

URBAN AREA EXPANSION AND LAND USE CHANGES OF PYAY CITY

Thi Thi Khine¹, Nwe Yin Min², Shine Wai Phyo³

Abstract

This paper examines changes in land utilization of Pyay City. Pyay is the second largest City of Bago Region situated on the eastern bank of Ayeyarwady River. The total area of Pyay City is 34.48 sq. km and a total population of 115,847 persons in 2018. Pyay City is easily accessible to the other townships within Bago Region and also with Upper and Lower Myanmar. Population growth and most of the urban functions are concentrated in Pyay City. The total urban area is 21.76 sq. km in 1990 and increased to 34.48 sq. km in 2018. The land use for primary production areas was transformed to industrial, residential areas, commercial and transportation. So, urban settlement areas have rapidly expanded. The transportation facilities changes affect the urban land use changes in Pyay City. Transportation infrastructure changes were followed by changes in urban land use area after 1990 such as residential, institutional, recreational, industrial, commercial, services, transportation and others. In addition, urban land use changes and types also differ during different period of transportation improvement. The trend of urban expansion is towards the eastern and southern part of the City because it is located on the eastern bank of Ayeyarwady River. The main aim of this research is to identify the process of urban area expansion and urban land use area changes in Pyay City. To present this paper, secondary data were collected from the Administrative Department of Pyay Township and other Departments. Primary data were obtained from field surveys, interviews and open talks, satellite images analysis with remote sensing and geographic information system. In the City map, the growth conditions in the past and present and the future trend of urbanization are included.

Keyword: *Urban land use, transportations, land use change, population.*

Introduction

Land is required for various uses both in the urban and rural areas of all society. Increase in population density, type and the use of land and climatic conditions of an area are not the major driving forces to cause change in land use but Government policy play a vital role. The conversion of agricultural land (land use for primary production) into urban land use had dominated in and around suburbs (Kikuchi et al, 1997). Urban land use is an important component in understanding the interactions of urban economic activities with environment as well as urban expansion. Urban Area Expansion and Land Use Changes are caused by growth of urban area and transportation facilities particularly construction of Nawaday Bridge.

The increasing population demanded more land for settlement. With seven wards, the area of Pyay City in 1990 was 21.76 sq. km (2175.95 hectare) and the City area extended to 34.48 sq. km (13.31 sq. miles or 3448.33 hectare) with ten Wards in 2018. The extension of settlement land was towards the east, south and north, but not towards the west, being separated by the Ayeyarwady River.

The rapid increase in the number of population was also due to improvement in transportation, particularly after the construction of Nawaday Bridge in 1997 and the establishment of Khittayar Industrial Zone (1) in 1990. The upgrading of colleges to university level and the opening of Nurse Training School were also attributable to the rapid population

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growth on 18 October, 1999. Pyay City was recognized as the capital city of Bago Region (West) and the related offices were built on Shwetachaung road formerly occupied by the Township General Hospital. In 2000, Nawaday Industrial Zone (2) was opened. In 2001, Nawaday Broker Sale Centre, freight loading and unloading Truck Terminal Compound were established near the Nawaday Bridge. Industrial zone 1 and 2 have been established in Pyay city 2011. The growth of economic activities affects the area of urban land use changes. After Nawaday Bridge was built, economic activities increased. Urban area changes are mainly found within the City. In the settlement area, number of houses and economic activities are more congested in 2018 than that in 1990.

In the study area, commercial activities, services become more congested. It is the result from infrastructure development especially construction of Bridge.

Aim

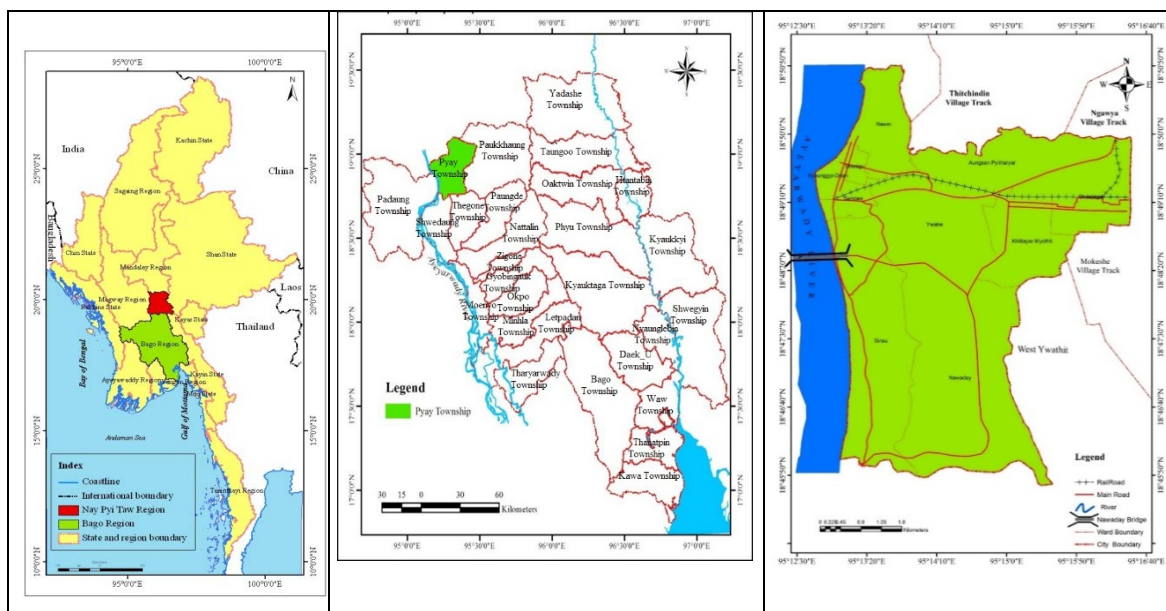
- To identify the process of urban area expansion and urban land use area changes in Pyay City

