

Geographical Analysis on Urban Land Utilization in Taunggoke, Rakhine State

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Abstract

Like other townships of Taunggoke Town, merchants depend on fishing and retail & wholesale economic activities which are a major economic activity of the area, in Rakhine State. Area of favourable conditions because of fishing ground encroached into the surrounding channel area as a change into spatial structure of favourable resources of their region. To study presents the field observation which was thoroughly done by intensive interviewing the local expert person, staff of government administrative department and authorities concerned. The survey was distributed to urban and village tracts selected as samples to know the increase in area of landuse and their uses. The objectives of the paper are to find out existing geographical factors that affect urban land utilization change and pattern to explore the pattern of urban land use change and to predict future prospect on urban land utilization.

Key words: urban landuse, land utilization change & pattern, socio-economic conditions

Introduction

Land utilization is a form on human activity as an effort to give certain purpose in result or service and realized space design in keeping the environment function survives (Soefaet, 1997, p- 76).Land utilization change over time is an inevitable phenomenon occurring globally due to both temporary and permanent interest of the inhabitants in a particular area (Eludoyin, 2010). And then the pressure of population on the land and its resources is a major factor affecting sustainable development of an area and land utilization changes are taking place at an accelerating rate (Giri and Shrestha, 1996). Land utilization change is known as a complex process which is caused by the mutual interactions between environmental and social factors at different spatial and temporal scales (Valbuenae et al. 2008; Rindfusset et al. 2004).Taunggoke Township is located in the middle part of Rakhine State. Although there are many economic activities, fishing and retail & wholesale economic activity plays an important role in economy of the area. In the area, the conversion of agricultural land into urban landuse and dominated in and surrounding suburban are as a major agricultural land use and forested area people mainly engage on it. But Residential landuse was noticeably increased from 2016-17 statistic records. Because some forested lands existing in the northern part of town were transformed into the residential landuse areas.

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Research Problem

Why do areas of Urban Land Utilization increase in Taunggoke Town?

Aims and Objectives

The aim of the paper is:

- To give suggestions that support the urban land utilization of the study area.
- The objectives of the paper are:
- To find out existing geographical factors that affect urban landuse change
- To explore the pattern of urban land utilization
- To predict future prospect on urban landuse

Study Area

Taunggoke Township is one of the townships which are located in Rakhine State. Taunggoke Township (including Ma Ei)has an area of (2057.25) sq.miles (1316641) acres and composed of eight ward and 52 village tracts which include 207 small villages coverage of the area, for only Taunggoke Sub Township is composed of four wards and 42 village tracts which include 146 small villages covering the area (Figure 1, 2 and 3).

Taunggoke Town has an area of 1.62 sq. miles (4.2) sq .kilometer which represents (0.08%) percent of the total total Taunggoke Township and comprised five wards. Although the Kaing She village upgrade to define as a urban area from the local people, but there is not assigned from the government site.

The shape of township is fairly compact and ellipsoid in shape. As a consequence, area of land utilization changed in Taunggoke Town. Total population was 32209 persons in 2017-18 records. Taunggoke Town is about 105 miles away from Pyay City.

Source of Data and Methodology

Primary data were collected by interviewing with the local people. Taunggoke Township is composed of an urban area comprising five wards and 42 village tracts. Among urban and village tracts discuss with administrator and peace and development council to know the causes and consequences of urban landuse change. Staff of government office and residents are also interviewed to get detailed understanding on it. Secondary data are obtained from books, various department such as Settlement and Land Records Department, General Administration Office, Township Administration Department, online sources, maps and satellite images. GIS methods were used on change analysis & descriptive to preparing and producing maps.

Research Plan and Conceptual Framework

Research writing will be done according to following steps.



