

A Study on Identifying Land Use Changes and the Causes Affected to Changes of Land Use Pattern in Monaragala City Area

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Abstract: *This study examines the changes that have occurred in the land use of the Monaragala city area during the period from 1985 to 2018. The main objective of this research is to identify land-use changes, trends, and progress of the land use pattern in the study area and the Causes affected to Changes of Land Use patterns in Monaragala City Area. Three GramaNiladhari Divisions belonging to the Monaragala Divisional Secretariat Division were selected as the study area. Because the City area was located in these three GN Divisions. Quantitative and qualitative data were used for this study using a regional approach and secondary data required for the study were obtained from the Land Use Department of Monaragala District, Department of Agriculture in Monaragala District, and the Agrarian Services Center of Monaragala District. Investigating the nature of the study area which is 1:50000 Metric Digital Data in 1985 and 1: 50000 Metric Digital Data in 2000 and 2018 data is obtained through Google Earth. The data thus collected were analyzed using GIS technology and Excel. After analyzing the data, it was possible to identify the changes, trends, and progress of the land use pattern and the Causes affected to Changes of Land Use patterns in Monaragala City Area. The land area of a home garden which was 4.179km² in 1985 had increased to 5.054km² in 2018. Rubber plantations were introduced to the study area in the year 2000, which resulted in a change in land-use patterns. Accordingly, in the analysis of the data, it was found that by the year 2018, 0.709km² from the study area had been planted rubber. And also the forest cover of 2.032km² in 1985 has decreased to 1.325km² by 2018. The number of paddy lands reduced from 0.417km² in 1985 to 0.219km² by 2018. The rock area of the study area was 0.171km² in the year 1985, and it has reduced to 0.147km² by the year 2018. Thus, at the end of the study, four key factors were identified that could influence changes, trends, and progress in land use patterns in the study area. They are increased service facilities, increased city limits of Monaragala town area, increased habitat, and the introduction of new crops such as rubber.*

Keywords: Land-use Changes, Land Use Pattern, Geographic information systems, Monaragala

1. Introduction

Land use can be defined as the process of comparatively investigating the features of the land according to the land requirements and examining to what extent it can have usage. There are different definitions for this by various scholars, institutions, and organizations. Thus, the World Food and Agriculture Organization define Land Use as (*The Future of Our Land: Facing the Challenge*, n.d.),

“The ground, which consists with various constructions and creations that are done by man and occurred naturally, has many features including biological materials, hydraulic patterns and it is a system which consists with not only various biological processes but also all circular processes which happen on the surface of the land fairly near environmental zones.”

Land-use changes can be defined as the changes that occur timely in the pattern of land use (Juergens & Nachtergaele, n.d.). It can be the changes in increment or decrement of range of settlements, range of forests, or cultivating methods (*Land Use Change - an Overview | ScienceDirect Topics*, n.d.).

Land use can simply be defined as the way man uses the land. Under this topic, we can discuss building construction, economic activities, agriculture, forests, reservoirs, tanks, and anicuts. This land use is changing under various levels like regional, provincial, and national, and global (Chen et al., 2014).

This changing cause due to some factors like weather, soil, trees, market, urban levels, etc (Chen et al., 2014). The methods or the ways used by various countries for land use are different from each other (*Land Use Change - an Overview | ScienceDirect Topics*, n.d.). For example, when we get the land use in the USA, it differs from the land use of Sri Lanka, which is located in the equator. It is based according to the need of the country and is influenced by some physical factors like weather, soil, etc (Read *"Population and Land Use in Developing Countries*, n.d.).

This article focuses on the land use Changes and the Causes affected to Changes of Land Use Pattern in Monaragala City Area.

1) Significance of this study

This study expects to investigate the land-use changes in selected three GNDs (Magandamulla, Monaragala and Viharamulla) in Monaragala district from 1985 to 2018. Here can be identified some important points. They are,

- Examining the development of urban settlements in the selected three GNDs in Monaragala district in 2018 when compared with 1985.
- Examining the forest destruction in these GNDs during this period.
- Study the reasons for this forest destruction and present information, which is helpful for the authorities to take suitable actions.
- Ability to identify temporal changes in agriculture in the selected three GNDs.

