Township the total population was (272,331) persons. In Sagaing Township the urban population was (61,400) persons which was (23) % of the total population of the township. The rural population of Sagaing Township was (214,314) persons which was (77) % of the total population of the township.

Within the town of Sagaing, the distribution of population according to the wards were studied; there was only one ward with a total population of more than (6,000) persons and that ward was Ywahtaung Ward with a population of (6,227) persons. It is the ward with the largest number of population. The second largest ward was Shweminwun ward with (5,428) persons. There were four wards which were included in the Third group of population with (4000) persons. They were Seingone ward with (4,516) persons, Zeyar ward with (4,395) persons: Panbedan ward with (4,239) persons and Dawezay ward with (4,037) persons respectively. There were 7 wards with a population between 3000 and 4000 persons. They were Ayemyawady ward with (3,063) persons, Nandawun ward with (3,656) persons; Moezar ward with (3,040) persons; Myothit ward with (3,891) persons; Poedan ward with (3,592) persons and Tagaung ward with (3,277) persons. In the inner section of the town, the wards with a few number of population between (1,000) and (2,000) persons were Htonebo ward with (1925) persons, Parami ward with (1,656) persons; and Nilar ward with (1,739) persons Padamyar ward which lies in the outskirt of the town had only (976) persons. Table (2.3)

Map (2.1) Population Distribution by Village Tract of Sagaing Township (2013)



Source: Based on Table 2.2 and 2.3

2.2.1.1 Region with the Largest Population

The most populated region with population over (10,000) persons was found in Sadaung village tract which lies within Sagaing Township. There were (11) villages with a population of (10,882) persons. It is classified to be a region in the first stage with the highest number of

settlements. There were (7) village tracts with a total population between (5,000 and 10,000) persons.

Within Sagaing Township Ywathitgyi village tract had a population of (7,487) persons. This big village tract includes three villages. Moreover as Ywathitgyi Cotton Yarn and Textile Factory and University for the Development of National Races of Union were situated in this region, the number of settlements was large. Tegyi village tract which is situated in Sagaing Township had a population of (6,437) persons. This village tract is formed by severn villages. These villages are near the town of Sagaing.

This is a region where agricultural activities and cultivation of crops thrive and flourish well. Padu village tract is a large village with a population of (5,641) persons and it is also situated along the Mandalay-Myitkyina railroad. It is also a region where agriculture thrives and flourishes well.

2.2.1.2 Region with the Moderate Number of Population

This region is with a population from (1000-5000) persons. There are (71) village tracts are in Sagaing Township, along the river and car roads of Mandalay-Shwebo; Mandalay-Monywa and Shwebo-Monywa car roads. These village tracts are also found along the Mandalay-Myitkyina railroad.

2.2.1.3 Region with the Least Population

This region is with a population less than (1,000) persons. There are five village tracts in Sagaing Township. These village tracts are situated on the edges and fringes of the regions in of Sagaing Township. Ye myet village tract lies within Sagaing Township with a population of (686) persons. It is a region with very few water to get for the croplands. It is also a region with poor transportation. Other villages in Sagaing Township are Kyaungphyu with (877) persons; Singaing with (953) persons, Nonedwin with (970) persons, Tegyi-Letpantha with (821) persons.

2.2.2 Population Density

According to the data of 2013, the population density of Sagaing District was (785) persons per square mile. The population density of Sagaing Township was(561) persons par square mile.

2.2.2.1 Urban Population Density

According to the data of 2013, the urban population of Sagaing Township was (61,400) persons. Within Sagaing Township there were (18) wards and the average population density

was (16,639) persons per square mile. The population densities are grouped into five according to the varied from below 10,000 to above (160, 000) persons per square mile.