Chart Flow (1) Research Design

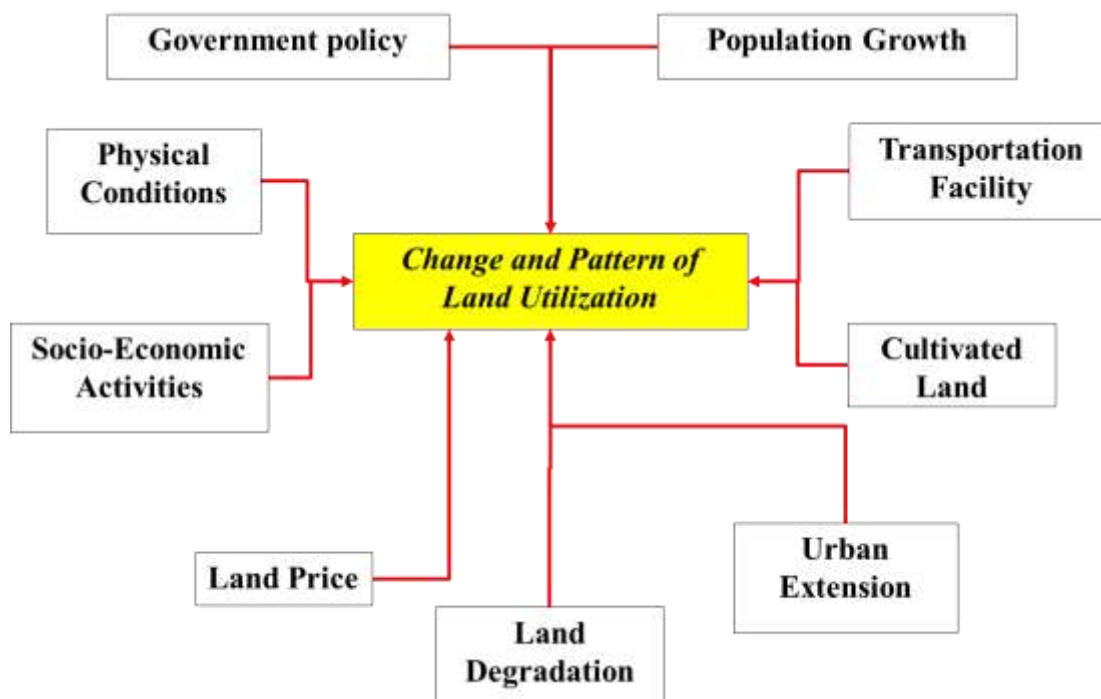


Chart Flow (2) Conceptual Framework on Change of Land Utilization

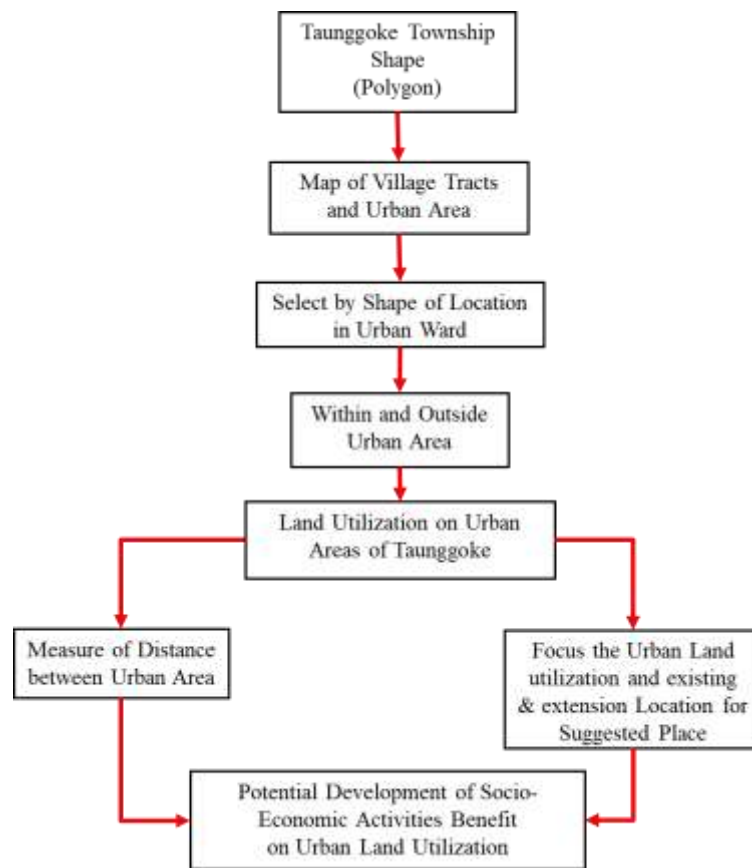


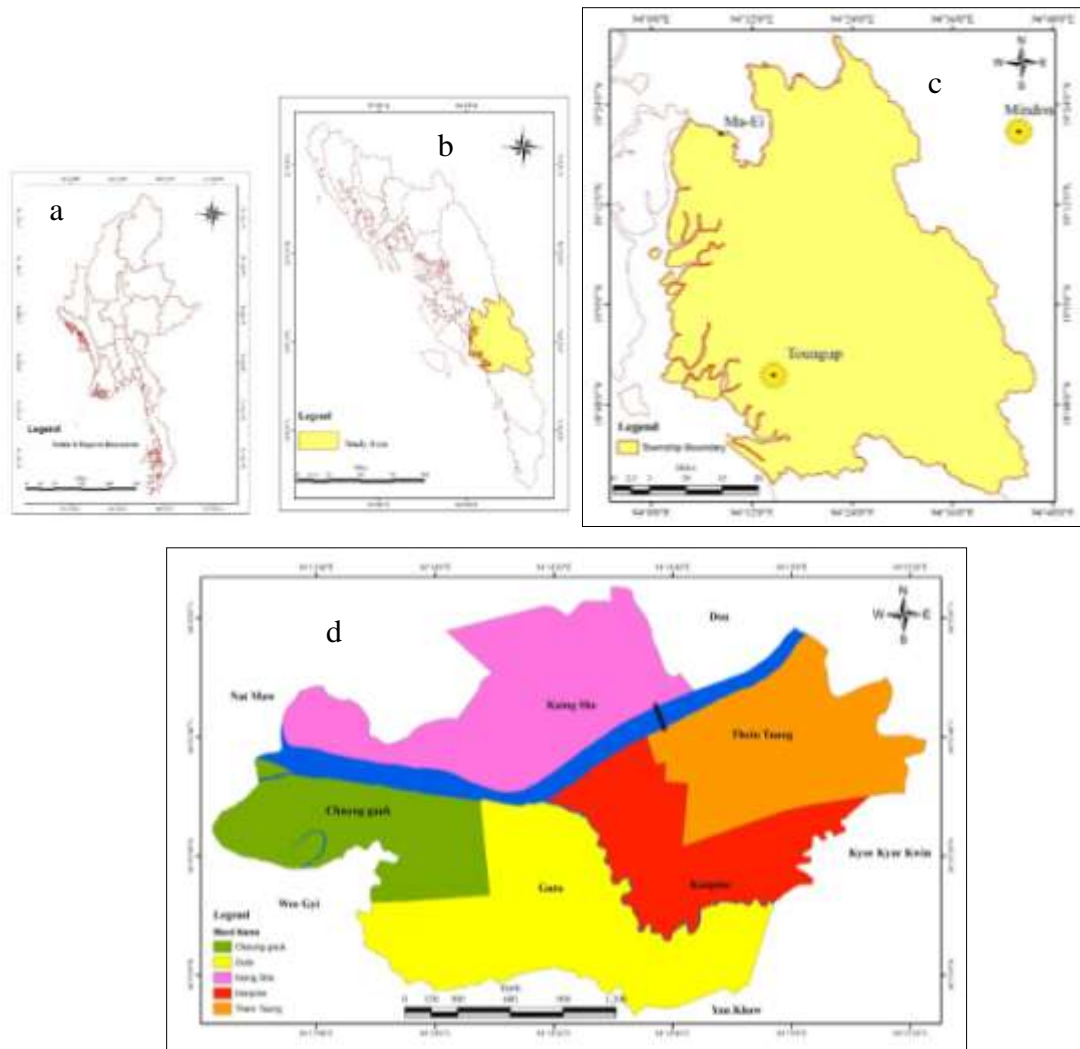
Chart Flow (3) Research framework for Analyzing on Land Utilization of Taunggoke Town by Classification Method

Source: Research Ideas from Field Observation in 2018

Results and Findings

Physical Background of Taunggoke Town

Taunggoke Township is one of the townships in the middle part of Rakhine State. It is situated between the Rakhine Yoma and the Bay of Bengal. It is located between north latitudes $18^{\circ} 37'$ and $19^{\circ} 32'$ and also between east longitudes $94^{\circ} 46'$ and $94^{\circ} 55'$ (Figure 1.a & b & 2). It has an area of 1173.39 sq.miles (3039.07 sq.km). It is the second largest township of Rakhine State which represents 13.42 percent of the total Rakhine State's area. There are Ma Ei and Taunggoke Township composed of eight ward and 52 village tracts which include 207 small villages coverage of the area, for only Taunggoke Township is composed of five wards of urban, 42 village tracts which include 146 small villages covering the area (Figure 3). Although the Kaing She village upgrade to define as a urban area from the local people, but there is not assigned from the the government site. Taunggoke Town covers an area of about (4.2) square kilometer or (1037) acre The shape of township is fairly compact and ellipsoid in shape. As a consequence, area of land use changed in Taunggoke Township.



