

A Geographical Study on Population Density in Kyaukse Township (1999-2014)

Yu Yu Swe ¹

Abstract

Kyaukse Township lies in the Dry Zone of Central Myanmar. Topography of Kyaukse Township can be divided into Kyaukse Plain and the Yeyaman Range. Kyaukse is one of the densely populated townships in the Central Myanmar. The factors: (1) getting irrigation water from the Zawgyi and Panlaung Rivers; (2) lying on flat fertile alluvial plain, encourage the development and productivity of agriculture and population growth in Kyaukse Township. Population density of Kyaukse Township depends a little or more upon topography and agricultural condition. Therefore, the density patterns of Kyaukse Township are mostly concentrated on the flat plain regions. In this research, the population density and changing pattern of population centers are analyzed by the population centroid method. The results show that population centres of Kyaukse Township has been moving toward the southeast during the 1999-2014 year. According to the result by the population centroid method, today mean population center of Kyaukse Township is at the intersection of 96°9' 32" East Longitude and 21°34' 38" North Latitude. Most of the people are found gradually shifted towards the southeast direction from the center of Kyaukse Township. Many cultivated lands in the southeast of the township have been changed into residential areas. Hence, rural dwellers have been shifting towards the southeast from the point of the 1999.

Key Words: Population; Density; Centroid; Population Center.

Introduction

Kyaukse Township is one of the townships of Mandalay Region in the Central Myanmar (Map 1). It is an agricultural township. It was known as Ledwin-setit-khayaing (11 paddy Districts) or Myanmar Granary. Kyaukse Township is comprised of two major divisions: Kyaukse Plain, and the Yeyaman Range. Kyaukse plain is a southern continuation of Mandalay Plain (Map 2). It is 375 square miles wide, about 51.7 percent of the township's areas. The Yeyaman Range is 4000 feet high and is the western part of the Shan Highland. Among them the highest is Mt. Taungma (5105')

¹ Associate Professor, Dr, Department of Geography, Mandalay University of Distance Education.

which lies in the extreme north of the township. Kyaukse has a Tropical Steppe climate (BSh) in some years and tropical Savanna climate (Aw) in some years.

Major drainage of Kyaukse Township is the combined river system of Myitnge River (called Dokhtawady), Zawgyi, Panlaung and Samon Rivers which have been serving as water resources from irrigation agriculture since the Reign of King Anawrahta. Soils suitable for agriculture cover the central alluvial plain of the township.

As the township is an agricultural developed region, most of the people are concentrated in 86 village tracts or 207 villages and earn their living in agriculture, together with partially in livestock-breeding, pottery and other subsistence work as a manageable scale. In the study area, the workable population in 2014 was about 60% of the total population. Out of which, the agricultural labour was 66 % of the total workable people. Therefore the highest percentage represented the agricultural worker.

In Kyaukse Township urban accounted for 19.99 percent the total population and rural population 80.01 percent in 2014. Therefore rural population represented about four-fifths of the township's population. As regard the urban area, Kyaukse is the only one in the township. It consists of 10 wards. In account with wide-spreading trade, well developing domestic industries, expanding of various government offices, and gradual growth of different private servicing , urban population increased year after year.

Objectives

The objectives of this research are:

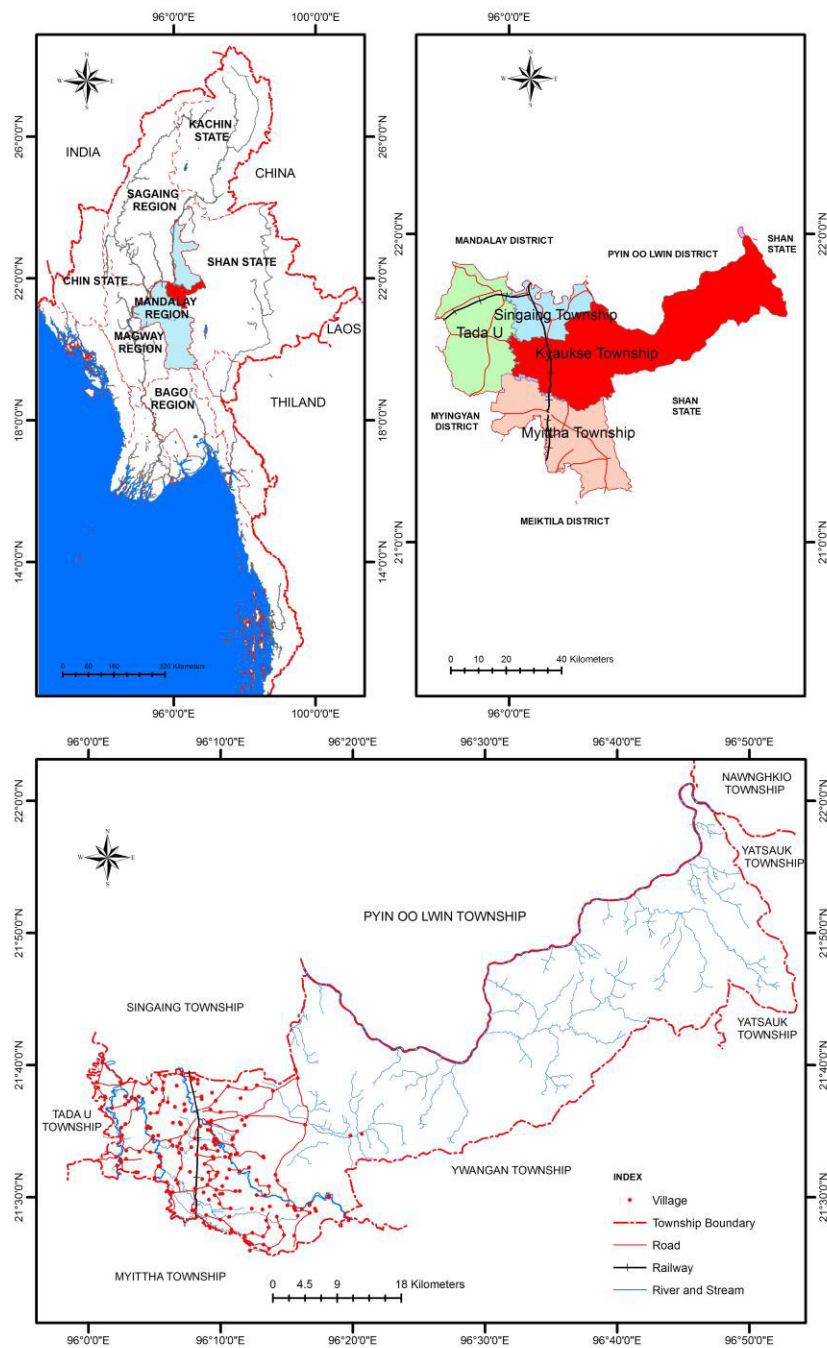
- To study the geographical factors of Kyaukse Township,
- To know the population density of Kyaukse Township and
- To identify how population has changed over the time.