Table 2.2 Distribution and Density of Population by Village Tracts of Sagaing Township(2013)

No.	Village Tract	Area Sq.ml	Area (Acres)	Population	Density
1	Sadaung	23.10	14,799	10,882	471
2	Ywathitgyi	6.34	4,085	7,487	1,181
3	Tegyi	2.50	1,597	6,437	2,575
4	Mingun	7.20	4,610	5,743	798
5	Padu	19.50	12,460	5,641	289
6	Tintate	6.05	3,877	4,439	734
7	Ohn taw	11.80	7,525	4,375	371
8	Nyaungpinwun	1.90	1,216	4,215	2,218
9	Marledaw	6.70	4,286	4,176	623
10	Kyeukse	7.70	4,937	4,056	527
11	Taungyin	7.30	4,640	3,957	542
12	Pegadoe	3.15	2,022	3,806	1,208
13	Baukthauk	13.10	8,432	3,804	290
14	Tharzin	6.80	4,340	3,652	537
15	Yetwingaung	8.80	5,612	3,570	406
16	Htantawseik	16.60	10,601	3,490	210
17	Saye	11.40	7,285	3,237	284
18	Wachet	3.10	1,939	3,109	1,003
19	Kyaukta	4.90	3,114	3,041	621
20	Mutha	1.70	1,110	3,021	1,777
21	Kywei lu	1.35	868	2,976	2,204
22	Legyi	8.70	5,592	2,888	332
23	Nyaungpinzin	3.30	2,104	2,885	874
24	Ma u-bin	2.40	1,505	2,859	1,191
25	Kaing pyin	4.00	2,561	2,858	715
26	Talie	5.10	3,232	2,818	553
27	Lintalu	6.10	3,900	2,808	460
28	Ngatayaw	5.90	3,772	2,805	475
29	Depeyingwe	5.90	3,776	2,754	467
30	Shantat	7.80	4,977	2,749	352
31	Shwehle	4.50	2,876	2,697	599
32	Aungtha	5.43	3,477	2,631	485
33	Paukma	7.20	4,632	2,624	364
34	Myinse	2.40	1,547	2,544	1,060
35	Byetayaw	2.05	1,313	2,484	1,212
36	Kyarmingyi	4.40	2,813	2,474	562
37	Ywama	2.80	1,786	2,468	881
38	Pagyi	21.57	13,806	2,444	113
39	Khetkha	6.10	3,930	2,432	399
40	Kyweipon	9.20	5,879	2,424	263

No.	Village Tract	Area Sq.ml	Area (Acres)	Population	Density
41	Natkhayaing	3.60	2,309	2,410	669
42	Kyaukpanan	7.20	4,622	2,347	326
43	Sinthat	8.02	5,133	2,330	291
44	Sin mye	4.50	2,892	2,327	517
45	Nyaungpintha	1.50	967	2,325	1,550
46	Chaung pauk	3.30	2,135	2,324	704
47	Sitee	4.60	2,975	2,315	503
48	Htonebo	4.74	3,038	2,289	483
49	Samon	6.30	4,032	2,266	360
50	Thoutapan	1.56	1,002	2,224	1,426
51	Pyitawtha	3.96	2,536	2,053	518
52	Tharpyauk	6.10	3,930	1,978	324
53	Zichaung	2.10	1,347	1,960	933
54	Letpan	3.80	2,222	1,885	496
55	Htan taw	2.64	1,688	1,835	695
56	Taung kyar	8.00	5,169	1,833	229
57	Kyakhet	8.20	5,255	1,727	211
58	Thaphantha	1.60	996	1,714	1,071
59	Naukkyeekyun	4.40	2,831	1,694	385
60	Yonepinkan	2.44	1,566	1,678	688
61	Minywa	8.90	5,732	1,669	188
62	Innsa	5.30	3,380	1,626	307
63	Daungma	1.50	956	1,616	1,077
64	Kin	2.97	1,903	1,584	533
65	Taeinte	6.50	4,172	1,527	235
66	Nyaung pinshe	1.50	980	1,491	994
67	Kangyigon	11.30	7,216	1,485	131
68	Yinmagyin	7.30	4,643	1,423	195
69	Maung htaung	2.40	1,510	1,354	564
70	Mezalichaung	5.40	3,433	1,335	247
71	Ar laung	0.69	441	1,280	1,855
72	Ye kha	2.20	1,399	1,181	537
73	Myetaing	0.99	637	1,141	1,153
74	Sakyin	4.10	2,622	1,121	273
75	Ta lie kyun	2.20	1,422	1,099	500
76	Taungmyo	3.00	1,928	1,037	346
77	Nondwin	13.60	8,708	970	71
78	Sintaing	5.70	3,633	953	167
79	Kyaungphyu	3.80	2,432	877	231
80	Letpantha	1.70	1,100	821	483
81	Yemyet	4.60	2,944	686	149
Sagaing Township		**470.05**	**300,669**	**213,550**	**454**