Sources: UTM Map:1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Landsat TM image: L71334047-0472010010DEM, ASTGTM2_N18E094, N19E094_DEM

Relief and Drainage

The physical conditions are mainly affected by the Rakhine Yoma and the sea. So, it is a series of mountain ranges and spurs. The relief of Taungoke Town can be divided into two parts, the eastern ranges and the western coastal plains. The eastern most part is the highest with an elevation of (1219.2) meter, about (4000 feet) and the lowest part with about 18 feet above sea level. In general, the alignment of these ranges is from northwest to southeast. Then, the elevation gradually decreases into the western part.

The Moehte-taung serve of the source of the Taunggoke Chaung. Existing topographic conditions about (75.83%) is covered to forest and drainage and land area are about (10.37%), cultivated area is about (14.20%). But the drainage is not barriers for human occupancy due to low land.

Climate

Taunggoke Township lies in the rolling nature of the topography zone. According to climatic data (2014-2018), The mean annual temperature is 25.6°C. The warmest month is

May; the average temperature is 28.9°C. The coolest month is January with the mean temperature of 21.1°C. The annual range of temperature is 10°C. The annual normal rainfall of Taunggoke Township is 5436 mm and the annual number of rainy days is 126 inches. According to Koppen's climatic classification, Taunggoke Township experiences the Tropical Monsoon Climate (Am) type.

The climatic conditions especially temperature and rainfall support the economic activities including agriculture, and it is a suitable area not only for human occupancy but also for economic activities.

Natural Vegetation

Topographically, Taunggoke Township is highly in the north, northeast, east and southeast portion. Lowland plains mostly occupy in the middle portion. With the expectation of land utilization for agriculture and residences the remaining areas are covered with reserved and unreserved forests. The types of vegetation generally vary with relief, climatic conditions, soils and underlying material. The Tidal forests, Evergreen forests, Mixed Deciduous forests and Hill forest are found in Taunggoke Township.

Soils

Although there are four types of soils of which saline swampy mangrove forest soil occupy the areas near the river mouths and along the coastal. Meadow soil (Gleysols) which are favourable for crop cultivation such as paddy jute, corn, sugarcane, cotton, groundnut, Sesame, chilly, beans and vegetables. Paddy is cultivated on the meadow land in the plains. Red brown forest soils (Xhodic Ferrosols) and yellow brown forest soil (Xanthic Ferralsols) in Taunggoke Township, covering by deciduous forests and the land is used as forest and orchards. Meadow soil (Gleysols) Which are favourable for crop cultivation such as paddy jute corn sugarcane, cotton, groundnut, Sesame, chilly, beans and vegetables. Generally, existing soils in the area support for crop cultivation. Therefore, generally, such existing physical conditions as location, topography, drainage, climatic conditions natural vegetation and soils support primary economy especially the land utilization patterns of socio-economic activities in Taunggoke Township.

Socio-economic Bases of Taunggoke Town

Population Growth

Table (1) Population Growth and Sex Composition of in Taunggoke Town

Ward	2014-15			2015-16			2016-17			2017-18		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Guta	3493	3958	7451	3334	3847	7181	3386	3896	7282	3429	3926	7355
Kanpine	3691	4121	7812	4366	4766	9043	4389	4700	9089	4456	4747	9203
Chaung gauk	2283	2523	4806	2441	2746	5187	2472	2800	5272	2500	2844	5344
Thein Taung	2339	2449	4788	2228	2551	4779	2284	2594	4878	2283	2595	4878
Kaing She	1827	1966	3793	2645	2766	5411	2645	2766	5411	2648	2781	5429
Total	28596			31601			31932			32209		

Sources: Township administration department.

Population Growth in Taunggoke Town

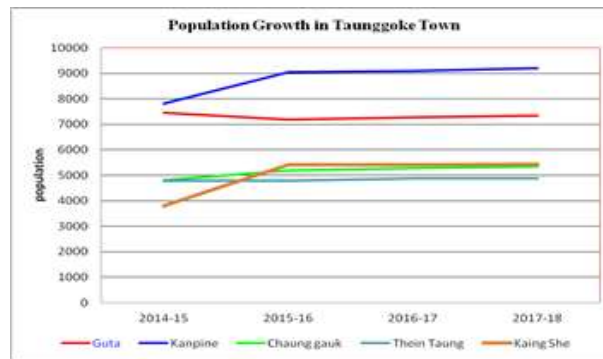


Figure (5) Population Growth in Taunggoke Town, Sources: Based on Table (1)

Table(2) Population Growth Rate in Taunggoke Town

Ward	2014- 15	2015-16	2016-17	2017-18
Guta	25.50%	24.50%	24.90%	25.10%
Kanpine	22.20%	25.70%	25.80%	26.20%
Chaunggawk	23.30%	25.20%	25.60%	25.90%
Thein Taung	24.80%	24.70%	25.20%	25.20%
Kaing She	18.70%	27%	27%	27.20%



Figure (6) Population Growth Rate (Percent) in Taunggoke Town

Source: Base on Table (2)

Population of urban area data is used from the general administration department of the Taunggoke township. According to the population data, Taunggoke town has 25345 persons in 1995 and had increased to 30092 in 2005 and had decrease and 28596 persons in 2014-15 and the number of population increased to 32209 persons in 2017-18. Due to upgrade to transportation, communication and productive agricultural lands & channel ground and favourable economic condition, and the number of population may continue to increase. The most population growth increased 25.5% in Guta and the least was 18.7% in Kaing She in 2014-15. The dense population of urban area are Kanpine and Guta, which is suitable for agriculture activities. The most growth populated areas are found in Kaing She.

In 2014, the household of the whole town was 5667, family was 5928 and the total population was 28596 person in 2014-15 and to 32209 persons in 2017-18. The number of male was 15316 persons and female was 16891 persons.

Table (3) Growth of House and Households in Taunggoke Town

Ward	2014-15		2017-18	
	House	Household	House	Household
Guta	1460	1430	1487	1492
Kanpine	1552	1650	1697	1707
Chaung gauk	997	1135	1018	1029
Thein Taung	868	903	897	900
Kaing She	790	810	938	906

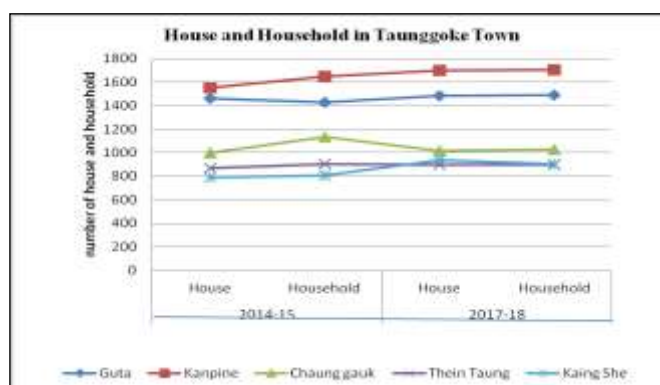


Figure (7) House and Household in Taunggoke Town

Sources: Township administration department.