- Ability to identify the areas of ancient tanks and new water spreading areas in these selected three GNDs. (Tanks, Anicuts, Channels)

These kinds of significance can be obtained from this study.

2. Research Problem

The research problem of this study is examining the Land Use of selected three GNDs (Magandamulla, Monaragala and Viharamulla) in Monaragala District, which is the second-largest district among 25 districts in Sri Lanka. It is in the Dry Zone. Further, this research expects to examine whether there are changes in land use in this selected three GNDs in Monaragala district in the last 33 years by using GIS. The research problem of this study is examining the land use Changes and what are the Causes of affected Changes in Land Use patterns in Monaragala City Area.

3. Research Objectives

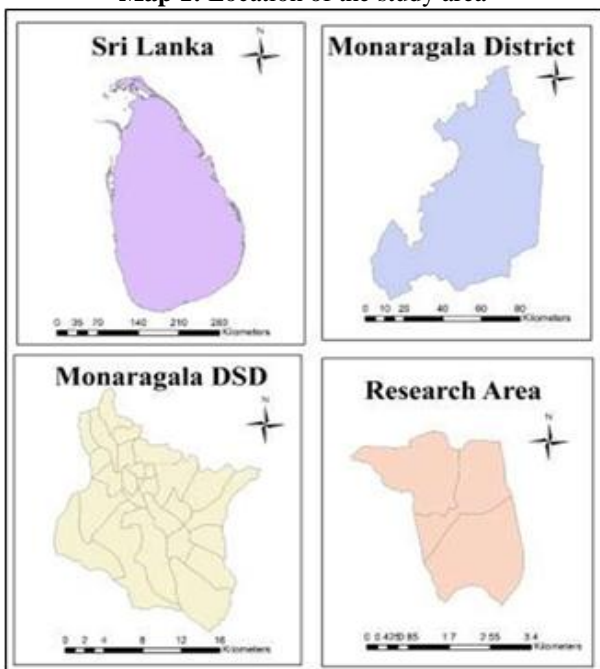
The main objective of this study is to identify the land use Changes and what are the Causes affected by the Changes of Land Use Pattern in Monaragala City Area.

4. Methodology

4.1 Study Area

This study examines the changes in land use in selected three GNDs (Magandamulla, Monaragala and Viharamulla) in Monaragala district, which is in a dry zone in Sri Lanka. The research location of this study includes 7.5 square Kilometers. (These particular GNDs) was selected through dissolving by calculating Geometry. The map no. 01 below depicts the location of Monaragala district, which is the research location of this study.

Map 1: Location of the study area



Source – Created by using GIS 10.1, 1:50000 Digital data, Survey Department of Sri Lanka

Data collection

When doing this research the need of having quantitative data is very important. Secondary data was collected according to a selected method. The secondary data are collected from the Land Use Department in Monaragala District (the maps and information that shows the special development of cultivating areas), the Agriculture department in Monaragala district (information about the agricultural works in the district), Agrarian office in Monaragala District (the agricultural information from the beginning to the end of the cultivation) and as well from google earth and 1:50000 metric maps used to get secondary data for this research.

Secondary data sources were used in this study to finish this study successfully. Thus to investigate the nature of the research location it was used 1:50000 in 1985 and 1:50000 Digital Data were made in 2000 and then began to use it. These secondary data sources were collected from the Department of the survey to obtained high accuracy at the end of the study. Finally, to examine the changes in land use patterns it was used a satellite image in google earth, which mentioned the nature of land use in 2018 and it was used because still there were not found any other secondary map (1:50000 map) better than this to get a clear understanding about the comparative nature of land use in past and present.

Data analysis

Data analysis is an important section in the study and obtained secondary data should analyze first. There, maps show the change of land use in each year and the changes of the extent of land will be depicted by graphs. The diagram below shows how the data analysis in this study was performed.

