

RELATIONSHIP BETWEEN RELIEF AND LAND UTILIZATION IN KAWLIN TOWNSHIP

San Dar Lin

Abstract

The classification of land utilization in Kawlin Township according to Land Records Department can be found into 13 main types. However, the land utilization of Kawlin Township varies spatially due to the control and influence of the physical features of the township. Especially relief in Kawlin Township, 73 percent of the area where the average height of the region is below 500 feet above sea level is occupied by eight types of land uses. Larkar Village Tracts lying on an elevation ranging from 1,500 feet to 2,000 feet above sea level has five types of land use. According to the physical features of Kawlin Township, the most suitable type of land use is forest land use. By the conservation of the forests, the valuable forest products can be extracted continuously and in addition the conservation of the natural environment can be carried on.

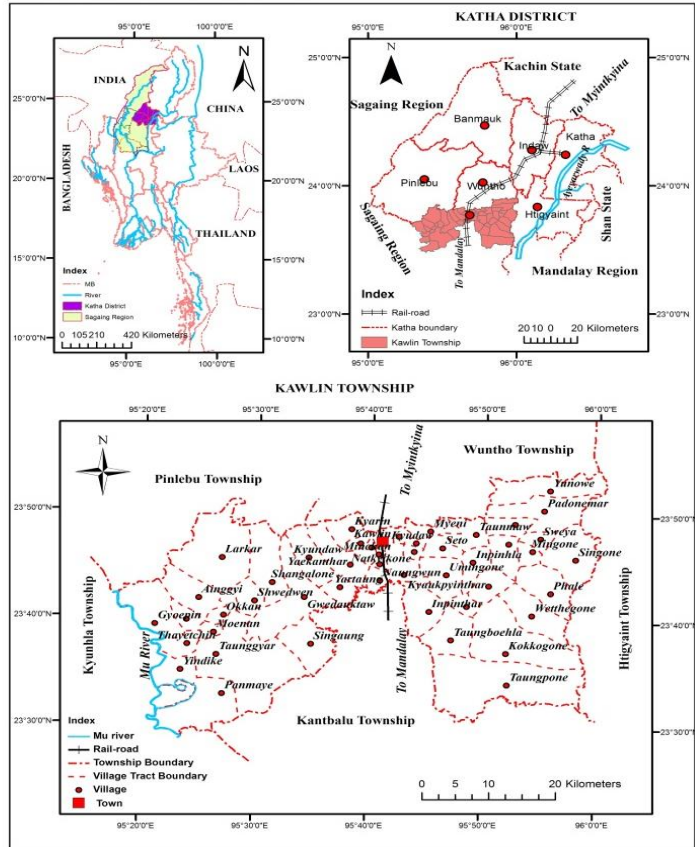
Keywords: relief, land utilization, forest, conservation and natural environment

Introduction

Kawlin Township is situated in Katha District, Sagaing Region. Kawlin Township is located between 23°28'48" and 23°54'53" north latitudes and between 95°17'51" and 96°0'36" east longitudes. Kawlin Township has an area of 730 square miles or (467,324 acres). Kawlin Township comprises 47 village tracts with 216 villages. Relief and drainage of Kawlin Township are predominant factors in determining the intensity of land use. The general terrain of Kawlin Township is low-lying. However, there are hills and higher areas in the eastern and northwestern parts of Kawlin Township. The relief of Kawlin Township can be divided into Minwun Range, Eastern Highlands, Central and Southwestern Plains and Northwestern Hilly Region.