Population Distribution and Density

Population distribution of Taunggoke Town depends largely upon the regional topographical condition and prosperity of the region. The population of this town favors the merchants, retailers, cultivators and fishery job. Most of the people are merchants and farmers in this town. The distribution of population is dense in places where land is commercial and communication is good. The majority of settlements are distributed along the road. The largest population was Kanpine and Guta ward. Khing She ward has the least and the population was 3793 in 2014. Now, Thein Thaung ward has the least and the population was 4878 in 2018 records.

Taunggoke Township covers an area of about 4.2 square kilometer or 1037 acre. In 2014, it had been settled in 28596 persons. Taunggoke Town population density was 6354.5 persons per square kilometer in 1995 and population density increased to 6939.5 in 2000 and 7164.7 persons per square kilometer in 2005. The population density decreased to 7114.04 persons per square kilometer in 2013 and 6821.4 persons per square kilometer in 2014-15 and 7668.8 persons per square kilometer in 2017-18. The coverage of land use in Taunggoke Towns is 1.95 square kilometer of urban area and 46.43% of the town area.

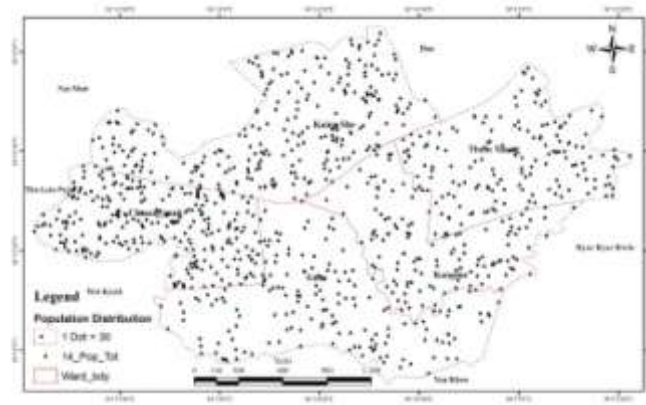


Figure (8) Population Distribution and Density

SOURCES: UTM MAP:1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, 2014 CENSUS DATA, TOWNSHIP ADMINISTRATION DEPARTMENT

Existing Ethnic Groups in Taunggye Town

Most of the inhabitants of Taunggye Town are Rakhines. Rakhine have been residing in Taunggye from the earliest times and they form the largest ethnic group in the township. In 2013, it was 28250 Rakhines, 98.45 percent of total population. The second largest group consists of 353 Burma, 1.23 percent of the total population. The third largest groups are Chin with a total of 77 persons, 0.27 percent. The ethnic nationals consist of 7 Kayins, 3 Shans, 3 Mons, 3 Kachins. The major region professed in Taunggye is Buddhism. Others are Christians in 2014-15 statistics.

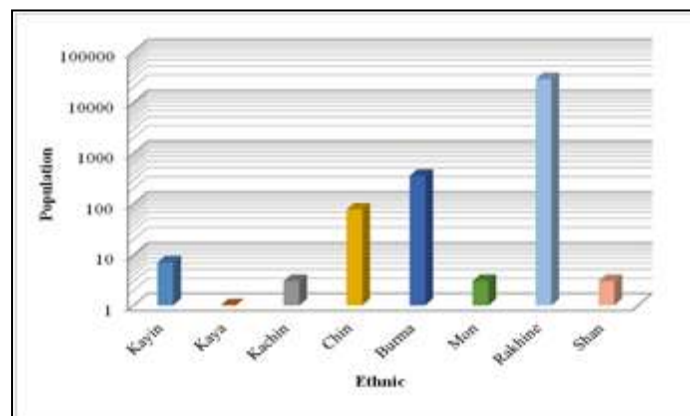


Figure (9) Ethnic Groups of Taunggye Town (2014 -15)

Education Facilities in Taunggye Town

Education is the most important role of human resource development. Education sector in Taunggye becomes improve and the living standard also fairly improves. Due to these improvements, health, knowledge, skill and other level are improving.

There were eight Basic Education High School, 5 branch high school to high school were opened during 2005 to 2015. In 2016, 18 branch middle school to middle school, 27 post primary school to branch middle school, 107 the primary schools and 15 branch primary school to primary school and 3 monastic education school can be extended in during 2016-2018 statistics. In Taunggye, three high school and one branch high school, two post primary school and one branch primary school. Now, some primary schools upgraded to Middle School and the number of schools are increasing year by year in the Taunggye

township. According to the increasing of the schools, this is of great help to the students from the government site.

Health Facilities in Taunggoke Town

Health is the most important sector for everybody. Everybody must be careful aware of the unforeseen disease which can happen every time and everywhere. More health care center like the hospital and sub-health care center need to be opened rural and urban areas.

During the year 1995 and 2000, There are three hospitals, six rural health care centers, three clinics, one traditional health care centre, one Maternal and Child Welfare Association and (31) sub-rural health care centers in 2016-17 records.

There are one 100 beds hospital, three clinics, one traditional health care centre, one Maternal and Child Welfare Association in Taunggoke Town. Social infrastructures are most important requirements for township developments and then good social infrastructures are related to socio-economic conditions, as a development factors. Health support were built up as a social infrastructures that used for the residents within town. Therefore, this is become improvement of living standard for residents in there.

Economic Factor

The Primary Sector mainly includes agriculture land (750970) acres and channel ground area (589.04) acres. The total area was 304145.15 ha (751559.04 acres) in Taunggoke Township in 2016. The main crops are paddy, sesamum, groundnut, pulses and sugarcane, sunflower. Marine products are Lates fish(*Cal Calcarifer*), *Penaeus(monodon)*, Moulted Shell Crab and *Carcinus* Crab breed in channel ground area.

Secondary sector includes rice mills, saw mills, oil mills, soft drinks factories, purified drinking water factories, food processing and electrical appliance. Saw mills, rice mills, and oil mills also can be found in some villages of Taunggoke Township. Existing agro-based industries (traditional rice noodles), somehow support agriculture in the area.

The population of this town is favour the merchants, retailers, cultivation and fishing job. Most of the people are merchants. Second important job is transaction. Fishing industry is one of the most important economy in this town. Marine products are sent to Pyay, Yangon, Mandalay, Muse and other regions. Other economy are livestock, retailer, daily wages, farming and cultivation the vegetable. Total cultivate areas of Taunggoke are 363 acres. Taunggoke Township is located between the Rakhine Yoma and the Bay of Bengal in the middle part of Rakhine State and Motor Road at a distance of about 105 miles away from Pyay City. Therefore, agriculture & marine products from the Taunggoke Township are easily carried to Pyay, Yangon, Mandalay and other parts of Myanmar.