Study Area

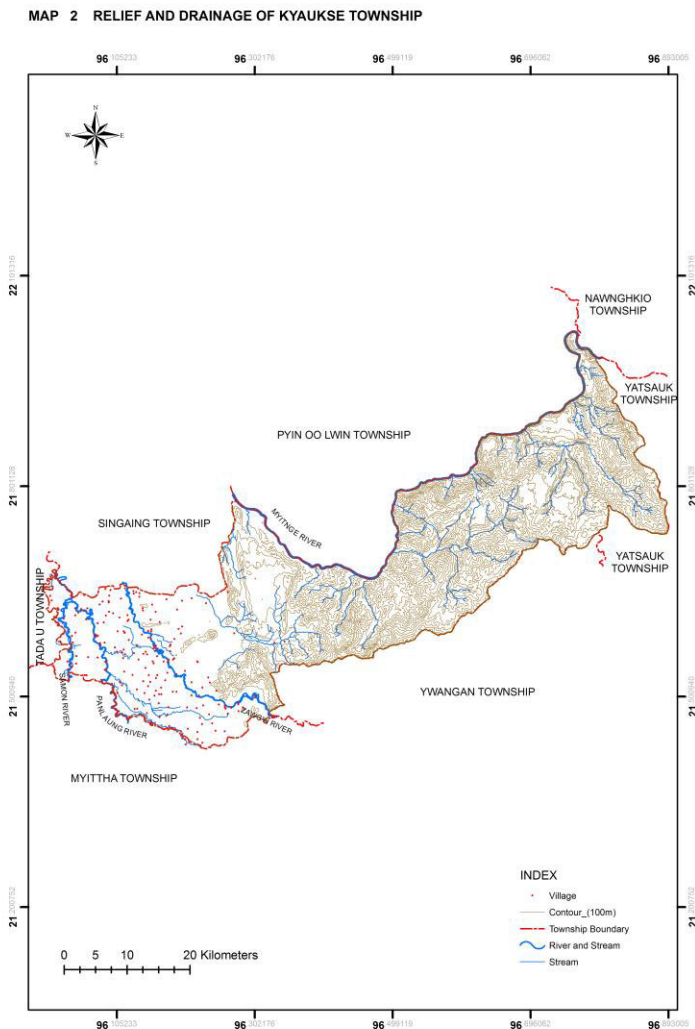
The study area chosen for this research is Kyaukse Township. Kyaukse Township is located in Mandalay Region. It lies between North Latitude 21° 26' and 22° 2' and East Longitude 95°57' and 96°58'. It has an area of 725.278 square miles or 464,178 acres. Kyaukse Township is bounded on the east by Pyin Oo Lwin Township

and Yatsauk Township; on the west by Tada-U Township; on the north by Singaing and Pyin Oo Lwin Township; and on the south by Myittha Township. Kyaukse Township includes Kyaukse Town and 86 village tracts. (Map 1)

MAP 1 LOCATION MAP OF KYAUKSE TOWNSHIP



Source : Department of Geography, University of Mandalay.



Materials and Methods

The map regarding the location of Kyaukse Township collected from topographic maps. Applicable facts and data are gathered from the government offices. Firstly, the number of population in 1999 and 2014 was used as a primary data source in this research. The population densities of Kyaukse Township were calculated by the aid of computer software. In analyzing population density, the Population Centroid method is used for searching the shifting places of center of population. Finally, questionnaires and field investigations are undertaken in the selected areas also.

Analysis and Results

Changing Pattern of Population Density in Kyaukse Township

Population density of Kyaukse Township depends a little or more upon topography and agricultural condition. As major economic activity of the township is agriculture, the irrigated plain with fertile soil and good in agriculture is more populous than other village tracts. Moreover the village tracts lying along the highway and the Yangon-Mandalay railroad, which have productive land under the development of trade and commerce, are also densely populated. Moreover, majority of the township's population live mostly in the riverine area of the Zawgyi and the Panlaung Rivers, and near alongside the irrigation canals, earning their living in agriculture.

Being small in arable land, difficult in accessibility to other regions, scarce in foot-path, far from the towns, and rough in terrain, the foot-hills of the Shan Highland lying in the eastern portion of Kyaukse Township are thinly populated. Generally, distribution and density of population in the township varies with the characteristics mentioned above. In Kyaukse Township population density was 160 persons per square mile in 1973, 205 persons in 1983, 256 persons in 1993, 292 persons in 1999 and 302 persons in 2014. Accordingly with increasing population, the density has become grownup year after year. Except the mountainous area of the Yeyaman Region, population density of the township is found greater than those of the surrounding townships. In fact, population growth of Kyaukse Township depends on the development of agriculture and vice versa, the development of agriculture depends on human resources.