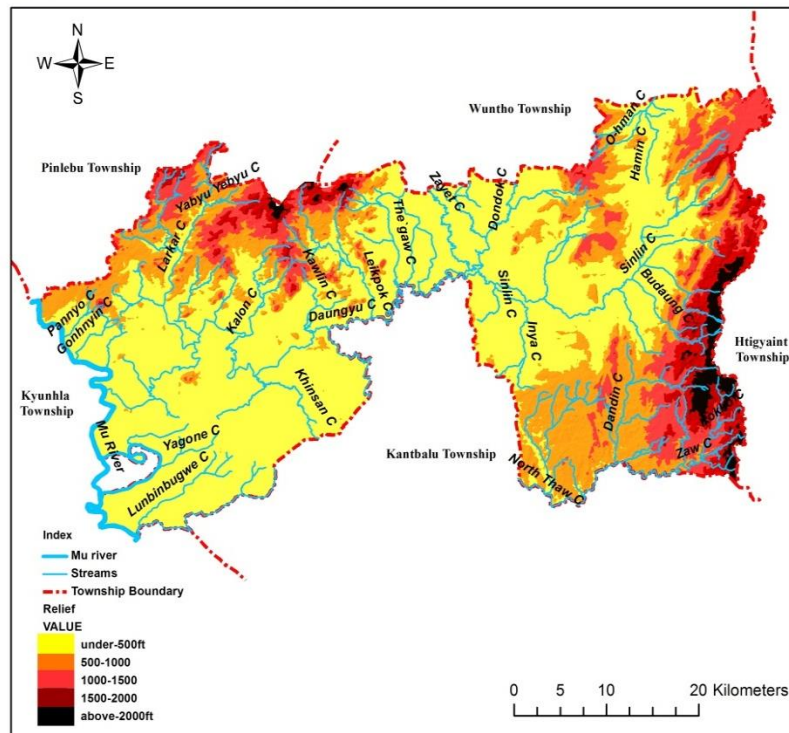
Mu River is the chief drainage of Kawlin Township. Kawlin Township is located in the northern part of Tertiary Basin in Central Myanmar. The rock formations are found as: Alluvium, Irrawaddy Formation, Upper Pegu Group, Male Formation, Granite and Volcanic rocks in Kawlin Township. According to Koppen's climatic classification system, Kawlin belongs to Tropical Savanna Climate (Aw). There are three main types of soils in Kawlin Township such as Meadow Gley Soil,

MAP 1. LOCATION OF KAWLIN TOWNSHIP



Source :Department of Geography , University of Mandalay.

MAP 2. RELIEF AND DRAINAGE OF KAWLIN TOWNSHIP



Source: UTM Map.No.83/P.84/M.93/A.

Yellow Brown Forest Soil and Red Brown Forest Soil. In general, the natural forests in Kawlin Township may be classified into three major types such as Mixed Deciduous Forest, Indaing Forest and Swamp Forests.

The total population of Kawlin Township was 129,908 persons. Kawlin town proper had a total population of 22,672 persons which constituted 17.45 percent of the total population of the township. Kawlin is the headquarters of the township. In 2012, the man-land ratio of Kawlin Township was 3.59 acres. By the year 2012, the total population of Kawlin Township was 129,908 persons, including 22,672 persons of urban residents and 107,236 persons of rural dwellers representing 17.45 percent and 82.55 percent of the total population of the township respectively.

Study Area

Kawlin Township is situated in Sagaing Region. It occupies an area of 730 square mile (467,324 acres). The Land utilization of Kawlin Township is determined by the physical and non-physical factors. Together with the growth of population, the land utilization of Kawlin Township is changed with time. The systematic utilization of land can be able to promote the regional development. To suggest for better use of land, the land utilization of Kawlin Township is analyzed from the geographical point of view.

Aim and Objectives

The main aim and objectives of this research are to provide the better land utilization under existing conditions and under changed conditions with a view to raise the regional development of Kawlin Township.

The objectives are;

- _ to study the physical factors that are affecting upon the land utilization in Kawlin Township.
- _ to examine the non-physical factors that are affecting upon the land utilization in Kawlin Township.
- _ to present the spatial variation of land utilization in Kawlin Township.
- _ to analyze the temporal changes of land utilization in Kawlin Township.
- _ to predict the future trend of land utilization in Kawlin Township.

Data Collection and Methodology

Acquisition of relevant data for this research involves secondary and primary sources. The essential information to the research problem and general background information for the research problem can be obtained from books, papers and internet websites.

The essential data for this research may not exist in published form. Therefore secondary data were collected from departments and offices. Most of the data concerning the land utilization are taken from Land Records Department of Kawlin Township.

Primary data are specially oriented to qualitative analyses by taking field trip to the selected area, questionnaire and structured interview.

In this research, the collected data have been classified and processed firstly and then these are transformed to the form of maps and figures by applying appropriate methods. To analyze the intensity of land utilization, the statistical techniques have been used in this research. The temporal changes of land utilization have been analyzed with the help of Geographic Information System.