Objectives

- To examine the expansion of urban area of Pyay City
- To focus on the factors affecting the urban area changes in Pyay City.
- To investigate the effects of land utilization changes

Study area

Pyay City is located in the northwestern part of Bago Region. It is situated on the east bank of Ayeyarwady River. Its latitudinal extent is from N 18° 45' N to 18° 52' N and the longitudinal extent is from 95° 12 ' E to 95° 17 ' E. It has an area of 13.31 sq miles or 34.48sq km and consists of ten wards.



Source: Land Use Department of Yangon

Figure 1.a. Location of Bago Region in Myanmar
 1. b. Location of Pyay Township in Bago Region
 1. c. Location of Pyay City

Source of Data and Methodology

Data collection- Urban Area Expansion and Land Use Changes in the study area was investigated by field observations to get detailed understanding on Urban Area changes and the effects of land use area change on local people and data were collected from secondary sources. Secondary data were taken from various offices such as Township Administrative Department for general information data, Department of Township Development Committee for land use data and maps, Population and National Registration Department for population data etc. Spatial pattern of land use were obtained from field survey, questioners and interviews.

Data processing done from extracting geographic objects such as ward boundaries, roads, and streets by using Geographic Information System, present the changing land uses in Pyay City.

The aim of this research is to find out Urban Area Expansion with its changes and conditions in land use area during the 28 years from 1990 to 2018 based on the development of socio- economic condition and improvement of transportation, upgrading of Universities and Public Health Care Services.

Results and Findings

Urban Area Expansion

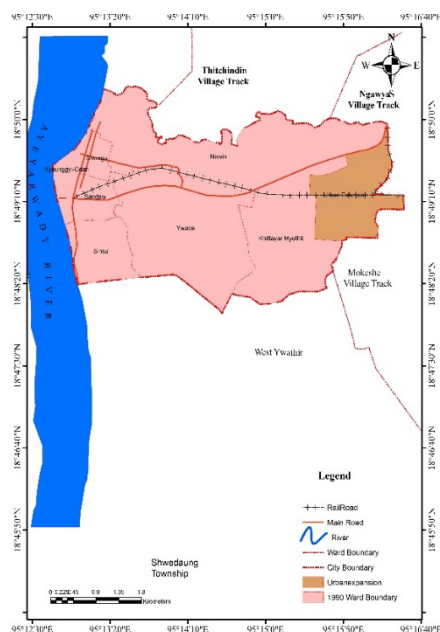
The socio-economic development of an area, to some extent, is partly related to types of land use. The urban land use area accentuates the urban development. Pyay is located on No.2 Yangon-Mandalay Highway road in Bago Region (West). Pyay is connected by motor roads and railroad with some townships of Upper and Lower Myanmar and Rakhine State. Due to good location, good transportation and communication, Pyay become the developed commercial town since the past time. As Pyay has commercial activities and economic development, many different races either nationals or foreigners live and carry out in various sectors of government and private enterprise. Thus, the residents in Pyay increased and it is found that the urban land uses are not systematic.

In 1973, there are seven wards (Nawin, Ywabe, Shwegu, Sinsu, Sandaw, Khittaya Myothit and Kyaunggyi-Odan) in Pyay City. The total population of Pyay City was 69,940 persons in 1973 and it increased to 83,332 persons in 1983. The increase of population is to extend its settlement area to the east, north and south. The area of Pyay is 17.1 sq-km (6.51 sq-miles) from 1959-60 to 1989 urban area did not change but the number of population: urban function and settlement area progress. The urban area extension, to some extent, occurred in Pyay City during the period from 1990 to 2000. In 1990, Pyay City has a total population of 87223. After the adoption of open market economic system, industrial zone, private banks, private hospital and clinic have emerged one after another. See Table.1, Figure. 2a , 2b.

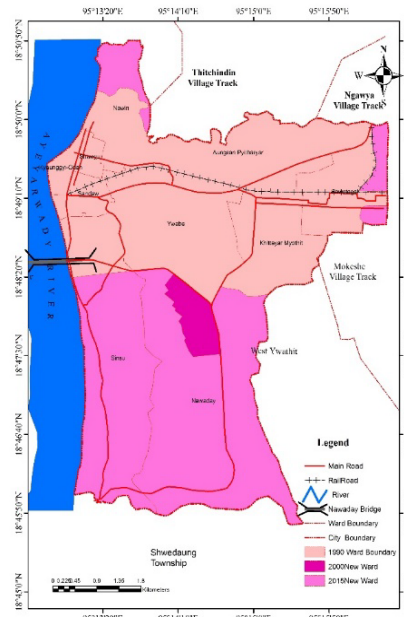
Table 1 Expansion of Urban Areas before 1990 and 2018

No.	Ward Name	Before 1990		2018	
		Hectares	Sq.km	Hectares	Sq.km
1	Nawin	599.74	6.00	289.35	2.9
2	Sinsu	180.49	1.8	645.47	6.45
3	Kyaunggyi-Odan	44.11	0.44	44.11	0.44
4	Shwegu	27.92	0.28	27.92	0.28
5	Sandaw	59.49	0.6	70.01	0.7
6	Ywabe	450.42	4.5	450.42	4.5
7	Khittayar-Myothit	324.56	3.25	324.15	3.24
8	Aungsan Pyitharyar	-	-	331.44	3.31
9	Nawaday	-	-	987.84	9.9
10	Shwedagar	-	-	277.61	2.78
11	Botataung	-	-	-	-
	Urban Extension	488.86	4.89	-	-
	Total	2175.59	21.76	3448.33	34.48

Source: Population and National Registration Department, Pyay



Source: Table 1.