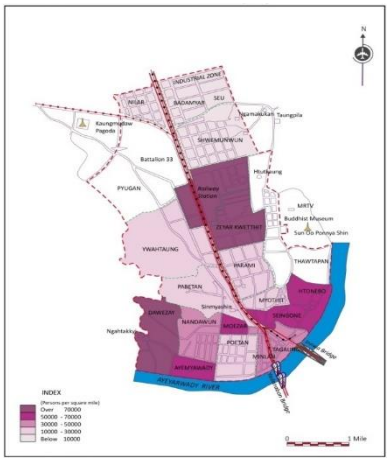
Source: Immigration and National Registration Department, Sagaing

Dawezay ward, Zeyar ward and Railways Quarters were the wards with the highest population density amounting to over (100,000) persons per square mile. In these wards, although the number of population was small the population density was the highest. The wards with the second most population density between (50,000 and 70,000) person per square mile were Ayemyawady ward, Moezar ward, Seingone ward and Htonebo ward. The wards with the third stage population density had population density between 30,000 and 50,000 persons per square mile. They were found in Nandawun ward, Pabedan Ward, Potan ward and Tagaung ward.

Wards with the fourth Stage population density had population between 10,000 and 30,000 persons per square mile. They are found in Myothit ward, Minlan Ward, Yuahtaung ward and Parami ward.

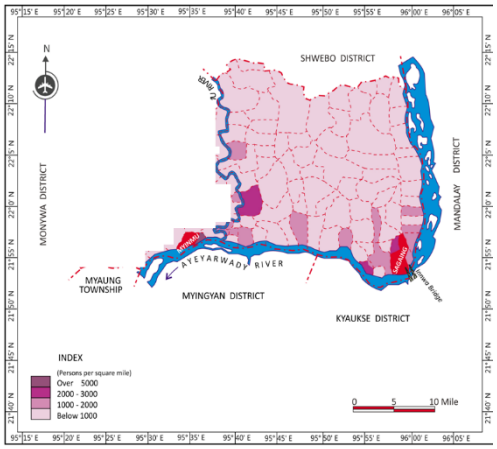
Shweminwun ward, Nilar ward and Padamyar ward had the least population density amounting to below 10, 000 persons per square mile. These wards had the least population density because these wards lie within the New Town Land site with a few populations and with a moderately wide land area. Map (2.3)

Map 2.2 Population Density by Wards of Sagaing (2013)



Source: Based on Table(2.3)

Map 2.3 Population Density by Village Tract of Sagaing Township (2013)



Source: Based on Table(2.2)

2.2.2.2 Rural Population Density

According to 2013 population data the Sagaing Township, there were (81) village tracts and the rural population was (210,931) persons. The population density of the rural village tracts depends upon location, size, topographic features, economic development and transportation. The rural population densities of the study area can be divided into (3) types of regions.

