

Research Article

Land Use Management in Colombo Municipal Council Area

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Abstract Colombo city is the commercial capital and the largest city in Sri Lanka. It is located on the west coast of the island and adjacent to the Greater Colombo area which includes Sri Jayawardenepura Kotte. It is the financial Centre of the island as well as a popular tourist destination. As the vast development in the city and the increase of the need of people, People used to gather in the city as well as around the city. So the land requirement of the city is being increased in various ways. So that monitoring the land use against the land use requirement is essential to identify the land use changing patterns in the city. The objective of this study is to detect the land use changes in the Colombo city Municipal Council area between years 2000 and 2016 using spatial data, non-spatial data of Colombo city and analysis data using GIS software.

Keywords *Land use; GIS; Management; Monitoring; Changing Pattern*

1. Introduction

A Geographical Information System (GIS) is a system for capturing, storing, analyzing and managing data and associated attributes, which are spatially referenced (Lyengar, 1998). The concept of the GIS system was begun with the study of John Snow about the cholera that had been distributed through the London city. Then onward in 1962, the world's first true operational GIS was developed by the federal Department of Forestry and Rural Development in Ottawa, Canada by Dr. Roger Tomlinson. Today GIS is being used in various purpose such as scientific investigations, resource management, asset management, environmental impact assessment, urban planning, cartography, criminology, history, sales, marketing, and logistics etc. Land use management is benefited by GIS in many ways as interpretation of results are clear and easiness of understanding (Trung, 2006). Three land use decision elements have been used at regional scale such as (1) the distribution of land cover, population, and human activities over the landscape, or infrastructure; (2) the social organizations present in a region, or structure, and (3) the ideas, values, and attitudes that people have about the particular uses of the land, or superstructure (Smith et al., 1995). In the prospective of proper planning and utilization of natural resources and their management, land use and land cover is very important (Asselman et al., 1995). Geographic Information System (GIS) and Remote Sensing (RS) are now providing new tools for advanced ecosystem management (Sreenivasulu et al., 2014) and also use of satellite data is to take advantage of increasing amounts of geographical data available in conjunction with GIS to assist in interpretation (James R. et al., 1976). Land use of Sri Lanka will increase day by

day with the population increase (Mapa, 2002). It will affect to most of the urban cities, mainly Colombo city which is the largest city of the country as well as commercial capital. With the development of the country needs of people will increase and demand of land will increase. As a solution for the demand of the lands in Colombo city, proper land use management plan has to be made and changing of land use patterns and trends should be monitored. So this study is to identify the land use patterns in Colombo municipal area and forecast the future demand in Colombo city lands.

Colombo city is located on the west coast of the island and adjacent to the Greater Colombo area which includes Sri Jayawardenepura. Because of the natural harbor located in Colombo a lot of sailors were attracted to the country by identifying the advantage of the country. As a result of that country was attacked by Portuguese, Dutch and British successively. As a result of that colonial rulers built Colombo city by giving their priority to the Colombo port area. Afterwards the city was developed mainly concentrated among the port area and towards the northern highland area of Mattakkuliya where housing and warehouses were located. The eastern flood plain remained undeveloped while the southern area and coastal belt of the city attracted the middle and high income inhabitants. The present administrative demarcation is coming from evolutionary development on the Colebrook reforms introduced in 1833 during the British colonial rule. They divided the country into 5 provinces as it is easy to manage. Based on the complexity of the country, again they introduced new provinces to the country in year 1845 to 1889. Finally, it was divided into 9 provinces and no further divisions were carried out in provinces wise until present. Again the country had been divided into 20 districts, and with the time it was changed to 25 districts. Boundaries of these districts have been changed time to time.

In 1991 every district had been divided into sub division called Assistant Government Agent. Later on those division areas were called Divisional secretarial areas and which have been again divided in to Grama Niladhari divisions. These Grama Niladhari divisions are made, of either a collection of small villages or, of a part of a larger village. And again every district was divided in to Municipal Councils, Urban Councils and Town Council by considering the state of the area. In Colombo district there are 13 divisional secretaries, 557 Grama Niladhari divisions, 5 Municipal Councils, 5 Urban Councils, 3 Pradeshiya sabha areas (Source: Census and Statistics, 2012).