Source: Table 1.

Figure 2.a. Urban Area of Pyay City in 1990 **Figure 2.b. Urban Area of Pyay City in 2018**

In 1990, Nawaday Bridge across the Ayeyarwady River was built, linking Pyay and Rakhine State. Easy and direct flow of commodities across the bridge affects the importance of warehouses and commodity exchange activity of the city gradually replaced by retail shops, stores and branch companies. Pyay City became headquarter of Western of Bago Region in October 1999. Pyay College was upgraded to Pyay Degree College in 1990 and Pyay University in 1999. The urban growth during the 1990 to 2000 period was manifested by the extension of new wards over the vacant land of the urban area, the upgrading of higher education institution and health care centre and the elevated status of the city as sub-region headquarter. In 2001 Nawaday Broker Sale Centre, freight loading and unloading Truck Terminal Compound was established near the Nawaday Bridge occupying 1.21 hectares (3 acres) of land.

To exploit the congregation of students at Pyay University, Pyay Education College, Pyay Technology University, Pyay Computer University, Nurse training School and Government Technical High school, a number of copier shops, photos studios, snack shops, stores, tea shops, food stalls and restaurants, TV game shops, beauty salons, fashion shops, tailoring shops, phone and phone repair shops, motorcycle and car showrooms, motorcycle repair shops and boarding house have emerged around these institutions. High job opportunity has attracted people from nearby areas rapidly increasing the population of the city which has led to urban expansion.

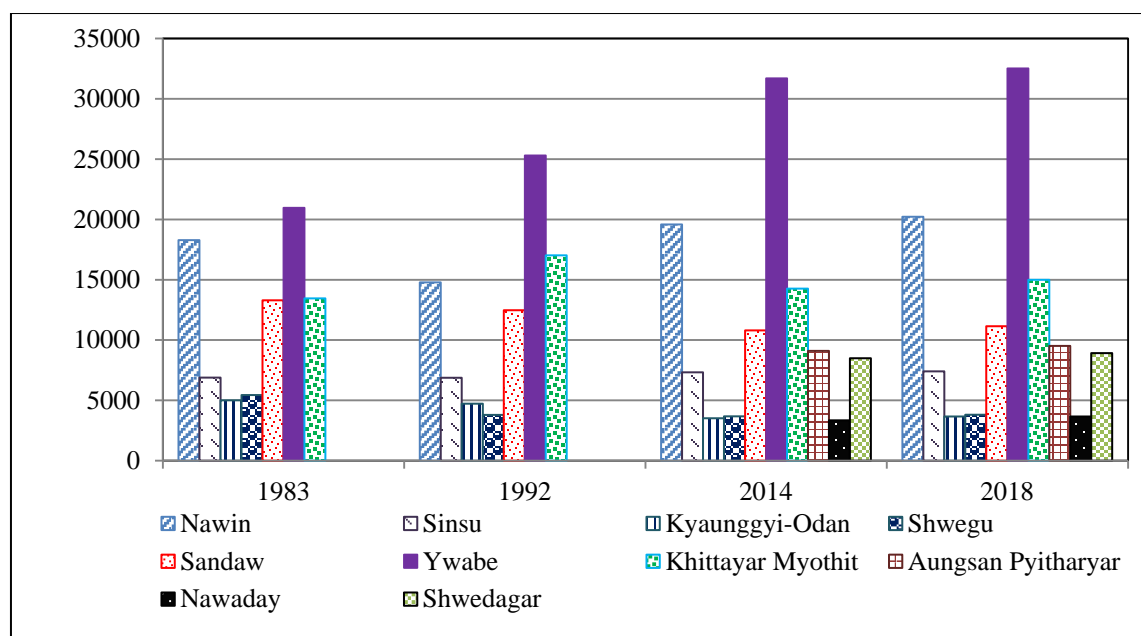
Population Growth

The rapid growth of population and the process of urbanization have resulted in an increasing demand for land in urban settlements. The distribution of population of Pyay depends upon the relief, economic condition and transportation. In Pyay, the area near the C.B.A (Central Business Area) is highly populated and the more the distance from the C.B.A, the less the population can be seen. Table.2.

Table 2 Population Distribution and Density in Pyay City (1983-2018)

Ward Name	Population (%)				Density (sq.km)			
	1983	1992	2014	2018	1983	1992	2014	2018
Nawin	18281 (21.9%)	14784 (16.6%)	19591 (17.5%)	20221 (17.5%)	3047	2464	6756	6973
Sinsu	6888 (8.2%)	6867 (7.7%)	7320 (6.5%)	7403 (6.4%)	3814	3815	1135	1148
Kyaunggyi-Odan	5009 (6.0%)	4721 (5.3%)	3514 (3.1%)	3667 (3.2%)	11384	10730	7986	8334
Shwegu	5439 (6.5%)	3798 (4.3%)	3673 (3.3%)	3812 (3.3%)	19425	13564	13118	13614
Sandaw	13298 (16.0%)	12473 (14.0%)	10807 (9.7%)	11145 (9.6%)	22163	20788	15439	15921
Ywabe	20970 (25.2)	25306 (28.4%)	31701 (28.4%)	32520 (28.1%)	3855	4652	5827	5978
Khittayar Myothit	13460 (16.2%)	17029 (19.1%)	14264 (12.8%)	14998 (12.9%)	4142	5240	4402	4629
Aungsan Pyithayar	-	-	9105 (8.1%)	9512 (8.2%)	0	0	2751	2874
Nawaday	-	-	3339 (3.0%)	3657 (3.2%)	0	0	337	369
Shwedagar	-	-	8495 (7.6%)	8912 (7.7%)	0	0	3056	3206
Urban Extension	-	4245 (4.8%)	-	-	0	868	0	0
Total	83323 (100)	89223 (100)	111809 (100)	115847 (100)	3671	3931	3155	3360

Source: Population and National Registration Department, Pyay



Source: Table 2.