Table 2.3 Distribution and Density of Population by Wards of Sagaing (2013)

No.	Wards	Area (Sq. ml)	Population	Density (per sq. ml)
1	Dawezay	0.03	4,037	134,567
2	Ayemyawady	0.05	3,063	61,260
3	Nandawun	0.09	3,656	40,622
4	Moezar	0.06	3,040	50,667
5	Myothit	0.17	3,891	22,888
6	Pabetan	0.17	4,239	24,935
7	Poetan	0.12	3,592	29,933
8	Minlan	0.07	2,359	33,700
9	Tagaung	0.09	3,394	37,711
10	Seingone	0.08	4,516	56,450
11	Htonebo	0.03	1,915	63,833
12	Zeyar	0.04	4,395	109,875
13	Ywahtaung	0.25	6,227	24,908
14	Railway Servant	0.02	3,277	163,850
15	Shweminwun	0.87	5,428	6,239
16	Parami	0.07	1,656	23,657
17	Nilar	0.3	1,739	5,797
18	Padamyar	0.37	976	2,638
Total		**2.88**	**61,400**	**21,319**

Source: Immigration and National Registration Department, Sagaing

They are:

(1) Region with the highest population density.

(2) Region with the moderate population density.

(3) Region with the least population density.

(1) Region with the highest population density

This region with the highest population density had a population over 5,000 persons per square mile. This region no includes the villages of Sagaing Township.

(2) Region with the moderate population density

This region is noted as a region having population density between (2,000) and (3,000) persons per square mile. These regions were found in Sagaing Township. These regions include Tegyi village tract with a population of (2,575) persons; Nyaungbinwun village tract with a population of (2,220) persons; and Kywepon village tract with (2,204) persons. As the region lies close to the Mu River and the town of Sagaing, cultivation of agricultural crops can be carried out successfully and there is an easy communication. As the population density was between (1,000) and (2,000) persons these village tracts are regarded to have a moderate region with a moderate population density. In Sagaing Township there are (13) village tracts, whereas in Myinmu Township, there are (2) village tracts. Although the area of each village tract was

narrow, the number of population within them was moderate who were engaged in agricultural activities. Moreover as the communication is smooth and easy, these regions are with moderate population density.

(3) Region with least population density

This region is demarcated as a region with population density less than (10,000) persons per square mile. In Sagaing Township , there were (65) village tracts which lies in the region with the least population density. Although these village tracts lie along the Ayeyarwady river and Mu river and have good strategic communication lines and good fertile soils for the people to settle there, the population density in each village tract have very wide of expanse of land area with a few residing settlers, hence the population density of these village tracts was low.

The most peculiar fact in this area was that in Nonedwin village tract within Sagaing Township, the population density was 71 persons per square mile. The population in this region was therefore thin because during the rainy season rain water which flows from the higher regions to the lower lands cause floods to Nonedwin village tract during every rainy season. At that time, cultivation of crops and other agricultural activities were destroyed. Communication lines were also destroyed in the inundated lands. So, the settlers and settlements were few and thus it is a region with the least population density. Map (2.3)

2.3 Household in the Study Area

The most basic factor for the composition or formation of all settlements is the households. Households are formed in urban regions as wards or quarters whereas in rural regions households are formed as villages. In this manner, from wards or quarters to towns or cities are formed. So also from villages, village tracts are formed.

According to 2013 statistical data, in the Sagaing Township had (55,277) households. In Sagaing Township, the total number of population was (272,331) persons and thus the average number of a household would have five members. Within Sagaing Township, the total urban household was (12,418) and Myoma (18) wards, the number of rural households amounted to (42,859) households and they were widely scattered within (81) village tracts. That is why the rural households in Sagaing Township were over three times more than the urban households.

In Sagaing town there were two wards which had over (1,300) households each. They were Ywahtaung ward with (1,390) households and Shweminwun ward with (1,325) households respectively: They are the wards with the largest number of households and were

grouped in the first stage. Each ward had (11) per cent of the total households in the urban areas of the whole townships of Sagaing. Zeyar Ward with (993) households had 8 percent of the urban households within the whole of the Sagaing Township. It was also the ward with the second largest number of household Seingone Ward with (859) household had 7 percent of the urban households within the township. It was also the ward with the third largest number of household within the township. There were (5) wards in the maintown with over (700) households. They were Pabedan, Nandawun, Tagaung, Railways Quarters, and Dawezay ward. There were 5 wards with over (500) households. They were Myothit, Poetan, AyeMyawady, Moezar, and Minlan wards. The remaining wards were Htomebo ward with (390) households; Parami ward with (296) households; Badamyar ward with (293) households; and Nilar ward with (265) households. Moreover as the regions were situated in the expanded new area the numbers of households were small.