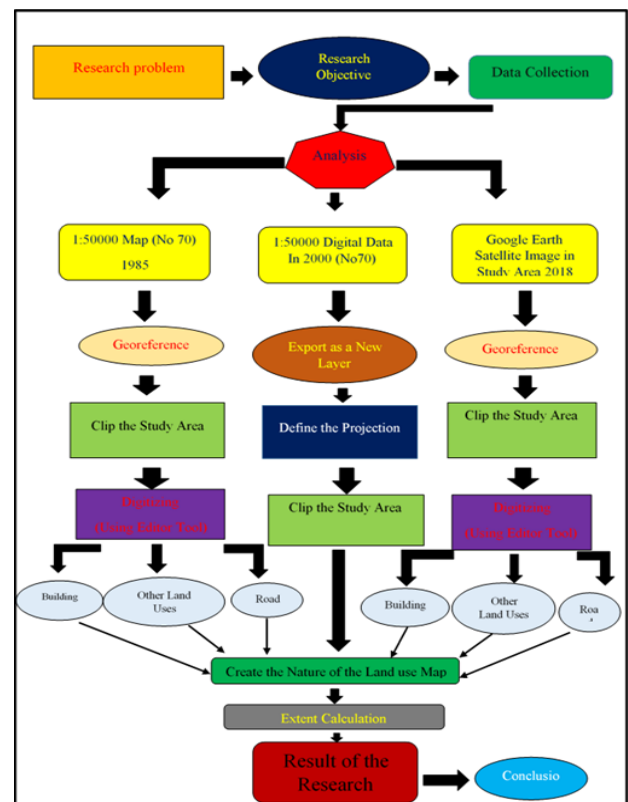


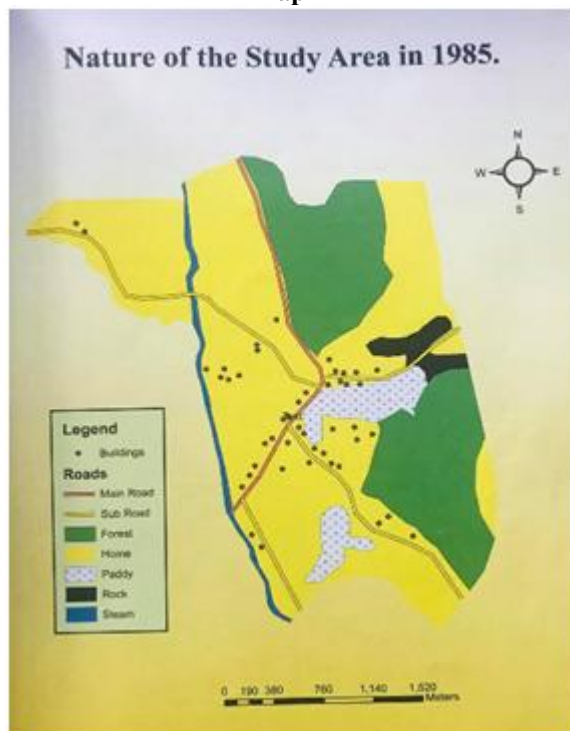
Figure 1: Flow diagram of the study

Source – Create by Author

5. Result of the Study

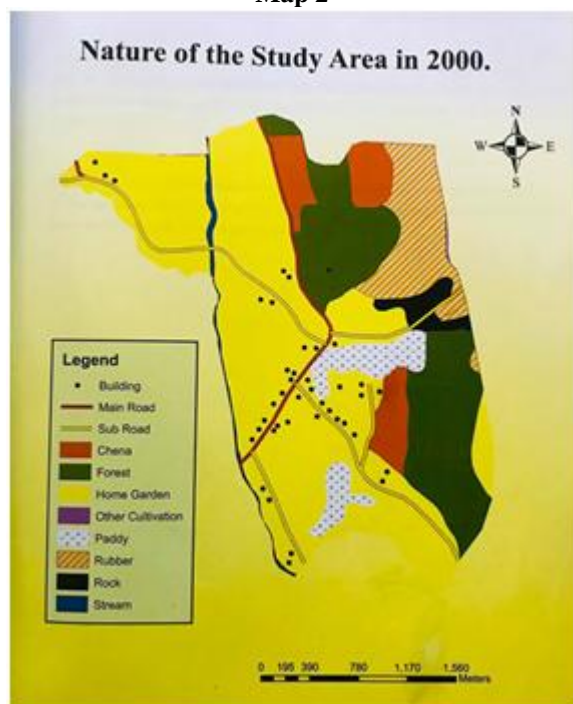
This study aims to investigate the changes in the pattern of land use and the Causes affected by the Changes of Land Use Pattern in Monaragala City area from 1985 to 2018. Those GNDs are Monaragala, Magandanamulla and Viharamulla. The nature of land use of this particular area was examined three times; 1985, 2000, and 2018.