Figure 3 Total Population of each Ward in Pyay City (1983, 1992, 2014, 2018)

Table 2, presents the size and proportion of population and density in different wards of Pyay City for the periods from 1983 to 2018. From 1983 to 1992, Pyay was composed of seven wards, between 1992 and in 2018 it was comprised with ten wards. During the 35-period, between 1983 and 2018, Ywabe Ward was mostly populated area in Pyay City. The causes of population increase are natural increase and migration from other wards or other regions. The lowest population number was found in Kyaunggyi-Odan Ward with 5,009 persons in 1983, Shwegu Ward with 3,798 persons in 1992, and Nawaday Ward with 3,339 persons in 2014 and 3,657 persons in 2018. Within 35 years, Kyaunggyi-Odan, and Shwegu, wards decreased in the number of population. As this ward is situated in the downtown area of Pyay City, Myoma Market, wholesale and retail shops, hotels, various stores, clinics, private hospital and banks are located in this ward. The commercial activities such as shops and stores are attached with the residential area. The price of land and buildings therefore, are high and many family units transferred to the suburban areas such as Myothit, where the price of land is cheap. Some people from this ward are transfer to Nawaday Ward, where wholesale centres and industries zone are located.

The population density was uneven in ten wards. According to Table 2, the population density in 1983 was 3,671 persons per sq.km in Pyay City. In this period the urban area was 16.87 sq.km or 6.51 sq. miles. In 1992, the urban area became 21.76 sq.km or 8.4 sq. miles and the population density was 3,931 persons per sq.km. In 1992, Pyay was composed of seven wards. In 2014, Pyay comprises with ten wards and the urban area is 34.48 sq.km or 13.31 sq. miles. In this year, the population of Pyay is 111,809 persons. Thus, the population density is 3,155 persons per sq.km. Due to expansion of urban area, the population density is dropped down in 2014. And then the population density was increased 3360 persons per sq.km in 2018. At present, people from the rural area and surrounding township were attracted by the good economic conditions of Pyay. Thus the urban population increased, due to natural increase and migration.

Economic factors

The economy of Pyay rests mainly on the trading of agricultural products. Because of its advantageous location it can profitably serve as the exchange center of surplus commodities from the lower Myanmar such as rice, fish and fish products with pulse, oil-seeds etc. produced from the 'ya' land of upper Myanmar. In the past, most agricultural products were restricted from sending place to place across the country. The practice of market-oriented economic system often in 1990 relaxed all the restrictions, enhancing domestic trading business. Private entrepreneur and companies are allowed to export the items which are demanded in the international markets. Such change of economic policy helps promote the emergence of more brokers, wholesalers and retailers. There are 5 markets and a number of brokers sale house. Myoma Market is the comprising a large number of wholesale and retail shops. Broker sale centre and industrial zone 2 were established at Nawaday Ward in 2001 and in 2003. All these developments enhance the growth of commercial and other related functions of the city.

Transportation factors

The transportation network which is the mirror image of the structures of the connectivity is vital for smooth and convenient undertakings of most urban land use patterns, particularly of commercial, tourism and recreation. Pyay City is accessible by means of multi-transportation routes including roads, railroad and waterway. As No (2) Highway runs through Pyay City, Yangon, Mandalay and the town on the road are early accessible by road transportation. Being a function city, the roads radiate toward the west to Okshitpin, Taungkok and Thandwe, and towards the east to Paukkaung and Toungoo. After the construction of Nawaday Bridge across the Ayeyarwady, Rakhine State has become more accessible through Pyay City, easing the flow of commodities and movement of people.

Land Use Types in Pyay City

The classification of types and land use in the country depends not only on geographical position, but also on social status. The differences depend on land surface, climate and types of soils. It also differs according to social-economy of the country such as population density, traditional practices, commercial centres, law and order relating to the social affair of nation. Based on all these facts, urban land use in Pyay is divided as follows: 1. Residential land use, 2. land use for primary production, 3. Commercial land use, 4. land use for services, 5. Land use for public and government, 6. Industrial land use, 7. Recreational land use, 8. Municipal Land use, 9. Transportational land use, and 9. Unused land.

Residential land use for buildings, comprised of brick buildings, buildings with timber and bricks as building materials, wooden buildings, huts and bamboo huts. There are varieties of building sizes, which are huge, large, medium, small and tiny.

Land use for primary production includes agricultural lands. Animal husbandry and nurseries are part of the primary production land use. Lands are used for forestry, mining and for exploitation of water resources such as fisheries and salt works.

Land used for commercial purpose include bazaars, wholesale and retail shops, restaurants, tea shops, electrical goods and other shops

Land used for services includes, financial institutions (bank, insurance), professional services, skilled services. Professional services are services by medical professionals, clinic, and training schools.