Within Sagaing Township, the distribution of the households within the rural regions can be analysed by examining the households village tract wise. There were (40) village tracts with less than (500) households. There were (35) village tracts with households between (500) and (1,000). Moreover the village tracts with households between (1,000) and (2,000) were Ywathitgyi village tract with (1,851) households; Tegyi village tract with (1,217) households; Mingun Village tract with (1,174) households; Ohndaw village tract with (1,037) households respectively. The village tract with households over (2,000) was Sadaung village tract with (2,055) households which amounted to (5) percent of the total households in rural areas of Sagaing Township. The (5) village tract were situated on the strategic transportation lines. They were lands where agricultural activities thrive successfully and where there were good opportunities for carrying out economic activities. Sadaung village tract is situated along the strategies and important transportation lines. Opportunities for other economic activities were opened and could be carried out successfully at that village tract. That is why the village tract was important for the people to settle there and build a settlement there.

2.4 Village Composition by Village Tract in the Study Area

Rural settlements are found only in rural villages. Village tracts are formed by the grouping of villages. That is why in order to known about the rural settlement pattern, it is necessary to examine about the distribution of villages within each village tract.

In Sagaing Township there were (206) villages and (81) village tracts. The formation of villages within each village tract is not similar and is not the same.

Table 2.4 Population and Household by Wards of Sagaing (2013)

No.	Wards	Population	Household	Person Per Household
1	Dawezay	4,037	702	5.7
2	Ayemyawady	3,063	570	5.3
3	Nandawun	3,656	735	4.9
4	Moezar	3,040	578	5.2
5	Myothit	3,891	658	5.9
6	Pabetan	4,239	744	5.6
7	Poetan	3,592	632	5.6
8	Minlan	2,359	560	4.2
9	Tagaung	3,394	718	4.7
10	Seingone	4,516	859	5.2
11	Htonebo	1,915	390	4.9
12	Zeyar	4,395	993	4.4
13	Ywahtaung	6,227	1390	4.4
14	Railway Servant	3,722	710	5.2
15	Shweminwun	5,428	1325	4.0
16	Parami	1,656	296	5.5
17	Nilar	1,739	265	6.5
18	Padamyar	976	293	3.3
Total		61,400	12,418	4.9

Source: Peace and Development Council, Sagaing

2.5 Accessibility for Development of Settlements

Sagaing Township is situated in the region along the river valleys of Ayeyarwady River and Mu River. The watercrafts ship in the Ayeyarwady River within Sagaing Township jurisdiction, pass through from Sagaing jetty, Mingun and Ywathitgyi and proceed to the far north and to the upper part of the river up to Bhamo.

With regard to motor roads, roads which connect towns within Sagaing Township along their routes are: from Sagaing via Amarapura to Mandalay; from Sagaing to Myinmu; from Sagaing to Wetlet and Sagaing-Mandalay, Sagaing-Monywa and Sagaing-Shwebo.

As for the railroads within Sagaing Township, the railroads are: from Sagaing via Nyaungbinwun to Monywa, from Sagaing via Padu-Ketkha, to Myitkyina. Ywahtaung Station and Sagaing Station are the two stations.

The peculiar fact about this region is that it does not have the airways. However, if developments in all there communication lines and accessibility were improved and upgraded, they can surely help in the development of settlements of every town as well as every rural region of the study area in the near future.

