

SPATIAL ANALYSIS ON THE AGRICULTURAL LAND USE EFFICIENCY ACCORDING TO MAJOR CULTIVATE CROPS IN MYAING TOWNSHIP: PAKOKKU DISTRICT, MYANMAR

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Abstract

A systematic and scientific evaluation of agricultural land resources is of paramount importance in regional agricultural land use planning. The interaction of physical, socio-economic and technological factors determine the effective use of agricultural land resource in the study area, to a great extent. Myaing Township lies in the Central Dry Zone of Myanmar and it has different characters of physical features. It has not only hot and dry climate and receives scanty rainfall but also the dominant cinnamon soil and sandy soil which cause the study area to practice subsistence type of agriculture by the local people. Therefore, it is interested to find out that whether the agricultural land use in this township is efficient or not for its people.

Keywords: Agriculture, Land use, efficiency, Myaing Township, Dry zone, Village treats, Irrigation, Major Crops.

Introduction

Land use is the function or functions that humans apply to the land available to them. The study of land use is the study of how the land is managed, including how the natural world is adapted to human needs. Particular areas of land can be utilized by humans in diverse way. Therefore, this research paper aims to evaluate the efficiency of agricultural land which is related to different variables by depicting the spatial distribution pattern of agricultural land use in the recent period. Myaing Township is one township of Pakokku District in Magway Region and is located in the Dry Zone of Central Myanmar. It lies between latitudes 21°25' North and 21°55' North and between longitudes 94°30' East and 95°20' East (Map-1).

Data and Method

Necessary data were collected both from primary and secondary sources. Various concerned government offices such as Land Records Department, Myanmar Agricultural Department, Hydrology and Meteorology Department, Township Peace and Development council, Immigration and National Registration Department were visited to collect the required data. Suitable questionnaires or interviewing method were applied for primary information.

Data Envelopment Analysis (DEA) is used to evaluate the efficiency and yield per acre of cultivated crops. An attempt was made to know and find out efficiency of the agricultural land use by adopting Kendall's Ranking Co-efficient Method considering six variables.

Study Area

The township is constituted, centering the town of Myaing, with one town and 82 village tracts. The former is formed by 3 wards and the latter by 330 villages. Generally, the western and northern boundaries are physical boundaries demarcated along the South Yama *Chaung* (small stream) also called Ngakhon-Yama *Chaung*, then along the Kyunzun *Chaung*, and along the crest of the Shwetagi Fault which is 1,700 feet high. In the east and

in the southeast the boundaries are demarcated, from north to south, along cart-tracks, low hills, gorges and west slope of Shinmataung range.

Relief of Myaing Township can be subdivided into three; (1)western hills and mountain ranges, (2)central undulating plain and (3)the eastern Shinmataung hilly region. There are no perennial stream in Myaing Township. Most of the torrent streams have water in rainy season and in early winter. Almost 90% streams are originating in the western hill ranges and in the central undulating plains and flow into the Yama stream, whereas, those draining to the south and the southeast flow into the Ayeyarwady River. As a whole, the township has a dendritic drainage pattern. (Map-2)

Myaing Township lies in the rain shadow zone of Rakhine *Yoma* (Range) and in the tropical zone. Moreover, as there is no considerably high mountain range in the township, it is hot and less in rain.

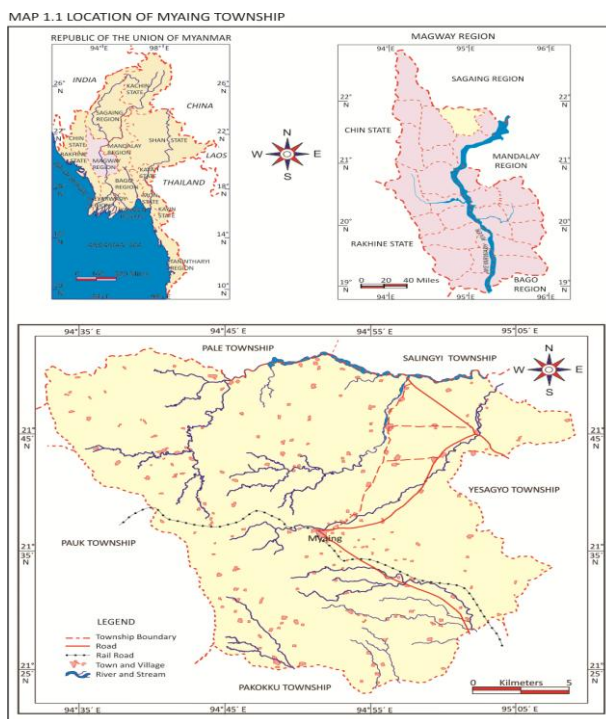


Figure 1. Study Area.