Land used for public and government departments include post and telegraph offices, military and police stations, fire station, government departments, religious institutions, hospitals and cemetery.

Land used for building of factories for production of food and foodstuffs such as rice mills, oil mills, preparation of foodstuffs, cotton and textile production are industrial land use.

Recreational land uses include play grounds, public parks, public gardens and other recreational sites.

Land used for municipal services like electricity supply such as electrical power stations and other uses concerning with electricity supply, water supply, cemeteries and sewage and garbage disposal.

Transportational land use includes railway transportation, road transportation, airways, water transport; headquarter offices for railway and road transportation.

Unused land includes land with poor quality, discarded lands, vacant land, unused buildings and rooms and other vacant lands.

Change of Urban Land Use Area in Pyay City

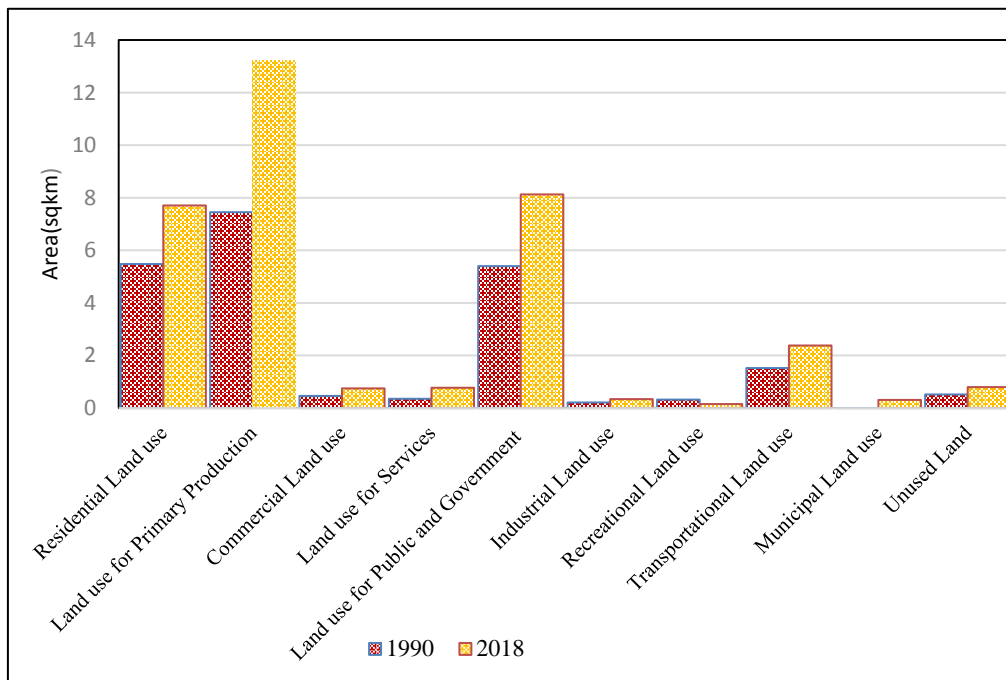
The rapid population growth, industrial as well as economic developments have resulted in urban areas expansion. Forest land, agricultural area, open space, and ecologically sensitive habitats, etc. are lost through urban expansion and development. After the construction of Nawaday Bridge, the economic activities of Pyay City has changed follow by the land use area changes.

The total urban area is 21.76 sq.km in 1990, and increased to 34.48 sq.km in 2018. In the urban land utilization of Pyay, the highest land use area is land use for primary production. In 1990, land use for primary production in Pyay City was 7.45 sq.km (34.2%) and it increased to 13.23 sq.km (38.4%) in 2018. Urban area expansion and population increase was 5.78 sq.km. Table 3.

Table 3 Changes of Urban Land use Types in Pyay City (1990 – 2018) (Area (sq.km))

	Land use Types	1990	2018	Change
1	Residential Land use	5.48 (25.2%)	7.71 (22.4%)	2.23
2	Land use for Primary Production	7.45 (34.2%)	13.23 (38.4%)	5.78
3	Commercial Land use	0.5 (2.3%)	0.75 (2.2%)	0.25
4	Land use for Services	0.35 (1.6%)	0.77 (2.2%)	0.42
5	Land use for Public and Government	5.40 (24.8%)	8.13 (23.6%)	2.73
6	Industrial Land use	0.21 (1.0%)	0.34 (1.0%)	0.13
7	Recreational Land use	0.32 (1.5%)	0.16 (0.4%)	- 0.16
8	Transportational Land use	1.52 (7.0%)	2.38 (6.9%)	0.86
9	Municipal Land use	0.01 (0.0%)	0.31 (0.9%)	0.30
10	Unused Land	0.52 (2.4%)	0.7 (2.0%)	0.18
	Total	21.76 (100%)	34.48 (100%)	12.72

Source: Google Map 1990, 2018.



Source: Table 3.

Figure 4 Changes of Urban Land use Types (sq.km) in Pyay City (1990 – 2018)

The residential land use area is the second largest area with 5.48 sq.km which accounts for 25.2 percent and of the total area of urban land in 1990.

As Pyay City became headquarter of sub-Bago Region. A number of government offices were established and more companies and banks were open after the adoption of market-oriented economic system. So, the second largest is land use for public and government with 8.13 sq.km (23.6 percent), and residential land use is third largest area with 7.71 sq.km (22.4 percent) of the total land area of Pyay City in 2018.