3. ANALYSIS ON TYPES OF SETTLEMENT PATTERN IN SAGAING TOWNSHIP

The locations of settlements are the expression of the geographical factors favourable at a particular spot in the landscape. In an agricultural country, the site of a village is determined by its vicinity to the agricultural land. The site should also have favourable physical factors such as the level ground, the availability of water, elevation to ensure safety from flood, availability of fodder and fuel from the forests and grasslands. Accessibility to means of transport and communication lines is also an important factor in the location of settlements.

In the study area three types of settlement pattern can be identified

1. Clustered Settlement Pattern
2. Compact Settlement Pattern and
3. Linear Settlement Pattern

3.1 Cluster Settlement Pattern

According to the field records and map observation, this type of settlement is found in three different units. The first unit is found in the area that lies between the Ayeyarwady River and Yehka-In and (8) villages are found in that unit. They are the villages of Ma-U-Bin (East), Ma-U-Bin (West), Konetanlay, Thadun, Tegyi, Paukma, Kywelu and Thalunphyu.

The second unit is found along the Monywa-Mandalay highway and it contains (4) small villages namely Kyaukse, Koneywa, Aungtha and Ywathit. The third unit is found in the northern most part of Sagaing Township area and it contains (7) small villages namely Samon, Kyethkat, Konegyi, Yonpin, Linyin, Baukthauk and Shankone villages.

One possible reason for this type of settlement is related to the good geographic location, good cultivable area and good transportation facilities. All these villages have the total population between 1,000 and 2,000.

3.2 Compact Settlement Pattern

This type of settlement pattern is found in three places. The first place is found along the Sagaing-Shwebo highway and Sadaung village tract is involved in that type.

The second place is found along the Mandalay-Myitkyina Highway and Padu village tract is involved in that type. The third place is found along the Ayeyarwady River and Ywathitkyi village tract is involved in that type. The total populations of these village tracts are recorded between 5,000 and 10,000 persons and they are well developed due to the facility of good transportation services.

3.3 Linear Settlement Pattern

This pattern is very common in areas of transportation routes and three places are recognized in this township. The first is found along the Ayeyarwady River that exposes between the Ayeyarwady and Sagaing Hill. The (11) villages are involved in this section and they are Thawtapan, Wachet, Arlaung, Htandaw, Myetai, Chaungpauk, Minkun, Letpan, Kin, Htonbo, Mezalichaung and Sinttai villages. The second place is found along the Ayeyarwady especially the western course and it contains (6) small villages. They are Tartai, Dawete, Myittha, Myinze, Letpandaw and Kindaw. The above two groups have the total population of over 2,000 persons. The third place is found along the Mu River and it contains (5) small villages. They are Shwehle, Thaphantha, Ywathit, Maupin and Nyaungbinwin. The total population of these villages is between 2,000 and 4,000 persons. The fourth place is along Mandalay-Monywa Highway and it contains (6) villages. They are Pyukan, Kyauksit, Tinteik, Makyisin, Site and Pekadoe villages.

4. FINDINGS AND RESULTS

By over viewing the analytical results of the research, it is found that two major controlling factors are governing the settlement pattern of the study area. These factors include physical factors and human factors. In this section findings are extracted for this township area and they are expressed with commentaries.

According to topographic map of the study area, it is learned that general elevation of the study area is about 250 ft above sea level. However, topographic features of Sagaing Township are more complex due to the exposure of Sagaing-Mingun Range, Ye-Myet-In and some low hills on the west.

In addition, undulating topographic features dominate nearly the whole township area. Among the different landforms, low mountain range of Sagaing- Mingun stands as the major barrier for the spatial dispersion of settlers who live on both sides of that range. The other important physical feature in this area is the wet point of Ye-Myet-In. Its major attraction is fishing industry and enclosed or circle pattern of settlement occurs around this wet point.

The small low upland that exposes on the western part of Ye-Myet-In is to some extent important as the barrier for communication and connection of people who live on both sides of this upland.