Land Utilization Pattern of Taunggoke Township

General land use of Myanmar is classified into eight types. They are (1)Residential landuse, (2) Landuse for primary production , (3)Industrial Landuse, (4)Commercial Landuse,(5)Landuse for Services, (6)Landuse for Public and Government Departments, (7)Transportation landuse and (8) Unclassied landuse.

Area of urban land use increased in the study period and it unfolds the importance of land utilization sector in the areas.

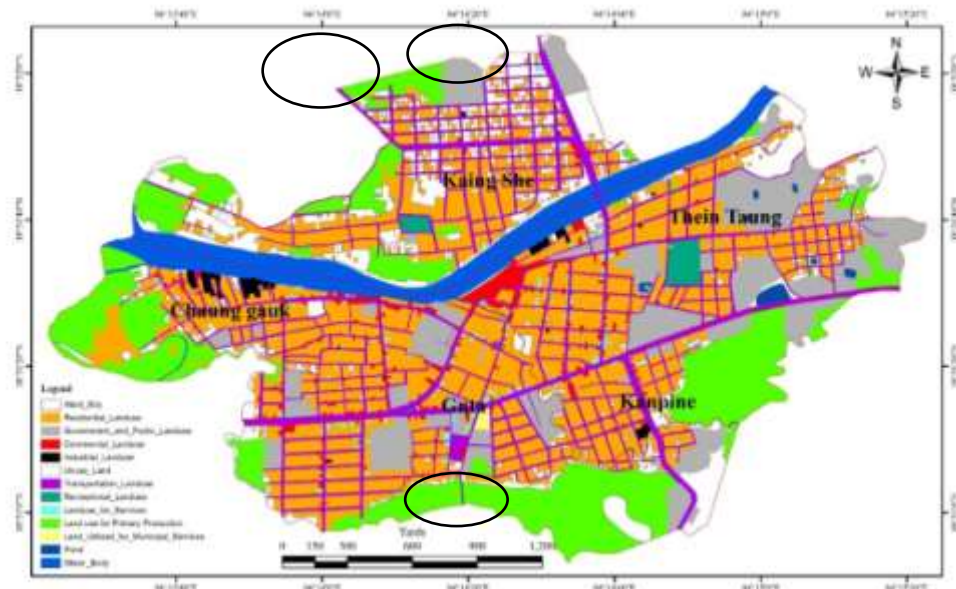


Figure (10) Land use types in Taunggoke Town

Sources: UTM Map:1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(1) Residential Land Utilization

In Taunggoke Township, land utilization change is mainly caused by government policy. Among land uses types of Taunggoke Town, area of forested land and unclassified land due to encroaching into urban area and suburban area and to relocate the people of living in other areas. Taunggoke town is composed with the five wards which are Guta, Kanpine, Chaung Gauk and Thein Taung. Now, Kaing She as urban wards, Although Khaing She is concerning from local people to in inside area of urban ward, but it not yet assigned from the government site. Residential land use was noticeably increased from 421 acres in 2002 to 481 acres in 2014 and about 500 in 2018. Because of the increase in residential land use is mainly the result of government policy and high price of land area as commercial value to extent new wards. Before 1995, Taunggoke town has four wards but after 2014 Kaing She ward began from village to urban ward defined by local people. Kaing She well developed as potential as a urban ward. Current situation of Kaing She have potential area of rural economy, because posses of high potential social infrastructure area. Some agricultural lands existing in the northern part and western part of surrounding of hospital area of the town were transformed into the residential land use areas.

According to 2013-2014 data, the household densities are respectively 7 household per acre in Guta ward, 12 household per acre in Kan Pine and 21 household per acre in Chaung Gauk wards, 12 household per acre in Thein Taung ward and 52 household per acre in Kaing She ward. According to 2013-2014, Kaing She is the highest density of household and Guta ward has the least density of 11 household per acre. Out of total area of 1037 acres in Taunggoke town, residential land cover about 481 acres accounting to 46.38 percent of the town area. Guta ward has a residential land use area of 217 acres, composing about 21 percent of the town total lands. Kan Pine ward has a residential land use area of 131 acres composing about 12.6 percent of the whole town land use. Chaung Gauk and Thein Taung wards have a residential land area of 70 acres, composing about 4.6 and 6.7 percent respectively of the total town land use. Kaing She ward has a residential land area of 15 acres, composing about 1.4 percent of the total town land use. Guta ward is the largest residential land and Kaing She

wards is the lowest number of residential lands. The increase of residential land use area depends upon the functions of a town's infrastructure. The dense population wards are Kanpine, and Guta (Figure 11). The most populated areas are found on the nearly flat plain which is suitable for agricultural activities. These areas possess large residential areas if near social infrastructure have and the lands in the areas will be suitable for commercial land use near future, because Taunggoke area is very narrow.



Figure(11) Residential land use in Taunggoke Town

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(2) Land Utilization for Primary Production

Agricultural lands of le, ya, plantations, orchards, nursery fields and animal breeding of cattle pigs- poultry (husbandries) are included in this category. Some agricultural lands were transformed into the residential. So, the total land use for primary production is decreased from 401 acres in 2002 to 362 acres in 2004. In Chaung Guak, Guta, Kanpine and Kaing She ward of the agricultural land are transformed into residential area. Guta ward has the most of the agricultural land use and Chaung Guak and Kaing She has a small scale areas of the agricultural land use. Other primary production are garden land, animal husbandry and nursery land use.

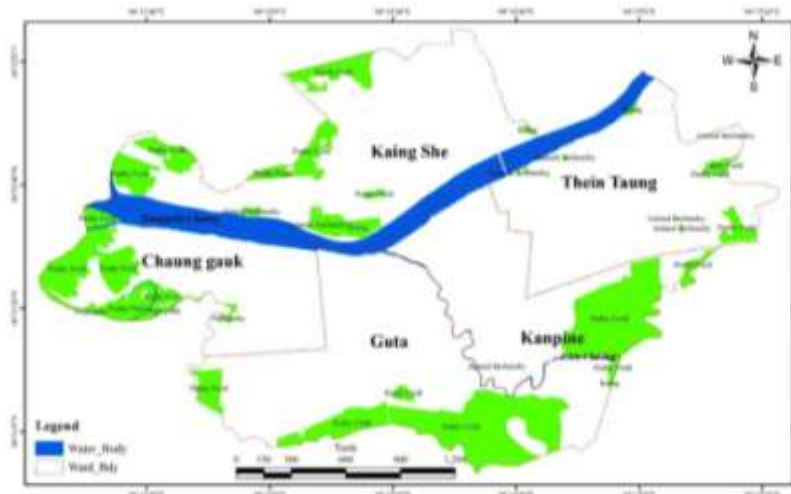


Figure (12) Landuse for Primary Production in Taunggoke Town

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(3)Industrial Land Utilization