The population densities of Kyaukse Township (1999- 2014) are illustrated in Map 3. It shows that the density patterns of Kyaukse Township are mostly concentrated on the flat plain regions.

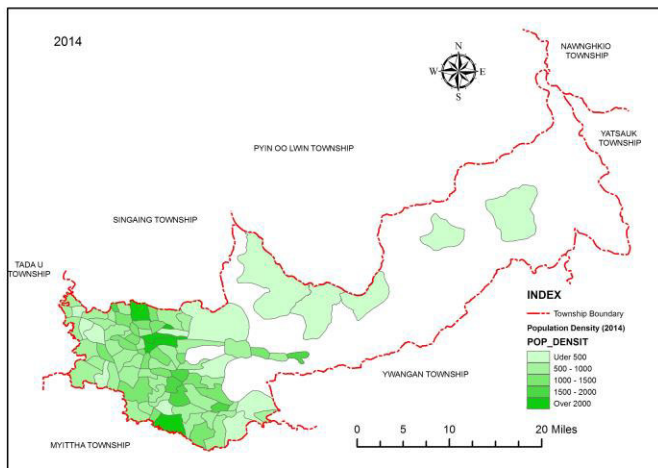
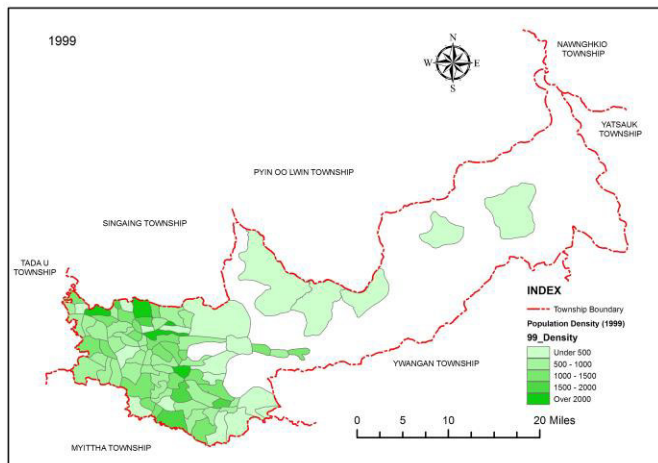
Analysis on Changing Pattern of Population Centres by the Population Centroid Method (1999-2014)

A geographical technique to characterize a population distribution is to locate its centre. The most common method is the population centroid, to show the population distribution according to its center. Actual calculation of a population centroid involves weighing each of the n populated geographic co-ordinates by the number of people residing at those co-ordinates.

$$\bar{X} = \frac{\sum_{i=1}^n P_i X_i}{\sum_{i=1}^n P_i} \quad \bar{Y} = \frac{\sum_{i=1}^n P_i Y_i}{\sum_{i=1}^n P_i}$$

where X and Y are the co-ordinates of the centroids, Pi is the population located at point " i ", and Xi and Yi are coordinates of " i ". This formula is readily usable for small areas or quarters. This method will provide one use of population center that characterizes how a distribution shifts geographically over time and will give another importance for computing more detailed measures of distribution.

MAP 3 POPULATION DENSITY OF KYAUKSE TOWNSHIP (1999 AND 2014)



Source : National Registration and Immigration Department, Kyaukse Township.

In order to become precise computation, astronomical coordinates such as latitudes and longitudes of each ward or village tract are used and then population centroids of Kyaukse Township are computed for the years 1999 and 2014, based on the respective population data. Resulting coordinates of the centroids are shown below (Table 1).