The major attraction for permanent settlement in this township is by no means the Ayeyarwady River itself. Due to its supporting power of water, fishing industry, navigation,

good agricultural lands referencing to deposited alluvial soil and many other supports, riverine tracts represent the largest amount and the largest area extent among rural settlements.

The human factors play a major role in the process of any development. Infrastructural development can be considered as the major determinant over settlement development. Transport network development also determines the changes and development of any area including settlement structure.

In rural areas the transport network development was comparatively lesser and instead of this, upgrading and new road constructing for rural road development projects were implemented across the whole rural areas. The achievements of this project become a major driving force for the process of rural to urban migration and some rural to road side migration. These two patterns are clearly found along the Mandalay–Monywa highway.

In studying the Sagaing Township the pattern of settlement development is separated into four unit areas. The first unit one is found along the area lying between Sagaing-Mingun Range and the Ayeyarwady River. Due to upgrading of the major road that runs on the eastern slope of the Sagaing Range, rural settlements along this road are gradually migrated toward that road sides and thus linear pattern settlement dominated here. However, their direction is south only and it was due to the physical constraint of the northern area. Therefore, it can be said that the unit one is linear settlement pattern and it has south directional bias. The pattern of development is more clearly seen between Sagaing urban fringe and Mingun Religious Domain.

The second unit is found in the area lying on the western part of the Sagaing- Mingun Range. Actually the area is located around Ye-Myet-In and it is similar to a circular pattern settlement or compact. However, rural settlement along Mandalay-Myitkyina railway or the eastern part of Ye-Myet-In is great and the rural settlements in south and west of Ye-Myet-In are small.

In this unit settlement development can be expected and actually found along the railway line. One major supporting element for this development is the new road construction for district level development and that road passes through the villages lying on the west of Sagaing-Mingun Range. That road can help in the general development of rural areas not only by the road sides but also for other connected linkages.

The third unit is found in areas that lie along the Mandalay-Monywa highway. That unit can be accepted as the most developed area for the following reasons:

-being upgraded the Mandalay-Monywa highway,

-being connected with the new highway of District-Level Road Connection project,

-being developed in the institutional land use project of a New University Construction,

-being enlarged for urban settlement project and some rural settlements,

-being moved toward that highway for new economic opportunities, and

-being developed by modern highway project with its amenities (e.g. Toll Gate system).

The fourth unit is found in area that lies parallel with the western river course of the Ayeyarwady. In this section settlement development is mainly found within the urban area and that of rural development is comparatively slow. Most of development projects are oriented to the north and north-western part of this section and thus riverine tracts especially the west river course remained as undeveloped one.

5. CONCLUSION

The general pattern of settlement and its inpact upon socio-economic changes and development of the study area are summarized as the followings.

The study area lies at the confluence of the Ayeyarwady and the Mu Rivers. This area has been settled by the Myanmar people since very early days. Topographic structure of a region is one of the important factors among the many factors which influence and affect the differences in the settlement patterns and the changes in the increasing development of the rural and urban settlements. Sagaing Range becomes the highest on the western part of Mingun Range with a peak of 1,332 feet. There are the many separate isolated hills and ranges. The elevation of study area generally (250) feet above sea level. The main drainage in these areas is the Ayeyarwady and the Mu Rivers. The Mu River flows as a natural boundary between the two townships of Myinmu and Sagaing for about (16) miles.

According to the latitudinal location, this region gets only the Tropical Steppe type of Climate (BSh). Soil is an important resource for the better environment. In the area of upland tracts Red Brown Savanma and Primitive Crushed-stone soils are found. This region has mostly occupied by dispersed settlements.

Meadow Soils and alluvial soils are found in the basins of the Ayeyarwady and the Mu Rivers. This is the region where there area thickly populated settlements.

The Study area is included in the thickly populated part of the country. According to the census Report of 2013, the study are had a total population of (430,811) persons. But in (1891), the population of the study area was (13,361) persons.

During the period of 122 years (1891 to 2013) the study area had an increase of population amounting to (417,450) persons and had increased (26) times.