Major industrial Landuse items, which occupied in the residential areas of Taunggoke Town are not large- scale enterprises. Actually, they are small- scale rice mills, saw mills, blacksmith, timber work, printing, machine workshops, household industries and other domestic productions including foodstuffs and purify drinking water industries. Industrial landuse occupies the area of 3 acres and the total area of 0.64 percent. There are two purify drinking water industries, Weitharli Oo Purify drinking water industry and Shwe Pyi Rakhine Purify drinking water industry, which are the largest concentration areas are located at the Kaing She ward. Saw mills are located at the Kanpine and Chaung Gauk ward. Most of the saw mills are found in the Chaung Gauk ward. They lie along the side of Taunggoke Chaung. Rice mills are found everywhere in the town. Large rice mills are located along Taunggoke Chaung in the Kaing She ward. Some of the small cottage industries are found everywhere in the town.

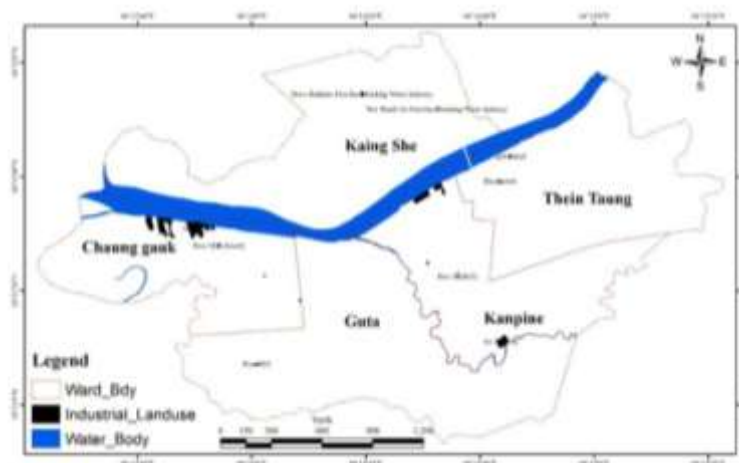


Figure (13) Industrial Land use in Taunggoke Town

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(4)Commercial Land Utilization

In Commercial landuse in the town increased significantly in early 2013. Because of Taunggoke College was built in Taunggoke Town in 2012 and after the Taunggoke Degree College, that area will improved as a potential commercial landuse. Some residential houses in down town area are moved into the commercial area and locational advantage of good transportation area as a utilization of commercial landuse. There are extended due to population growth and chance of higher economic activities on main road for the residents in there(e.g . big Myoma Sibintha Market) . Transportation and communication play a vital role in town economic development. With the population growth and higher economic status of the residents, the commercial landuse area are extended. Some residential houses are changed into commercial landuse in 2013.

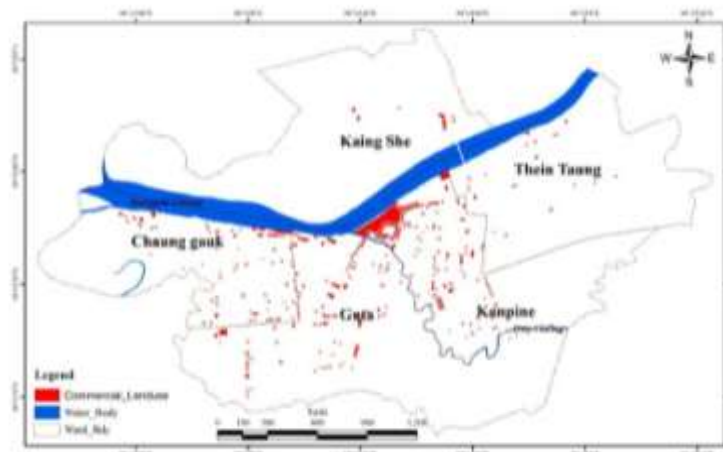


Figure (14) Commercial landuse in Taunggoke Town

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(5)Land Utilization for Services

The landuse for services had increased due to the development of motorcycle repair, bicycle repair, beauty parlor, restaurant, private clinics, tailoring shop, private bank, etc.



Figure (15) Landused for service in Taunggoke Town

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(6) Land Utilization for Public and Government Departments

Among the public and government department's land use there are school, township administrative office, ministries, churches, hospital, fire station, telecommunication and post office, township development committee office, educational status and police office and etc. Most of the public and departmental office are found in Their Taung and the small scale are found in Kaing She ward.



Figure (16) Landuse for Public and Government Departments

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(7) Transportation Land Utilization

The land area used for roads, street, high way terminal is classified as transformational land. The construction of new roads, upgrading of former roads in Taunggye Town had resulted in the increase of land under transformational land use. At present, the existing roads are extended and upgraded because extending the resident areas result in increasing the population in the town.



Figure (17) Transportation Landuse

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

(8)Unclassified Landuse

In recent period, as regards unclassified land, there is vacant land that is no use for arable landuse, but there will be potentially used for residential area or industrial area or cultivated area or commercial area and others in there. Most of the unused land is waste land, no building area, forest area. Most of the building area has Kaing She and a few are other wards. Part of the formerly unused land in Taunggoke is transformed into residential land and other landuse area. This is meaning for residential area that increasing amount of population pressure & growth rate and social infrastructures. These social infrastructures created improvement of major economy, this is effected toward of minor economy within Taunggoke Town from the above facts, it is need to trace on the further study. But landuse for primary production (agriculture land) and unclassified land are decreased to the expense of residential land. Due to not only population growth but also government policy& high level land prices and socio-economic potentialities in urban land utilization both pattern and amount has changed throughout in the study periods in 2018.



Figure (18) Unclassified Land

Sources: UTM Map: 1894_01, 1894_02, 1894_05, 1894_06, 1894_09, 1894_10, 1994_03, 1994_04, 1994_07, 1994_08, 1994_12, Field record, Google Earth 2014.

FINDINGS AND DISCUSSIONS

Taunggoke Township is one of the townships in Rakhine State. It lies on the Rakhine Yoma. Astronomically, it is located between north latitudes $18^{\circ} 37'$ and $19^{\circ} 32'$ and also between east longitudes $94^{\circ} 46'$ and $94^{\circ} 95'$. It has an area of 1173.39 sq.miles (3039.07 sq.km). It is the second largest township of Rakhine State which represents 13.42 percent of the total Rakhine State's area. It is composed of five wards and potential urban area and 42 village tracts which include 146 small villages covering the area.