Classification of Land Utilization of Kawlin Township

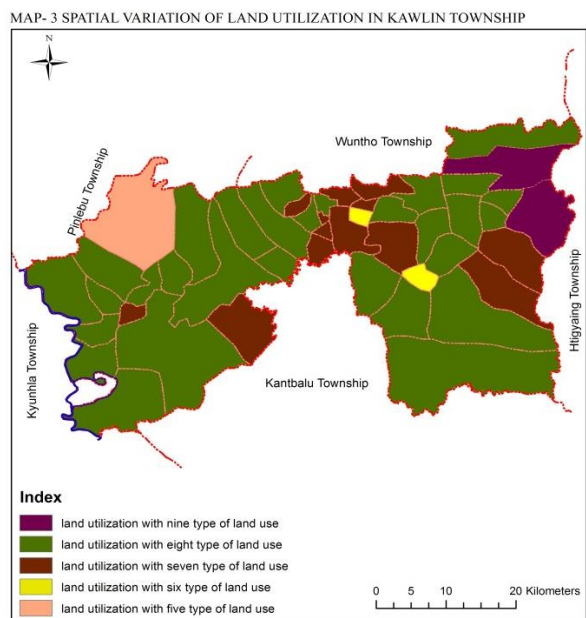
The classification of land utilization in Kawlin Township can be found into 13 main types. These are: forest lands occupying 55.87 percent, agricultural lands occupying 25.78 percent, cultivable waste lands occupying 8.3 percent, water body area occupying 1.7 percent, residential land occupying 0.8 percent, transportational land occupying 0.5 percent, institutional land occupying 0.3 percent, mining land occupying 0.3 percent, industrial land occupying 0.007 percent, commercial land occupying 0.002 percent, recreational land occupying 0.001 percent, waste-land occupying 0.01 percent and other land occupying 6.43 percent.

There are eight types of land use in Kawlin Town Proper. These are residential land use, institutional land use, transportational land use, water body area, commercial land use, industrial land use, recreational land use and waste-land. The land utilization in the rural area can be divided into five groups. They are land utilization with nine types of land use, land utilization with eight types of land use, land utilization with seven types of land use, land utilization with six types of land use and land utilization with five types of land use. In Kawlin Township, Singone and Padonemar village tracts used nine types of land use on their lands. There are 29 village tracts which use

the land with eight types of land use. Although the total numbers of their types of land use in these village tracts are alike, the types of land use are different in some village tracts. There are 13 village tracts which use their lands with seven land use types. Thapyayaing and Natkyikone village tracts use six types of land use on their lands. Land utilization with five types of land use can be found in Larkar Village Tract.

In Kawlin Township there are thirteen types of land uses, but all of the thirteen land use types are not found together in any one place. The village tracts which used the largest number of land use types are found in the village tracts of Singone and Padonemar. Nine types of land uses are found in these two village tracts. These two village tracts lie on the north-eastern part of Kawlin Township along the foothills of Minwun Range. The land surface of the village tracts has elevation ranging from 500 feet to 1,500 feet above sea level. The total area of the two village tracts was 33,947 acres where 63.3 percent of the land area was used as forest lands. As it is a highland region, forest land use is mostly found. The remaining land use types are few.

Eight types of land uses are found in Kawlin Town Proper and 29 village tracts of Kawlin Township. In Kawlin Town Proper, residential land use occupied 68 percent; Kawlin is the Government Headquarters of Kawlin Township. That is why, residential land use, institutional land use and transportation land use are mostly found in Kawlin Town Proper. Three village tracts with eight land use types can be found on the north eastern and western part of Kawlin Township. Sweya village tract



Source :Based on Table 1

Table .1. Land Utilization in Rural Area of Kawlin Township (2014-2015)

S r N o	Category	Nu m b e r o f V i l l a g e T r a c t	Area (Acres) by Types of Land Use										Total
			Agricu ltural Land	Fores t Land	Cult ivab le Was te Land	Mi nin g Land	Transpo rtational Land	Resid ential Land	Wa ter Bo die s	Indu stria l Land	Instit ution al Land	Ot her Land	Area (Acre s)
1	Village Tractst with nine Types of Land Use	2	5,783	21,452	3,349	1,130	126	163	331		34	1,574	33,942
2	Village Tractst with eight Types of Land Use	29	83,916	185,747	33,793	266	1,414	2,093	6,250	28	713	23,374	337,828
3	Village Tractst with seven Types of Land Use	13	26,213	29,324	1,295		619	701	1,291	8	285	4,662	64,164
4	Village Tractst with six Types of Land Use	2	3,831		323		42	137	160		33	447	4,972
5	Village Tractst with five Types of Land Use	1	759	24,606			30	40	5				25,440
	Total	47	120,502	261,129	38,760	1,396	2,231	3,134	8,037	36	1,065	30,057	466,346