Map 1



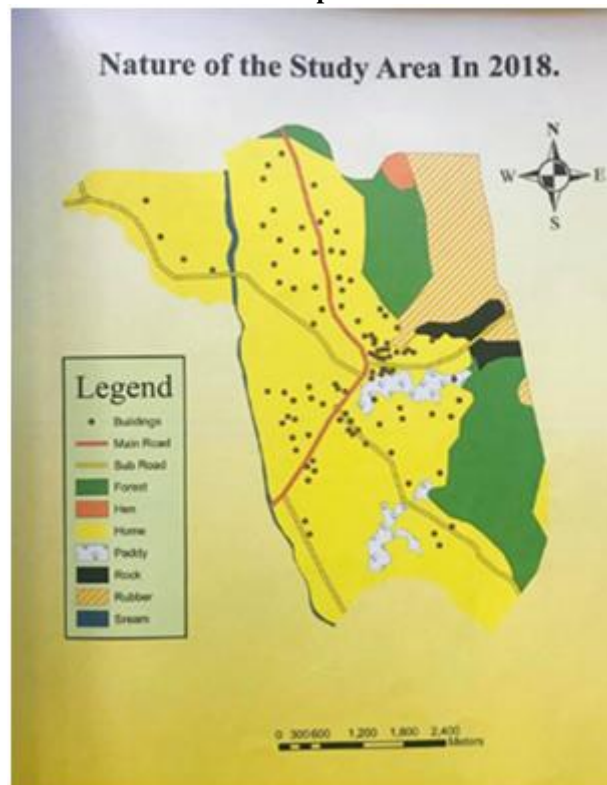
Source – Created by using GIS 10.1, 1:50000 Digital data, Survey Department of Sri Lanka

Map 2



Source – Created by using GIS 10.1, 1:50000 Digital data, Survey Department of Sri Lanka

Map 3



Source – Created by using GIS 10.1, Google Earth Map, 2018

The 03 maps above illustrate the changes in land use over time. Table 01 below shows the land use of the study area in the year 1985.

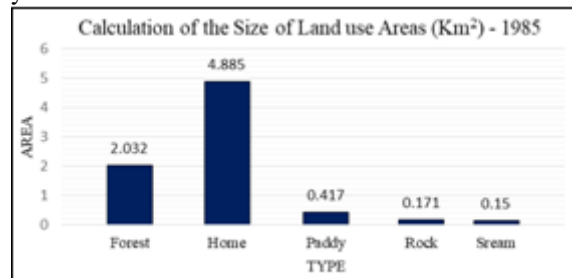


Figure 1

Source – Create By Author

Accordingly, most of the land in the area was used for home gardening in that year. It is recorded as 4.885km². Secondly, there are forests in the area which is 2.032km². Other land uses in the area are paddy cultivation, rock, and drainage system. It is clear that these are all less than one square kilometer.

In 1985, the land use pattern in the area is changed. Accordingly, the following Figure 02 shows the land use pattern of the study area in the year 2000.