This research work is studied by classifying eight different types of land use from the geographical standpoint. During the period under study, i.e. from 2014-15 to 2017-18, the changes are observed in agricultural land use, residential land use, forest land use, governmental land use, as well as unclassified land and other lands. Based on these land utilization of different types were described and explained.

Residential land area has somewhat increased, but at the expense of forested land. Such change has both positive and negative impact on the local inhabitants. As the population of the study area has been increasing steadily, the local populace needs more food and land for residing. However, the extension or encroachment of settlement land over the forestland can render such negative effects as environmental quality deterioration, widespread and serious

floodings, intense heat due to lack of moderating and cooling effects of forest and limited availability of timber and firewood.

The decrease of recreational land is undesirable, as the urban children has no ground to play freely for their enjoyment and healthy body growth. For the elders, they need places for recreation, particularly for relaxation of stress caused by urban congestion. Lack of suitable places for stress relaxation may lead to the increase in the number of alcoholics and drug addicts, as well as the crime rate.

The location of Taunggoke City gives impetus to socio-economic growth of the city in the foreseeable future. Its physical layout, tourism development potential with ancient some long history Pyu image inside mountainous area and a lot of mountains as high potentiality, all enhance its development potential which is somehow related to best means of land use. The pattern and it changes of land use, in fact, are largely the manifestation reflected by the decisions of government or responsible persons of the departments concerned. Very little change has been caused by the local inhabitants. Therefore, the authorities concerned should learn the comprehensive understanding of the entire physical and social attributes of the township and intelligibly weigh the pros and cons of the change in the land use types before making decision. There still remains a limited area of culturable waste land and unclassified lands. They can be changed into any other useful land, but great care should be taken in the change of already used land into another types to maximize the benefit that may come out of a unit area of land.

In order to gain better insight of the different land use types of the study area, other fields of study such as forestry, urban planning, transportation, industry and tourism should conduct further researches, for the multi-disciplinary approach is indispensable achieve the best means of land utilization.

The area of agricultural land and residential land further increased in 2011-12 to 2015-16 and garden continued to increased. Due to the increase in utilization of agriculture, residential land public and government department, commercial land by the conversion of other types of land use, the area of culturable waste land further decreased in 2012(e.g Taunggoke Degree College). The increase of cultivated waste land area somehow helped benefit the local inhabitants and capacity building of social infrastructures. This social infrastructure will be created to improvement of economic activities for local inhabitants.

In 2015-2016, some urban area gained more chance of economic activities and agricultural land in residential landuse, on the other hand, due to the degraded forestland with some are changed to low elevation as a le land.

The increase of rolling topology in Taunggoke Area including urban and village tracts was in account of the reclamation of virgin and the decrease in the culturable waste land area was due to conversion into residential land and public and government departmental landuse. The depletion and degradation of forest land enhances the intensity of flooding and the impact of global warming.

Land use is mainly related to the optimum use of the limited land between the alternative major types of land use (R.B Mandal, P-3, 1981).

According to 2014-2018 data, the urban landuse area is likely to increase in the future in response to the increasing population pressure and social infrastructures development momentum.

The agricultural land area has also somewhat increased due to the expense of forestland. Moreover, area of culturable waste land decreased and area of residential land

increased in the study period. Such change has both positive and negative impact on the local inhabitants.

In land utilization encourage extending residential area, consequently cultivated areas increased to a great extent. In some areas, the merchants and fishing activities and their associated families and groups operated more natural fishing ground such as fishes and prawn, livestock near their water channels as the natural giving environment. This trend gave much advantage to the area with income generated economy activities can create as well as for improve of economy.

Nowadays the fishermen have much knowledge on the channel pattern, they carefully chose the fish and prawn according to demand, market and prices. On the other hand, merchants (expert traders) are now considered for grouping or consolidated ways for secure condition in the future. In Taunggoke Township, Trader Association gave much advice and guidelines for promotion of more profitable fish and prawn in the area.

The demand and market in inland and abroad, the specialization of fish and prawn would be prospects in the area. Some fishes and prawn, such as kakatit(), pazon kyar, become an export item and the area's production will be increasing in the future from the giving natural environment.

FINDINGS AND DISCUSSIONS

The location and shape of Rakhine State, unlike other regions of the country, is manifested by the extension towards the east from the west, separation of the region between Rakhine Yoma and Bay of Bengal which run as barrier from north to south. All these conditions more or less affect the landuse change of Taunggoke Town. Thus it located in the middle part of Rakhine State, and which are also supportive to the socio-economic development of the township.

The population of Taunggoke Town gradually increased from 25,345 persons in 1995 to 29146 persons in 2000, 30092 persons in 2005 and to 28650 persons in 2014-15, to 32209 persons in 2017-18. More shelters and more food as basic needs are needed for the increasing population which resulted in the increase of residential land. But landuse for primary production (agriculture land) and unclassified land are decreased to the expense of residential land. Due to not only population growth but also government policy and socio-economic potentialities the utilization of urban land is changed throughout the study periods both in amount and pattern.

The decrease of forest land in Rakhine Yoma in 2010-2012 was due to the extension of agricultural land and settlement land over the degraded forestland.

Like most other townships of the country, the culturable waste land area has been declining, as it is mostly converted to agricultural land and residential land and land use for Public and Government Departments. There are still some new residential land and landuse of Public and Government Departments (especially Taunggoke Degree College) in Taunggoke Town located in the upland area of the east and they may be turned into rolling land in the near future in response to population pressure.

In the land type of other lands, unclassified land area has remained constant, while the unclassified land has somewhat increased. The change in the area of other lands has little or residential landuse and transportation landuse, landuse of Public and Government Departments effect key on the socio-economic condition of the local inhabitants, as a key factor in Taunggoke Town.

CONCLUSION

Taunggoke Township is one of the townships in the middle part of Rakhine State. It lies between Rakhine Yoma and Bay of Bengal. Astronomically, it is located between north latitude $18^{\circ} 37'$ and $19^{\circ} 32'$ and also between east longitude $94^{\circ} 46'$ and $94^{\circ} 55'$. It has an area of 1173.39 sq.miles (3039.07 sq.km). This research work is studied by classifying eight different types of land use from the geographical stand point. During the period under study, i.e. from 2014- to 2018, the changes are observed in agricultural land use, residential land use, forest land, land use for public and government department, as well as culturable waste land and other lands. Based on these land use types, the utilization of different lands was described and explained.