According to the Land Records and Land Survey Department in Myanmar, types of land use are mainly divided into 3 categories, namely: forest land, uncultivated land, cultivated land. The forest cover has been found above the average of 20-year period since 2002-03. It was mainly due to the replantation of community forest by the forest department as the study area is included in 13 areas of Dry Zone Greening Project. Again in 2010-11 and onwards, the forest land area slightly decreased till 2013-14 but not less than the average. It was caused by the local people cut the trees for fuel wood consumption.

Along with the increase of forest land, the virgin land area declined since 2001-02. Among the study period of 20 years, virgin land area for 7 years was more than that of average

value, while the remaining 13 years have been found less than the average. It showed benefit as such type of land is converted into forest land or cultivated land.

The same trend could be found for the land use type of waste land since 2002-03, the waste land area was gradually decreased up to 2013-14. Before 2002-03, its area was more than that of average value for 20 years. This type of land use change also showed the advantage of other land use intensity.

But, in the study area, there was a degeneration of agricultural land use within 20-years span. The decline of net sown area was found since 2002-03 up to 2013-14. There are many reasons. For some village tracts, the rainfall, soil condition caused to reduce the net sown area, while for the others, the reason was labour shortage or crop price. The main reason was the climatic condition and the cultivated areas were left by the farmers who finally changed into another job type especially in the nearby towns or even to abroad.

For 20-year period, the change of fallow land area was fluctuated, but there is negative impact on agricultural land use in 2013-14; i.e. the significant increase of fallow land in these years.

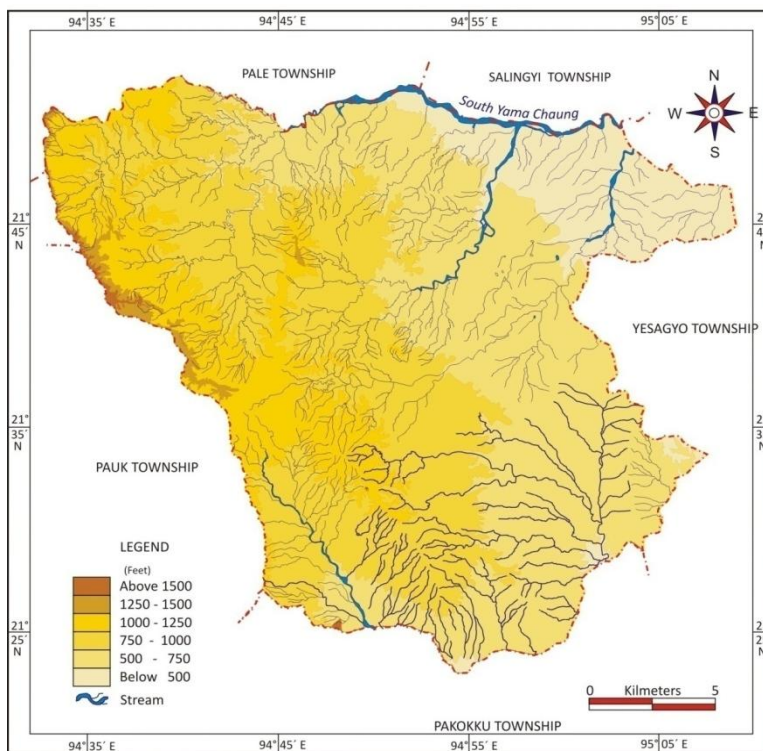


Figure 2. TOPOGRAPHY AND DRAINAGE OF MYAING TOWNSHIP

Soils commonly found in Myaing township are:

- | | |
|--------------------------------|--------------------------------------|
| (1) meadow soil, | (6) red brown eroded savanna soil, |
| (2) dark compact savanna soil, | (7) turffy primitive soil, |
| (3) red brown savanna soil, | (8) primitive crushed stone soil and |
| (4) yellow brown savanna soil, | (9) mountainous yellow brown and |

- (5) red brown crushed stone soil, mountainous red brown soil (Map 3)