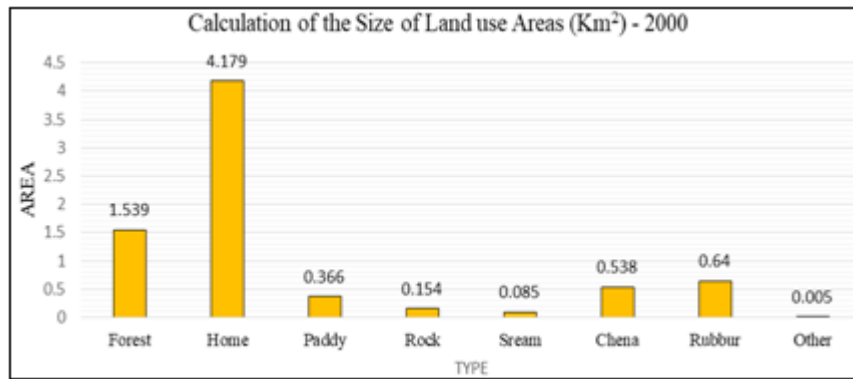


Figure 1

Source – Create By Author

Thus, it can be seen that the size of home gardens has decreased by the year 2000. That is, the extent of plantation land which was 4.885Km² in 1985 has been reduced to 4.179km² by the year 2000. It is also clear that the area of forest in the area has decreased in the year 2000 as compared to the year 1985. That is, from 2.032km² to 1.539km². Besides, paddy, rock, and drainage areas have been reduced and it is clear that chena cultivation and rubber cultivation have started in the area. In particular, the introduction of rubber cultivation in the area has led to a decline in other land uses in the area. Figure 03 below shows the land use of the study area in 2018.

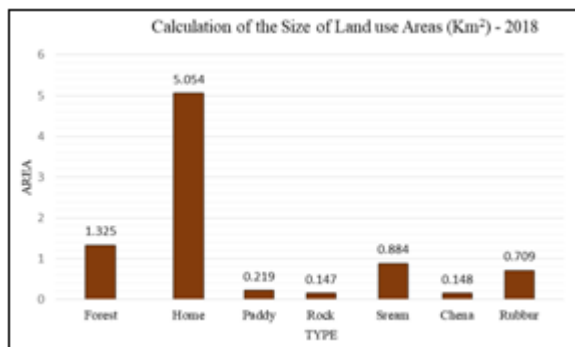


Figure 3

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By the year 2018, the area of home gardens and rubber plantations has increased. Home gardens up to 5.054km² and rubber plantations up to 0.709km². But other land uses in the area, such as paddy, rock, and stream, have declined. These tables highlighted that there are certain changes in land use in these selected areas.

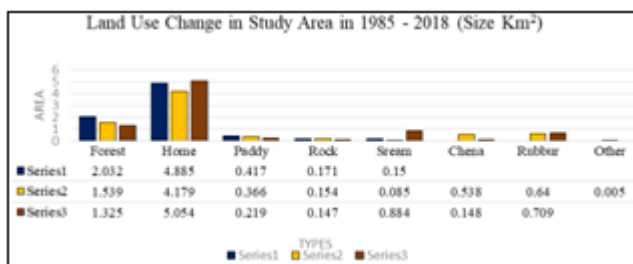


Figure 4

Source – Create By Author

The above-given table proves it and the series 1, series 2 and series 3 in the table indicate the patterns of land use 1985,

2000, and 2018 respectively. According to that figure, it is clear that there was a decrement in the spreading of forests in 2018 when compared with 1985. That is in 1985 the extent of the forests of that zone was 2.032km² but in 2018 it was only 1.325km². By examining these maps, it implied that there is an increment in the spread and extent of land used for home gardens. There was a gradual change from 1985 to 2018. There was an increment in the land extent, which was used for streets and rubber cultivation because many institutions including the river reserved area *Monaragala Pradeshiya Sabahawa* had taken conserved actions and encouraged people to engage in Rubber cultivation. People in these areas tend to sell stones in stone quarries by giving out paddy cultivation and Chena cultivation and they construct buildings and rent them. So that there was a decrement in paddy and Chena cultivation.

Therefore, it implied that there are land-use changes in these areas. The above mention factors can be taken as the reasons for this change. These GNDs are in a town area and it may also affect the pattern of land-use changes in these GNDs.

6. Conclusion

The main objective of this study is to identify the land use Changes and what are the Causes affected by the Changes of Land Use Pattern in Monaragala City Area from 1985 to 2018. Accordingly, by analyzing data and the results of this study it can be concluded that the main objective of this research study was completed. Especially the reasons to change the pattern of land use in these GNDs were, introducing Rubber cultivation, regional development activities, developing Monaragala as a town, and developing settlements in those areas as there were sanitary facilities. Therefore, it can conclude that there can be seen clear changes in the pattern of land use in selected three GNDs near Monaragala town and the above-mentioned factors are the effect of that change.

References

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