Source: Land Record Department of Kawlin

lies on the north-eastern part of Kawlin Township, and *Sinlin chaung* flows through the plain region which has an elevation below 500 feet above sea level. In Sweya Village Tract, agricultural land use occupied 59.7 percent of the area of the village tract. The main economic activity of the village tract is agriculture and the area of agricultural land use is the largest. As there are gold mining sites and other sites for mining other minerals, mining land use occupied the second largest area of the village tract.

On the western part of Kawlin Township lies Nanwentaw Village Tract and on the north-eastern part of Kawlin Township lies Mingone Village Tract. Both village tracts are in a plain region with an elevation below 500 feet above sea level. The total area of the two village tracts is 4,980 acres and 79.3 percent of the land is used as agricultural lands. As the elevations of the land surface of the village tracts of Sweya, Nanwentaw and Mingone are less than 500 feet above sea level, forest lands are not found.

Out of the 29 village tracts which used eight types of land uses, 26 village tracts have similar types of land use. The total area of all these village tracts is 329,757 acres and forest land occupied 56.31 percent of the total area of these village tracts. The average elevation of the land surface of the village tracts is below 500 feet above sea level but the land surface rises as hills from 1,000 feet to 1,500 feet. As Mixed Deciduous Forests and Indaing Forests grow on these lands, the areas of the forest lands occupied the largest percentage of the lands of these village tracts. In Kawlin Township, there are 13 village tracts with seven types of land uses. According to similar land use types, the village tracts can be divided into five groups.

In group I, only Kayargone Village Tract with an area of 686 acres is included. The agricultural land use occupied 63.41 percent of the total area of this village tract. In group II, only Ngapwelay Village Tract is included. Its area is 1,382 acres and agricultural lands occupied 79.8 percent of the total area. In group III, there are six village tracts with a total area of 14,143 acres. The agricultural land occupied 71.4 percent of the total area of these village tracts. The eight village tracts which are included in groups' I, II and III are flat plain regions with elevation below 500 feet above sea level. There are no forests in these village tracts and agricultural lands are the most used lands.

In group IV, the village tracts of Phale and Warthegone are included. These two village tracts are located on the eastern part of Kawlin Township and are also

located at the foothills of Minwun Range. The elevation of these two village tracts which lie in the highland regions are ranging from 1,000 to 2,000 feet above sea level. The area of the two village tracts was 22,482 acres, with various land uses. The percentages of the land uses of the village tracts are: forest lands 64.1 percent, agricultural lands 32.43 percent, cultivable waste land 1.41 percent, transportation lands 0.84 percent, water body areas 0.6 percent, residential lands 0.52 percent and institutional lands 0.1 percent.