Map 4 shows that today's respective population centre have been moved from the point of the year 1999 (96° 8' 50" East Longitude and 21° 34' 33" North Latitude) to the southeast in 2014 (96° 9' 32" East Longitude and 21° 34' 38" North Latitude). This means that most of the people are found gradually shifted towards the southeast direction from the center of Kyaukse Township. Many cultivated lands in the east of the township have been changed into residential areas. Hence, rural dwellers have been shifting towards east of the township. Moreover, forest cover had been converted into residential area. It is mainly caused by the land reclamation of industrial zone. This was noticeable at the foothill of Dattaw Hill and around the village tracts of Phyaukseikpin, Yebawgyi and Kalagyaung.

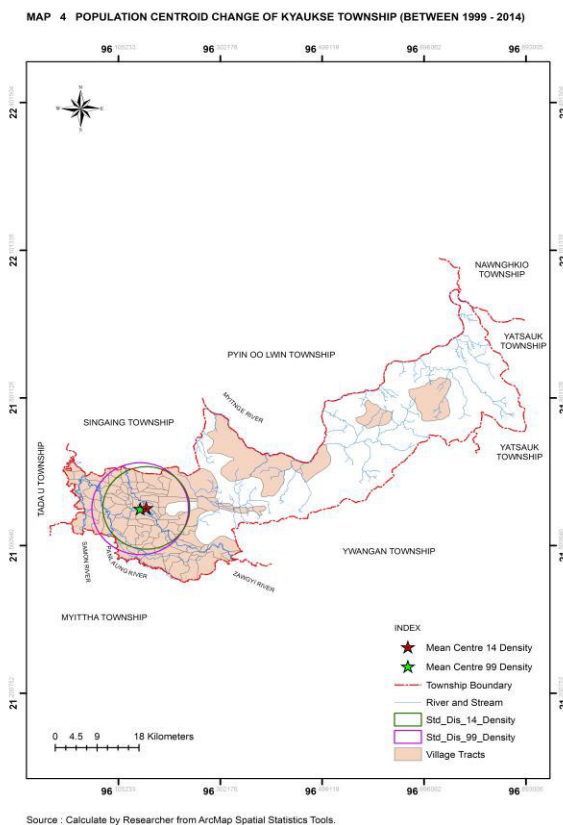


Table (1) Movement of population centers for Kyaukse Township

Township/ Years	1999	2014
Kyaukse Township	moved to	SE
X	96° 8' 50"	96° 9' 32"
Y	21° 34' 33"	21° 34' 38"

Source: Result from own calculation according to population centroid method.

Conclusion

Kyaukse Township is situated in the Dry Zone of Central Myanmar. It is included in Kyaukse District of Mandalay Region. Kyaukse Township is bounded on the east and southeast by Yaksauk Township of Shan State, on the south by Ywangan and Myittha Townships, on the west by Tada-U Township, on the north by Singaing and Pyin Oo Lwin Townships and on the northeast by Nawngkhio (Naungcho) Township. Kyaukse plain area is one of the important river basins of the Ayeyarwady River. Moreover, it is well known for its high productivity in paddy. Kyaukse Town is the centre of the area and both highways and railroads from Yangon to Mandalay pass through the study area.

In analyzing population density, the Population Centroid method is used for searching the shifting places of center of population. According to the result, mean population center of Kyaukse Township is at the intersection of 96° 8' 50" East Longitude and 21° 34' 33" North Latitude in 1999, today mean population center of the township move at the intersection of 96° 9' 32" East Longitude and 21° 34' 38" North Latitude. This show that population centres of Kyaukse Township has been moving toward the southeast during the 1999-2014 year. As a reason, many cultivated lands in the southeast of the township have been changed into residential areas. Hence, rural dwellers have been shifting towards the southeast from the point of the 1999.

As the result of this research, the researcher would like to suggest that as the mean population centre of the township is moving southeastward, public buildings, health care centres, educational schools and universities, township offices and departmental buildings should be built up near or at the resulting population mean centre. So this it will make the public save the time and decrease the transportation cost by reduction the distance.

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