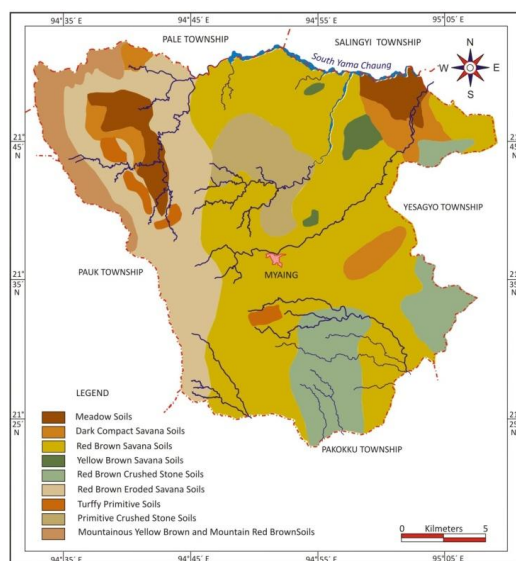


Figure 3. SOIL TYPES OF MYAING TOWNSHIP

Agricultural Bases

Cultivators, Agricultural Labourers and Size of Land Holdings

Most of the rural dwellers in Myaing Township are engaged in agriculture and its related economy. Although they own their lands to cultivate various types of crop, their size of land is relatively small. Even though large size of fields could be practiced by those farmers, the soil condition is not fertile and is sandy. Hence, most of the farmers used to work not only in their own fields, but, also in those of others as labourers. Most of the farmers own land area of less than 5 acres. It is no doubt that the farmers who own more than 20 acres are very less in number (not more than 10 farmers) in all village tracts.

Discussion on General Land Use Types

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Discussion on Agricultural Land Use and Cultivated Crops

The nature of agricultural land use depends on the types of crops and agronomic systems which can vary from intensively managed monocultures to more organic systems involving annual or perennial crops and little use of fertilizers or pesticides. Land Records Department has accepted the 3 different types of agricultural land use. They are: net sown area, fallow land, area sown more than once.

The decrease trend of net sown area could be observed in some village tracts. There were different reasons for such decrease in the village tracts. In the northwestern part of the township, there was more used of land for oil exploitation (very small scale) than that of crop cultivation. In the southwestern part of the township, the infertile soil condition is the main reason for growing various crops. The animal husbandry like raising goat, poultry has become the dominant economic activity in these village tracts at present. Some aspects of urban expansion caused to decrease the cultivated land especially around the periphery of urban area which caused the increase of non-cultivated land use types such as residential land, commercial land and industrial land. For example, the factory of agricultural machines is constructed by the Ministry of Agriculture and Irrigation in Thatkeka village tract (north of Myaing Town).

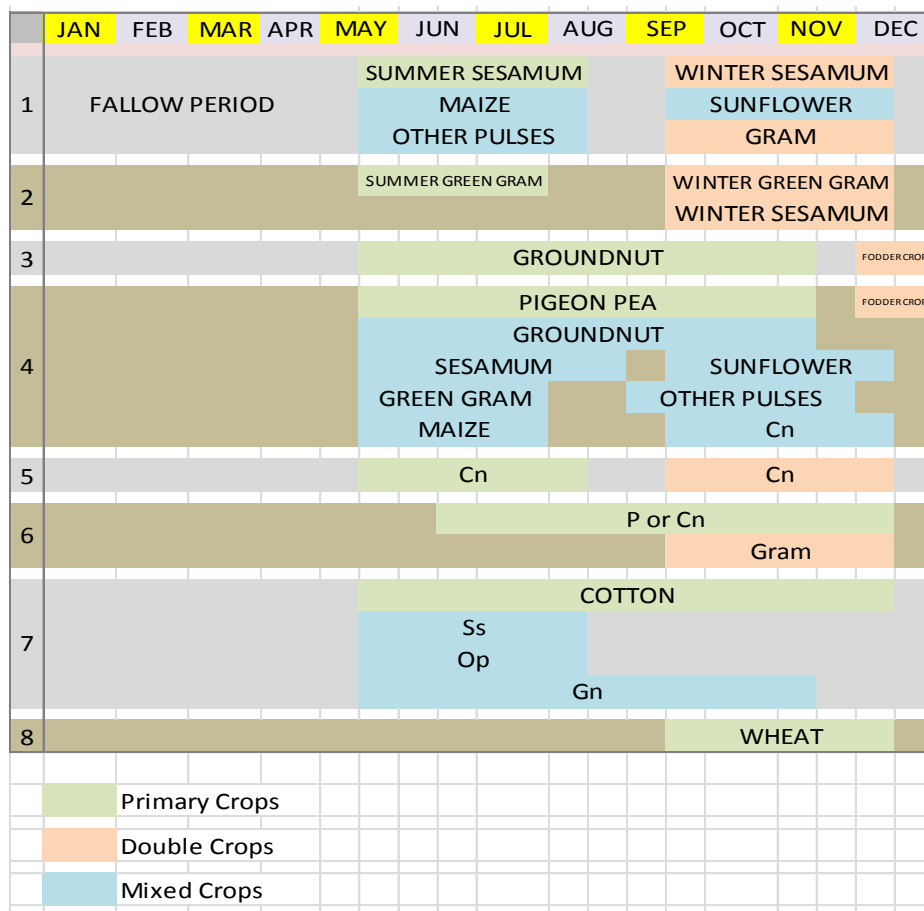
Among 82 village tracts, 58 have been found that more than 50% of respective total area was used for growing crops in 10-year period. The increase of cultivated land was found in the village tracts of Thanbogyi, Bazwa, Hlegouk, Thanutpingone, Thinma, Taungzone, Myosoe, Kantein and Kyanseik. But the amount of such increase area was very less, i.e, only 1-2% of its total area. The main reason was that the conversion of virgin land or cultivable land to cultivated land after 10 years.