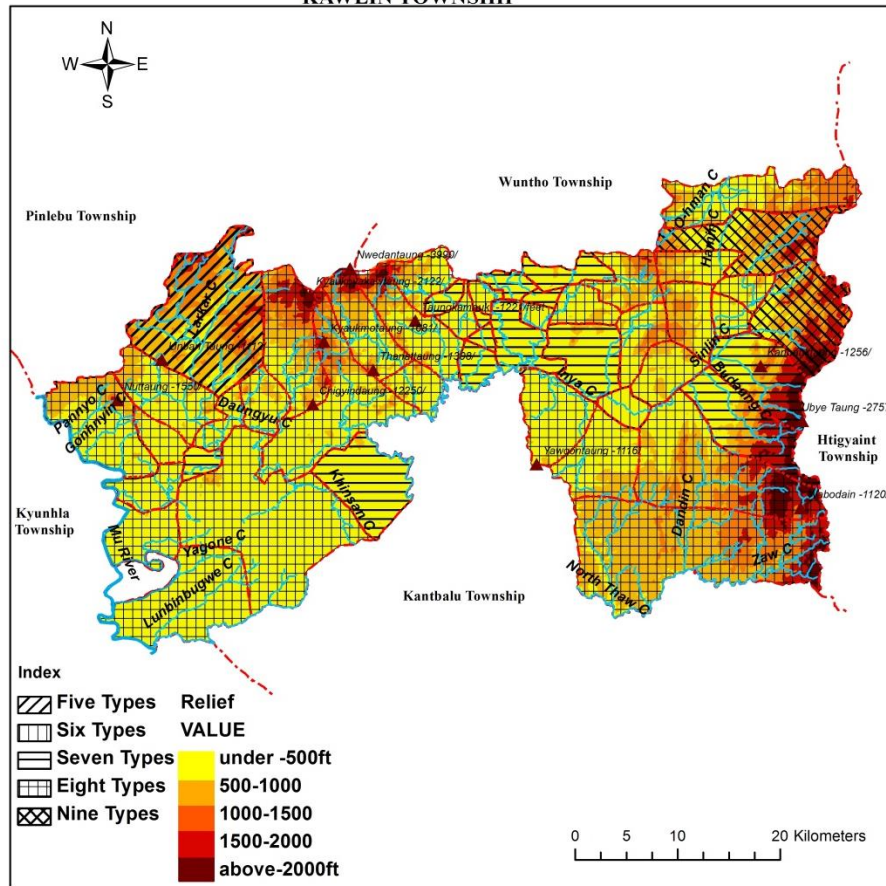
In group V, the village tracts of Umingone, Moenum and Singaung are included. The land use types in these three village tracts are: forest land use, agricultural land use, transportation land use, residential land use, water body area, institutional land use and other land use. The village tracts of Moenum and Singaung are located in the south-western part of Kawlin Township whereas Umingone Village Tract lies in the central part of Kawlin Township. The elevation of the land surface of these village tracts is below 500 feet above sea level. As there are highlands with heights above 1,000 feet in the village tracts of Umingone and Moenum, forest land uses are found there. But agricultural land use is the most land used in the two village tracts. As Singaung Village Tract which lies on the western part of Kawlin Township is adjacent to the Reserved Forest of Chatthin, 94 percent of the village tract is occupied by forest lands. Although the locations of the village tracts which used seven land use types are different, yet it is found that the village tracts with similar topographic features have similar land use types.

In Kawlin Township six land use types are found in the village tracts of Thapyaying and Natkyigone. These village tracts are situated in the central part of Kawlin Township; they are also flat plain regions with elevation below 500 feet above sea level. The area of the two village tracts is 4,649 acres. The percentages of the land uses are: agricultural land use 82.4 percent, water body area 3.44 percent, residential land use 2.94 percent, transportation land use 0.9 percent, institutional land use 0.72 percent and other land use 9.6 percent.

In Kawlin Township, the village tract which has five types of land uses is Larkar Village Tract. Larkar Village Tract lies on the north-western part of Kawlin Township and its land surface has an elevation ranging from 500 to 2,000 feet above sea level. The forest land use occupied 96.72 percent of the total area of this village tract. The types of land use of Kawlin Township vary spatially as they are controlled

mainly by the different conditions of topography. According to Map (4), 73 percent of the area of Kawlin Township is occupied by eight types of land uses. The average height of the region is below 500 feet above sea level.

MAP 4. RELATIONSHIP BETWEEN RELIEF AND LAND UTILIZATION IN KAWLIN TOWNSHIP



Source: Based on Map.2 and Map .3

Conclusion

In Kawlin Township, there are various different land uses due to the control and influence of the physical features of the township. The most used eight types of land uses are forest land use, agricultural land use, residential land use, transportational land use, institutional land use, water body area, cultivable waste land and other land uses. These lands use occupied 71 percent of the land area of the township. There are temporal changes in the area of each land use type in the whole of Kawlin Township. In order to increase the development of each land use type in the township, the percentage of cultivable waste-land should be reduced. Moreover, instead of on the cultivable waste-lands the areas of agricultural lands, residential lands, transportational lands and institutional lands should be expanded.

As the main economic activity of Kawlin Township is agriculture, 25.84 percent of the land area of the township was used as agricultural lands. The cultivable wasteland occupied eight percent of the land of the township and in future, there are prospects to use these lands as agricultural lands which can be expanded later. Although, 83 percent of the village tracts are moderate level of the agricultural land use intensity. By carrying out scientific methods of cultivation of crops extensively in order to get a higher yield of crop, the agricultural land use intensity level will also become high. Finally there will be a more development in the agricultural land use in Kawlin Township.

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