The residential land area has somewhat increased, but at the expense of public and government department. Such change has both positive and negative impact on the local inhabitants. As the population of the study area has been steadily increasing, the local populace needs more food and land for residing. However, the extension or encroachment of settlement land over the forested land can render such negative effects as environmental quality deterioration, widespread and serious flooding, intense heat due to lack of moderating and cooling effects of forest and limited availability of timber and firewood. The decrease of primary production land is undesirable, as the urban children has no ground to play freely for their enjoyment and healthy body growth. For the elders, they need places for recreation, particularly for relaxation of stress caused by urban congestion. Lack of suitable places for stress relaxation may lead to the increase in the number of alcoholics and drug addicts, as well as the crime rate.

The notable decrease in the land area used by recreational land use was due to the recombination of Gayunar Dam to as a single recreational land use at Taunggoke City. This can somehow retard the dynamic force that initiates and gives impetus to socio-economic growth of the city in the foreseeable future. The location of Taunggoke City, its physical layout, development potential of topology with Rakhine Yoma and fair accessibility, it enhances its development potential for near future if upgrade transportation land use which is somehow related to the moderate means of land use. The pattern and the changes of land use, in fact, are largely the manifestation reflected by the decisions of government or the responsible persons of the departments concerned. Very little change has been caused by the local inhabitants. Therefore, the authorities concerned should learn the comprehensive understanding of the entire physical and social attributes of the township and intelligibly weigh the pros and cons of the change in the land use types before making decision. There still remains a limited area of culturable waste land and unclassified lands. They can be changed into any other useful land, but great care should be taken in the change of already used land into other types to maximize the benefit that may come out of a unit area of land.

In order to gain better insight of the different land utilization types of the study area, other fields of study such as forestry, urban planning, transportation, industry, commercial and potential tourism sites(Kathan mountain, Gyidu mountain, Sanwin mountain, Khar-taung-nga mountain, Myinmadin mountain, Moehte –Taung, Taung-kon-gyi-Taung, Padat-tar-taung and Ran-khwar-Taung and etc) should conduct further researches, for the multi-disiplinary approach is indispensable to achieve the best means of land utilization pattern. It can be said that with the gradual improvement of economic status for urban ward, it will get further progresses and prospects of the socio-economic activities effected in the giving environment and utilization pattern for the near future. Therefore, urban Land Utilization Change pattern need to systematic constructive alignment with Topology Conditions(Alignments) and Physical Conditions(Relief, Drainage System, Climate, Soils, Forested Area(Natural

Vegetation) as good extension Urban Land Utilization Pattern to near Future for Taungoke Township from the above facts.

Systematic Constructive Alignment

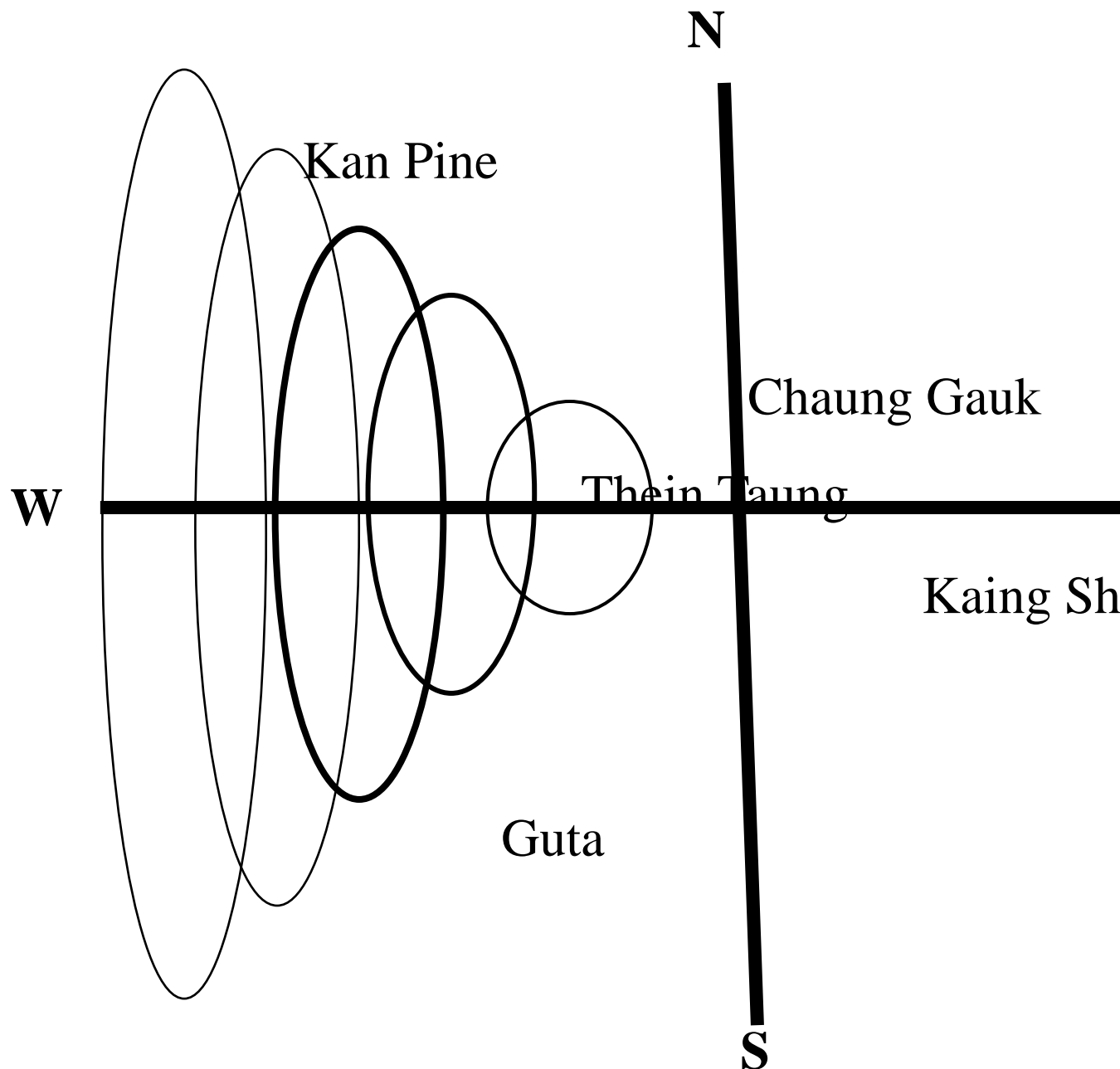


Figure (19) Systematic Constructive Alignment,
Sources: Based on the above facts

ACKNOWLEDGEMENT

We are greatly indebted to Rector Dr. Myint Swe, Taungoke Degree College for his permission and guidance on this research.

We would like to express my special thanks to Dr Thida Aye, Professor and Head of Geography Department, Taungoke Degree College, for her valuable advices and works of encouragement.

We also thank to all of departmental persons who helped and provided the valuable informations, also wish to thank to admin staff in General Administrative Department, in Taunggoke Township.

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