It is also necessary to study that the agricultural land in the study area was covered by what sort of crop by a specific method of cultivation. So, some major cultivated crops will be discussed with five different categories and their crop cultivated calendar and they are as follows: Cereal Crops, Oil Seed Crops, Pulses, Plantation, Orchard.

Cn-Corn., P- Paddy., Ss- Sesamum., Gn- Groundnut., Op- Other Pulses.

In the study area, paddy, wheat, pigeon pea, cotton, plantation, orchard and vegetable are grown as primary crops during pre-monsoon and monsoon periods. As the study area lies in the dry zone of the country and as there are less number of water resources, paddy cultivation is not dominant in the study area. Gram, sunflower and other pulses (except pigeon pea and green gram) are mostly cultivated in the study area as doubled or mixed crops. Gram is grown on the land where and when paddy cultivation is not possible due to rolling topography or scarcity of rainfall or late onset of monsoon. When sesamum is faced with problem during harvesting time due to unexpected rain, sunflower is replaced to extract

for edible oil. Therefore, sunflower is mixed with sesamum, or green gram or groundnut. Most of the mixed or doubled crops were grown just for their family needs or local market.



Discussion on Agricultural Land Use Efficiency

The agricultural land use efficiency is an integrated system which considers both the spatial spread of this land resource and the effective ways and means of agronomic practices ranging from single to multiple cropping, types of crops etc, of which this resource is being utilized at an optimum level. For this analysis, one growing year of 2013-14 will be considered as it is important to observe the present situation of land use efficiency in the study area. Apart from that six variables are taken into account: three as positive factors for agricultural efficiency (net sown area, area sown more than once, fallow land) while the remaining three as negative impacts (namely uncultivated land, forest land and virgin land). The magnitude of the variables used for evaluating the efficiency of agricultural land use in Myaing Township is quite uneven and which ultimately gives rise to spatial disparity in the crop cultivation pattern. The range of the composite indices for different village tracts indicates that there is a notable variation in the levels of agricultural land use efficiency within the study area. The indices can be grouped with a suitable class interval to classify

the village tracts into high, medium and low efficiency regions as presented in following table and Map 4:

Agricultural Land Use Efficiency Levels for Village Tracts in Myaing Township (2013-14)

Range	Level	Name of Village Tracts
< 26.25	High	Kyaukkan, Banbo, Phyathi, Pougde, Kyigan, Shwelinzwe, Kundaw, Alean, Htanbontaw, Htanbutaw, Bahim, Oyin Nyaunngdwin, Kantein, Hanawbin, Monnyin, Paunggwe, Magyisu
26.25 -52.5	Medium	Thidon, Sinzwe, Wedaung, Thadut, Htayaung, Chaungzon, Thanbongyi, Pongyigan, Kyauktaung, Ywashe, Letyetma, Ywthitpya, Taunggaine, Taungbo, Bazwa, Kanni, Innyaung, Gwepinle, Paukypin, Thanutpingone, Kyetmauk, Mintharkya, Obo, Htanaungwun, Magyikan, Thinma, Gyokkone, Seikche, Suwin, Sinzein, Kunlat, Wetpoke, Aingma, Pebindike, Chainzouk, Thayetgwa, Doung O, Thinbounggan, Myothar, Thitkyidaw, Myodin, Nyaungywa, Myeyient, Ywadanshae, Kanyarkaung, Kaingdawma, Nhansekan, Twinma, Dahatchauk, Kyauksauk, Paikthin, Sabay, Seiksin, Letsegan, Wetkya
> 52.51	Low	Thamingyauk, Hlegouk, Tegyi, Lingadaw, Myaing 2, Thatkekan, Taungzon, Myosoe, Kyanseik