In this research it is going to be analyzed Colombo Municipal Council area land use patterns to carry out a better development plan in the city. Approximately 15% of the total urban population of the country lives in Colombo Municipal Council area. Land area of the CMC area is 37.3 squares Kilo meters and consist with two divisional secretariats. Which are Colombo D.S. Division with 35 Grama Niladhari divisions, and Thimbrigasyaya with 20 Grama Niladhari Division. Colombo CMC area consist 5 electorate areas. Which has been divided into 47 wards and 15 postal zones for administrative purposes and as the core area of the country, Colombo city has subjected to vast land use changes because of population increase in the city. The development of the port; the construction of roads and railway lines radiating from Colombo to all parts of the island; the rapid growth of the export trade based on plantation agriculture; the concentration of industrial, commercial, communicational, business and financial, administrative, health, educational, recreational functions in Colombo, attracted migrants to the city. So that the increase of hotels in the city area has been increased. As the almost all the main branches of companies are situated in the city population flow from different areas, cities, villages etc. has been increased.



Figure 1: Colombo Municipal Council Map

2. Objectives

The main objective of the study is to identify the changing pattern of land use in Colombo Municipal Council in Sri Lanka. In order to achieve this main objective, the following specific objectives are also to be achieved.

- To identify the pattern of urbanization.
- To study the main factors of the change in land use.
- To identify the temporal pattern of the land use changes.
- To forecast the future trends and changes in land us

3. Methodology

Case study of the selected area and scope of the research was identified. Study area limited to the Colombo Municipal Area as the current issue is highly effect on that area. Research proposal and literature review were prepared and Data was collected from relevant agencies. Then Data analysis was carried out using GIS software. Flow chart of the methodology is shown in Figure 2.

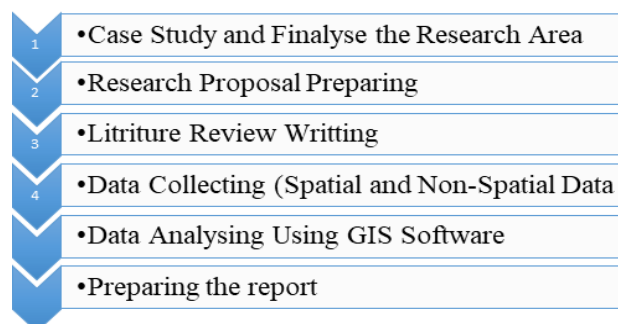


Figure 2: Flow Chart for Methodology

3.1. Data Collecting

In this research, it has collected two types of data to analyses the task. Which are spatial data, non-spatial Census and statistic data. Spatial data was obtained by Obtain by Urban Development Authority. Census data was obtained by Census and static Department. Spatial data that was collected is 2001- 2014. Land use shape files from Urban Development Department. Census and Statistic data of 2001, 2012 from Senses and Static Department.

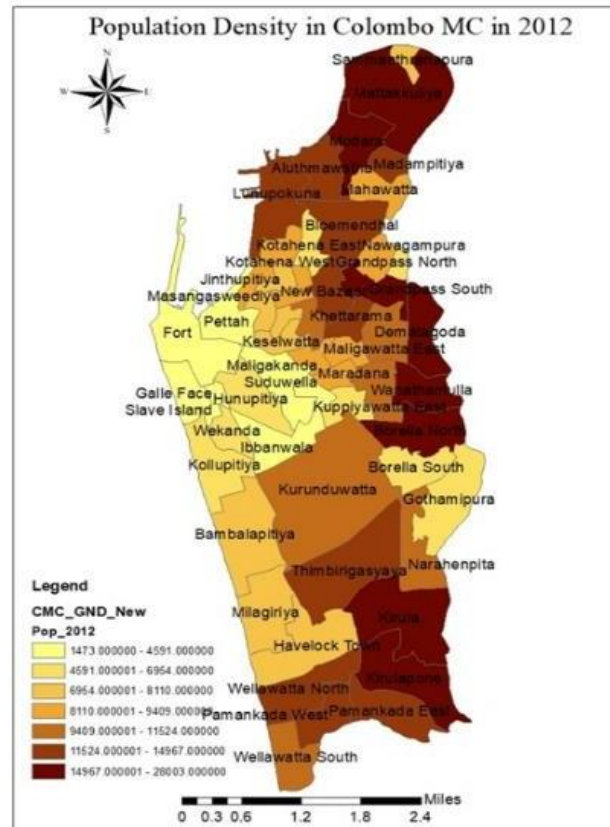


Figure 3: Population Density in CMC area

4. Results and Discussions

Land Extend in Colombo Municipal Council is shown in Table 1. It was divided in to two DS Division namely Colombo and Thimbirigasyaya. Thimbirigasyaya has higher extended than Colombo. The next outcome is population; Population distribution is changing in vast range in the area. High population density is appearing in Kirula, Kirulapone, Grandpass South, Modara, Mattakkuliya, Wanathamulla East, Borella North. Around 15000 to 28000 of population live in these areas. Least distribution of the city is around 1473 to 4591. The least population is identified in Fort area is 1473 (Table 2). The other consideration is Land use pattern; Land use pattern in 2014 at Colombo Municipal Council, Formal law density residential unit, Commercial, Industrial and Transport Units and Formal High Density Residential Units are shown in Figures 4, 5, 6, 7 and Table 3 respectively.