In 1990, land use for primary production, residential areas and land use for public and government services area covered 7.45 sq.km, 5.46 sq.km and 5.41 sq.km respectively. These uses have increased to 13.23 sq.km, 7.71 sq.km and 8.13 sq.km respectively in 2018. As a consequence of the expansion of area, increasing population, residential areas extended to the agricultural areas and recreational areas. During 1990-2018, unused land increased from 0.52 sq.km to 0.70 sq.km. Most of the unused land are converted to transportation areas, residential as well as land use for public and government services areas. Recreational land area are decreased as well as residential area, land use for public and government area, services area, commercial area, transportational area and unused land increasing rate is also fastest during 1990 and 2018.

According to 1990 record, out of the total area of Pyay (21.76 sq.km) the residential land use area was 5.48 sq.km. The largest residential area is in Ywabe Ward representing 2.5 sq.km of total area of ward. The second largest residential area is Nawin Ward with 1.0 sq.km and the third largest residential area is Khittayar Myothit Ward with 0.7 sq.km.

Urban Pattern Changes in Pyay City (1990, 2018)

The land utilization of Pyay City depends on the city boundary, physical factor. Increasing of population, social and economic, transportation caused urban growth and expansion. (Table 4 and figure 5,)

The residential area was 5.48 sq.km and 7.71 sq.km out of the total area of Pyay 21.76 sq.km and 34.48 sq.km in 1990 and 2018. The largest residential area is in Ywabe Ward representing 2.5 sq.km and 2.6 sq.km of total area of ward in both years. The second largest residential areas are Nawin (1.0 sq.km) Khittayar Myothit wards with 1.2 sq.km and the third largest residential area is Khittayar Myothit Ward with 0.7 sq.km in 1990 and Nawin Ward with 1.07 sq.km in 2018. In 2018, the third largest residential area is Nawin Ward 1.07 sq.km due to Aungsan Pyitharyar (3) and Koethaung Kwetthit 1 and 2 ward were extended and Aungsan Pyitharyar Wards became separate Wards in 2003. Nawin, Shwegu, Kyaunggyi-Odan and Sandaw Wards were being used not only as residential area but also commercial area. The residential area was densely populated.

The primary production area was 7.45sq.km and out of the total area of Pyay 21.76 sq.km in 1990 and 13.23 sq.km and out of the total area of Pyay 34.48 sq.km in 2018. The largest primary production area is in Nawin Ward with 3.38 sq.km and 3.4 sq.km in Sinsu of total area of Ward in both years. The second largest primary production area is urban expansion area Ward 2.65 sq.km and Aungsan Pyitharyar Ward 1.66 sq.km in 1990 and 2018. Shwegu, Kyaunggyi-Odan and Sandaw Wards were commercial centre as well as urban centre. The primary production area was not found in this area. The primary production area was replaced by urban land utilization and industrial zone.

Both in 1990 and 2018, the greatest commercial areas were most dominant in Kyaunggyi-Odan (0.16 sq.km) and Nawaday Wards (0.17 sq.km) out of the total area. The Market is located at the centre of the urban centre and Kyaunggyi- Odan and Shwegu Wards. These Wards are within urban centre and have a number of wholesale and retail shops. Accessibility is high and population is second highest in density. Nawaday Broker Sale Center and Highway Truck Terminal compound were established in Nawaday Ward in 2001, In 1990, commercial areas was second greatest in Shwegu Ward (0.06 sq.km) and Kyaunggyi- Odan (0.12 sq.km) in 2018. Wholesale shops move from urban centre to Nawaday Broker Sale Center.

Both in 1990 and 2018, the largest Service areas were most dominant in Ywabe (0.13 sq.km) and Nawaday wards (0.23 sq.km) out of the total area. Accessibility is high and population is second highest in density. Nawaday Broker Sale Center and Highway Truck Terminal compound were established in Nawaday Ward.

Both in 1990 and 2018, the largest governmental areas were most dominant in Khittayar Myothit wards (1.68 and 1.75 sq.km) out of the total area. After the completion of highway bus terminal in 1993, the government offices were shifted to Khittayar Myothit Ward where accessibility was high. Pyay City had the offices of western Bago Region in 1997.

. In 1990 and 2018, Sandaw Ward (0.2 sq.km and 0.2 sq.km) had the largest industrial area, partly due to the presence of industrial zone and its advantageous location. These wards also ranked first in industrial area in 2000 and 2018, followed by Nawaday Ward. In the past industrial area were distributed in all wards of the City. Nowadays, most of the industrial areas are located within the industrial zone.

. In 1990 and 2018, Ywabe Ward (0.15 sq.km and 0.2 sq.km) had the largest Municipal area out of the total area. Sandaw Ward (0.14 sq.km and 0.06sq.km) had been the largest of Recreational area. Recreational land area decreased, while new settlement areas of residential, services and commercial area increase.