Note: Compiled by the Researchers.

MAP 5.2 AGRICULTURE LAND USE EFFICIENCY LEVELS FOR VILLAGE TRACTS IN MYAING TOWNSHIP (2013-2014)

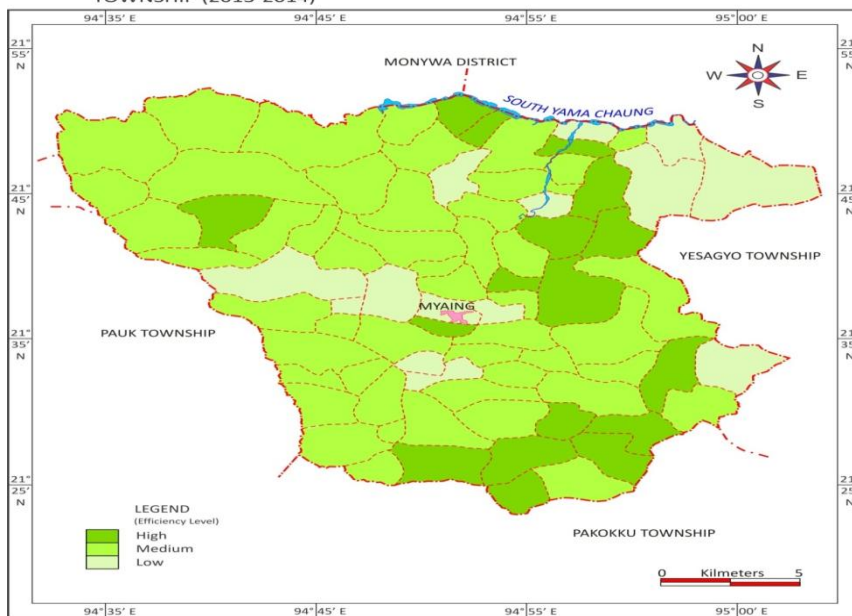


Figure 4. Agricultural land use efficiency.

High agricultural land use efficiency region is embraced with 18 village tracts in 2013-14 among them 9 are located in the northern, northeastern portions of Myaing Township, while in southern and southerastern part, there are eight village tracts, and only one village tract in the northwestern part. The medium agricultural land use efficiencies are found in 55 village tracts of Myaing Township. The low agricultural land use efficiencies are found in nine village tracts of Myaing Township.

Conclusion

The favourable relief conditions and agronomic conditions in relation to agricultural land use are prevailing in these regions but with little variations. This region is also considered to be the potential productive and stable region in terms of agricultural land use development. However, some village tracts have plain topographical conditions that favour for agriculture as well as limited proportion of uncultivable and virgin lands. Apart from that these areas suffered scarcity of rainfall once in three or four years, so that it is the major hindrance for the crop production. That is why, irrigation water should be sufficient by constructing weir or dam. The geographical and agronomic conditions like the poor topographic condition, low rainfall, infertile soils, limited spatial extent of agricultural lands, significant proportion of uncultivated lands and virgin lands in the village tracts with medium level efficiency are not very favourable in one way or the other for ineffective utilization of agricultural land resources at intensive level. Therefore, nine village tracts are found with very low agricultural land use efficiency in the study area. It can be noted that sesamun, pigeon pea and green gram were the dominant crops on the cultivated lands with high agricultural efficiency. The farmers from this township have become realized the benefit of changing crop pattern, i. e. from irrigated paddy cultivation to the market demanded crops. Moreover, cultivation of those pulses also caused refertile naturally. In summing up, Myaing Township is an agricultural region which mainly cultivates the oilseed crops, pulses and paddy in Central Myanmar. Cultivated crops are normally changing based on the types of agricultural land use.

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