Table 1: Land Extent in Colombo MC

| D S Division | Area Sq.km |
|-----------------|------------|
| Colombo | 14.59 |
| Thimbirigasyaya | 18.29 |

Table 2: Land use in Colombo MC Area

| Land use Type | Area (hectare) |
|---|----------------|
| Agricultural land | 14.59 |
| Commercial , industrial and transport Units | 110441.55 |
| Construction Sites | 1310.27 |
| Forest | 4499.61 |
| Formal high density residential | 220199.72 |
| Formal low density residential | 195114.78 |
| Other Natural and Semi- Natural area including wetland | 7334.23 |
| Urban Greenery | 59289.01 |
| Vacant land not obviously being prepared for construction | 15641.61 |
| Water bodies | 9028.16 |

Table 3: Building Units in Colombo Municipal Council

| | Colombo | Thimbirigasyaya | Total | Percentage |
|-------------------------|---------|-----------------|-------|------------|
| Single Stories | 42881 | 34040 | 76921 | 62.83 |
| Two Stories | 15057 | 11955 | 27012 | 22.06 |
| More than two stories | 1483 | 1178 | 2661 | 2.17 |
| Attached House/ Anex | 2472 | 1178 | 3650 | 2.98 |
| Flat | 3001 | 2380 | 5381 | 4.39 |
| Luxury Apartment | 505 | 402 | 907 | 0.74 |
| Twin House | 389 | 307 | 696 | 0.56 |
| Row House/ Line Rome | 1857 | 1473 | 3330 | 2.72 |
| Hut/Shanty | 598 | 475 | 1073 | 0.876 |