The settlement of study area can be observed into two categories such as urban and rural. The ratio of urban to rural is about (1:3) in the Sagaing Township. Population density of study area shows that it concentrates in riverine regions and on the major transportation routes.

Settlement forms and patterns of the study area show variety, chief among them are urban and rural settlement. Sagaing Township is made up of (81) village tracts with (206) villages. Most of these villages have compact type. Along the bank of the Ayeyarwaddy and the Mu River, Mandalay-Myikyin railway and Mandalay-Monywa highway, the prominent form of settlement is to be said as linear pattern.

One possible reason for cluster settlement pattern is related to the good geographic location, good cultivable area and good transpiration facilities.

Spatial distribution patterns of rural settlements in the study area are found different from one locality to another.

Suggestions and Future Prospect

Rural areas along the Mu River are comparatively slow in development and the major reason for that case is related to the transport facilities including street structure and types of vehicles. Vehicle development can be overrun by community themselves but transport network development is actually the out of reach from that rural community. For that reason, special rural development project should be conducted by local level and regional level if the condition is favoured by state level.

The area left behind the settlement development is the south-western part of this section and it needs to perform special development programme. Their transport link is mainly waterways and this means of transportation is to some considerable extent. Therefore, upgrading the present rural cart track and the construction of new tarred road should be conducted.Rural areas in this section usually suffer annual flood and it gives dual impacts. By conducting the special development project that it can take a good impact for the long-term development, settlement pattern of this section should be upgraded or changed.

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REFERENCES

1 Aye Aye Than, Ma (2000): **Growth of Sagaing City**

2 C.N.J Scadumore (1977): **Settlement Problems**

3 Census Division, (1983): **Census Division Sagaing** (1983), Immigration and Manpower Department, Rangoon.

4 D.C Money, (1964): **Introduction to Human Geography**, Fourth Edition, University Tutorial Press LTD

5 Garnier, J.B Chabot. G, (1967): **Urban Geography**, Longmans. Green and Co. Ltd.

6 Hawarth, L., (1963): **The Good City**, Student Edition, Fawcett publication Inc. New York, U.S.A.

7 Hla Tun Aung, (2003): **Myanmar: The Study of Process and Pattern**, NCHRD, Ministry of Education, Myanmar.

8 John Small & Michael Witfierick: **Modern Dictionary of Geography**, Second Edition, Edward Arnold, London.

9 Khin Win Myaing, Ma (1995): **Landuse of Sagaing Township,** Unpublished M.A Thesis, Department of Geography, University of Mandalay.

10 Ministry of Information, (2002): **Myanmar Facts and Figures 2002**. Ministry of Information, Union of Myanmar

11 Mya Mya Nyein, Ma (1998): **Population Geography of Sagaing District**, Unpublished M.A Thesis, Department of Geography, University of Mandalay.

12 R.Y.Singh (1994): **Geography of Settlements**

13 Scudamore C.N.J (1977): **Settlement Problem,** A. Wheaton and Co. Ltd., Great Britain

ကျမ်းကိုးစာရင်း

၁။ စစ်ကိုင်းတိုင်းလုံခြုံရေးနှင့် အုပ်ချုပ်မှုကော်မတီ (၁၉၆၂-၇၃)။ **စစ်ကိုင်းတိုင်းသမိုင်း အကျဉ်းချုပ်။**

၂။ စစ်ကိုင်းမြို့နယ်စည်ပင်သာယာ ရေးဦးစီးဌာန (၂၀၀၇)။ **စစ်ကိုင်းမြို့နယ်စည်ပင်သာယာရေးမှတ်တမ်း။**

၃။ စည်ပင်သာယာရေးဦးစီးဌာန၊ စစ်ကိုင်း (၂၀၁၃)။ **စစ်ကိုင်းမြို့ပြဖွံ့ဖြိုးရေးစီမံကိန်း အစီရင်ခံစာ။**