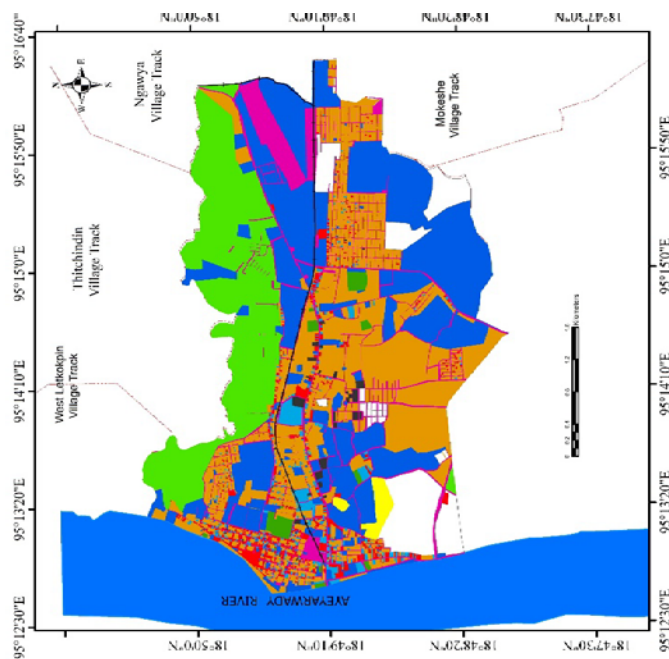
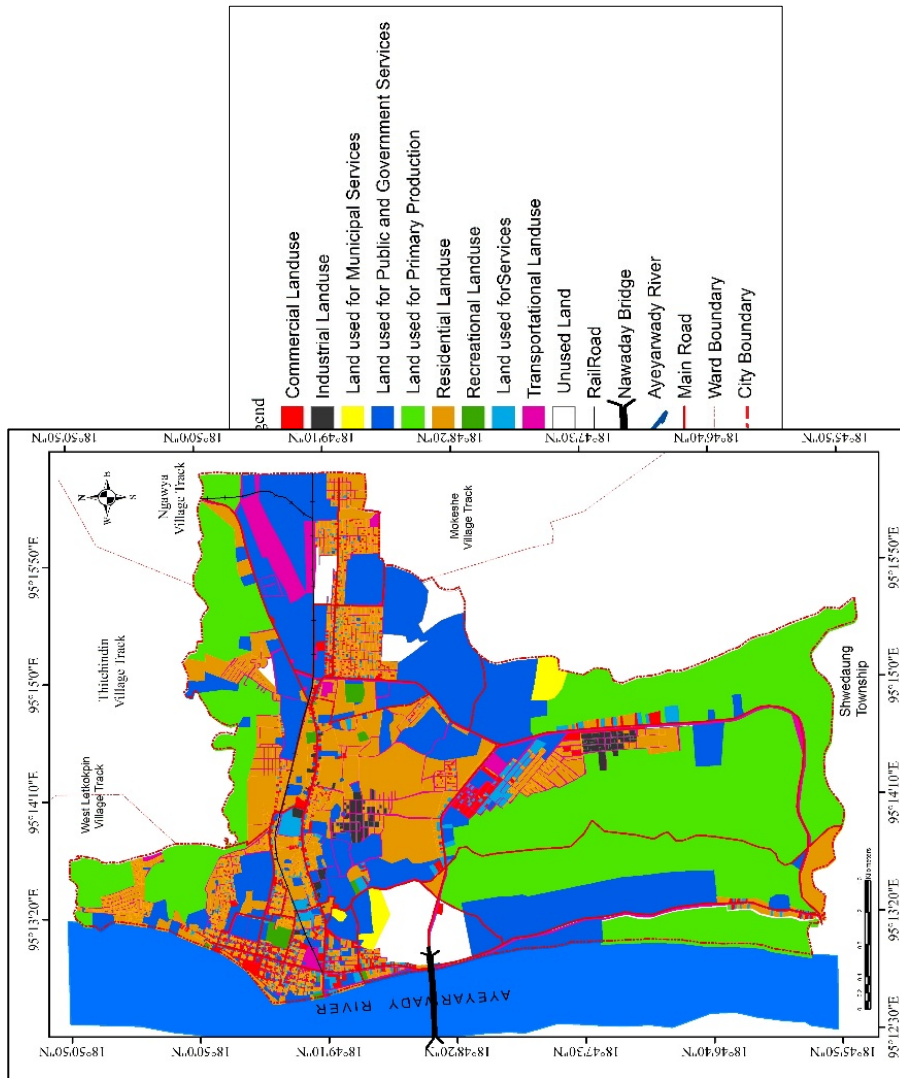
Out of the total area in 1990 and 2018, the largest transportation area is in Nawin ward with 0.23 sq.km and Ywabe ward is 0.24 sq.km. The improvement in transportation enhanced the rate of population growth which led to the extension of urban area.

The largest and second unused area is in Sinsu ward with 0.13 sq.km and 0.12 sq.km in 1990. The largest and second unused area is in Nawaday and Sinsu wards with 0.16 sq.km and 0.12 q.km in 2018. These two areas had witnessed expansion of urban area. Urban area expansion and population growth are also changes of land use as well as residential, commercial and industry

Table 4 Urban Pattern Changes in Pyay City (1990, 2018)