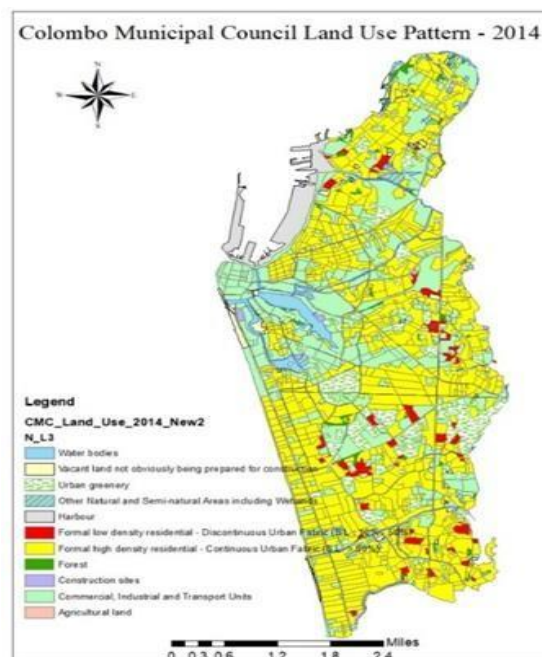


Figure 4: Land use pattern at Colombo Municipal Council

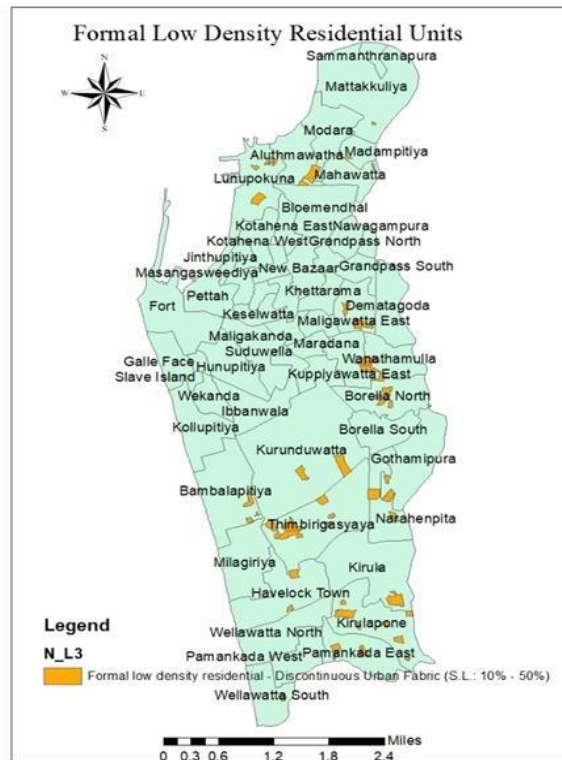


Figure 5: Formal Low Density Residential Units

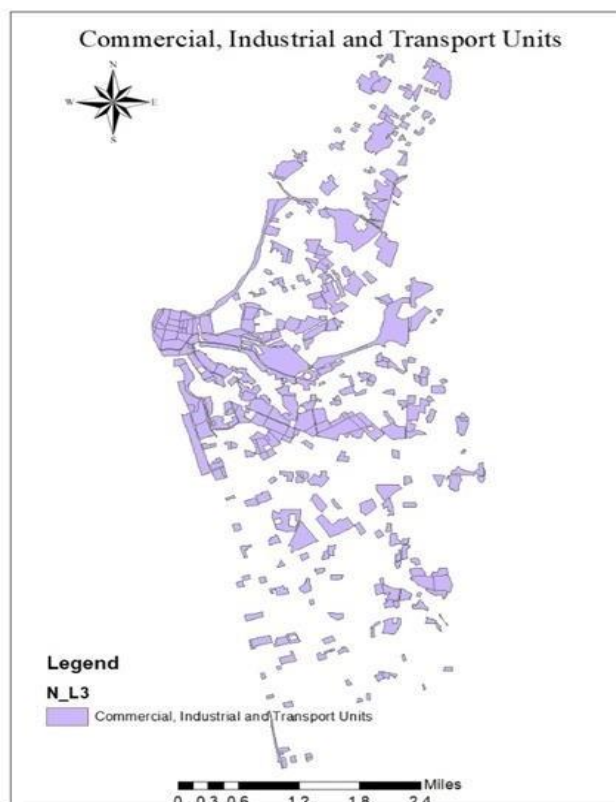


Figure 6: Commercial, Industrial and Transport Units

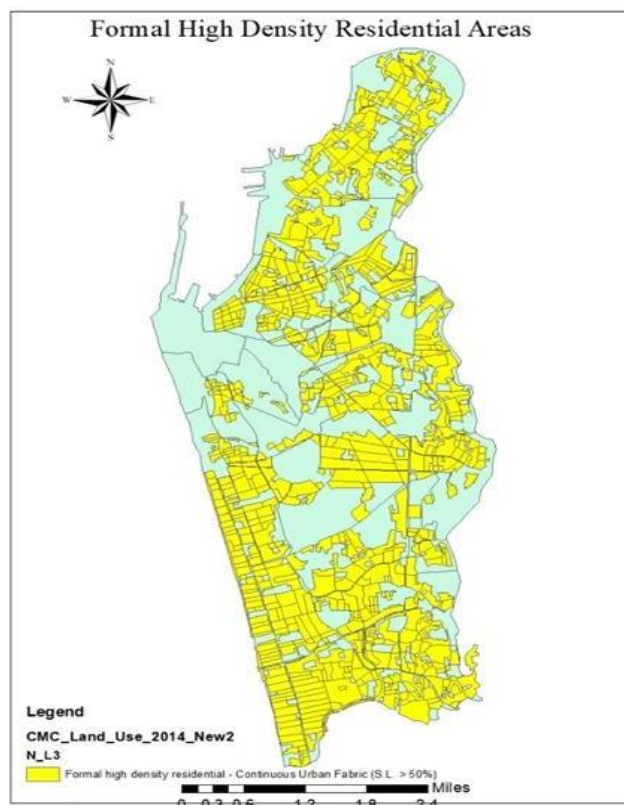


Figure 7: Formal high Density Residential Units

5. Conclusion

Most of urban centers are concentrated at west coast and Southern part of Sri Lanka. Suburbanization process can be identified very fast in Colombo city and surrounding cities around Colombo. When we consider the land use changing pattern in Colombo Municipal Council, we can see high density residential are high in the city while less agricultural land present in the city. No of one story houses, Dwelling, Shanties are a major issue as which reduce the land value of the city. As we can see 62% from the total buildings are single story buildings. Single house more than two story buildings are less than 3 present. As we compared with the population increase of the city near future the city will be over dense and proper rules and regulation have to be amended.

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