Ward Name	Residential Land use		Primary Production		Commercial Land use		Land use for Services		Governmental Land use		Industrial Land use		Municipal Land use		Recreational Land use		Transportational Land use		Unused Land	
	1990	2018	1990	2018	1990	2018	1990	2018	1990	2018	1990	2018	1990	2018	1990	2018	1990	2018	1990	2018
1 Shwegu	0.08	0.08	0	0	0.07	0.03	0.02	0.01	0.04	0.08	0.01	0.0	0	0	0.01	0.03	0.05	0.05	0	0
2 Kyaunggyi-Odan	0.12	0.15	0	0	0.16	0.12	0.03	0.03	0.05	0.05	0.0	0	0	0	0	0.01	0.08	0.08	0	0
3 Sandaw	0.12	0.15	0	0	0.02	0.06	0.1	0.09	0.17	0.17	0.01	0.01	0.01	0.02	0.14	0.04	0.16	0.16	0	0.0
4 Nawin	1.02	1.07	3.38	0.94	0.04	0.1	0.04	0.08	1.3	0.5	0.02	0	0	0	0	0	0.23	0.19	0	0.02
5 Ywabe	2.5	2.6	0.11	0	0.1	0.09	0.11	0.19	1.13	1.13	0.16	0.2	0	0.0	0.04	0.04	0.22	0.24	0.1	
6 Sinsu	0.47	0.39	0.9	3.43	0.04	0.05	0.02	0.05	0.12	1.7	0.01	0	0.00	0.13	0.01	0.01	0.1	0.23	0.1	0.5
7 Khittayar Myothit	0.7	1.22	0.41	0	0.06	0.1	0.02	0.07	1.67	1.7	0	0	0	0	0.02	0.03	0.09	0.1	0.2	0
8 Shwedagar	-	0.63	-	0.28	-	0.02	-	0.02	-	1.16	-	0	-	0	-	0	-	0.67	-	0.02
9 Nawaday	-	0.5	-	6.92	-	0.17	-	0.23	-	1.11	-	0.13	-	0.16	-	0	-	0.5	-	0.16
10 Aungsan Pyitharyar	-	0.91	-	1.66	-	0.01	-	0.00	-	0.53	-	0	-	0	-	0	-	0.16	-	0
Urban Expansion	0.47	-	2.65	-	0.01	-	0.01	-	0.92	-	0	-	0	0	0.1	-	0.59	-	0.12	-
Total	5.48	7.71	7.45	13.23	0.5	0.75	0.35	0.77	5.40	8.13	0.21	0.34	0.01	0.31	0.32	0.16	1.52	2.38	0.52	0.7

Source: Google Map 1990, 2018



Finding and Suggestion

Pyay City is the second largest town in Bago Region. In accordance with the location, it is an important junction city between upper and lower Myanmar, and so Pyay is the main commercial city where commodities are stored and distributed.

Due to good transportation, convenience to undertake the business, and good social status, the population in Pyay City is going to increase with natural increase and migration.

In Pyay, the urban area does not extend from 1911 to 1953 and the urban area in these periods was 1680.90 hectare or 6.49 sq. miles. In 1955, Shwehintha quarter was emerged as residence for government employees. The urban area increased to 2175.59 hectare or 8.4 sq. miles in 1989. The Industrial Zone (1) and Shwetagar New quarter (3) and (4) were established in 1990. The population in Pyay increase to 83332 persons in 1983 and 89223 persons in 1992. The increase of population forced to extend its settlement area to east, north and south of Pyay. Urban extension is considered thoroughly. The new settlement wards should not be extended in the east because the area of ancient Pyu City. Ayeyarwady River is located in the west. The new urban extension must be made vertically.

In Pyay City, population yearly increases and the residential land use areas also increase. In accordance with the population increase, the residential land use, commercial land use, recreational land use etc. will increase as well. Therefore, the problems of water supply and electricity power supply, problem of waste disposals and danger of fire can be encountered.

The problem of water supply can be solved by raising the artesian wells in every ward. The problem of electricity power supply can be solved by constructing the hydroelectric power stations at North Nawin and South Nawin dams. The problem of waste disposals can be solved by increasing the numbers of garbage collecting truck cars and stuffs. The danger of fire can be solved by raising the numbers of car with fire engine. Hence, the authority concerns together with the people in Pyay City should carry out the tasks to solve the problem.

Conclusion

Pyay is located on the eastern bank of Ayeyarwady River in Bago Region (West). It lies between north latitude 18° 45' and 18° 52' and also between east longitude 95° 12 ' and 95° 17 '. It has an area of 13.31 sq. miles or 34.49 sq km and consists of ten wards.

Generally, Pyay City is located on the flat lowland plain 60.9 meter above sea level. The northern portion is a flat lowland area below 30.48 meter. Pyay City experiences the Tropical Savanna Climate (Aw). The mean temperature is 28.09°C (82.56°F) and the average annual rainfall is 1244.98 mm (48.94 inches).

Pyay City is the most populous city in Pyay Township, as well as Pyay District.

The urban land use in Pyay City is divided into 10 types. The highest urban land use area is land use for Primary Production. The largest area of Land use for Primary Production is found in Nawaday Ward. The residential land use area is the second largest area. Land use for public and government include schools, college, university, hospital, post and telecommunication office, police station, etc. Transportation land use is a chief requirement for the urban settlement. The industrial land use area is 54.63 hectare. There are two industrial zones in Pyay City. The recreational land use includes playground, sport buildings, parks, cinemas hall, and view point. There are two parks, two playgrounds, a cinema hall are found in Pyay. Other recreational sites are viewpoint and Chaungthar sand bar in Sinsu ward and Shwepalinmaw pagoda viewpoint in Shwegu Ward.

Pyay City is situated at the strategic point to transport the goods from Magway Region and lower Myanmar to upper Myanmar and Rakhine State. After the construction of Nawaday Bridge, Pyay became the main commercial centre. Beside, Pyay City links Taungoo with Pyay-Taungoo motor road. Hence, Pyay City can develop in transportation and communication in the future. Moreover, tourism industry can develop in Pyay City because of ancient Thayekhittayar City, the world heritage.

Acknowledgement

First of all, we would like to express our deep gratitude to Dr Sandar, Professor and Head, Department of Geography, East Yangon University for her kind permission to conduct this research paper and proper guidance. We are greatly indebted to Dr Mi Mi Kyi for encouraging advice and guidance on this paper. Lastly, we deeply thank to our colleagues for their eager and willing help and supports in field observation and data collection.

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