Land Use Change in Manmunai North D.S Division

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Abstract

Land use change is necessary and essential for economic development and social progress. Even though, land-use changes involve economic and environmental effects with implications for global climate change, wildlife, and other policy issues. The study is conducted to identify changes of land use patterns in Manmunai North D.S Division in Batticaloa district. The study also conducted to identify the present and past land use pattern of Manmunai North D.S Division and to prepare past and present land use map for the study area. Arc GIS 10.4 was utilized to identify the land use changes. The study found that the land use in the study area changed shows variation over the period 1982 to 2015 that comparison has made. Land use of homesteads, scrub and water sources has been increasing in this study area. Paddy, marsh, chena, other cultivation, and sand land area are decreased in this area. Decreasing change pattern of other cultivation shows whereas land use of homesteads has been increasing during the period of comparison. Thus, the findings revealed comprises both increasing pattern and decreasing patterns of land use.
Key words: Land use, GIS, Manmunai North

1. Introduction

Land is one of the most valuable resources in the Earth. It is a complex and dynamic combination of factors: geology, topography, hydrology, soils, microclimates, and communities of plants and animals that are continually interacting under the influences of climate and human activities. The human landscape is a dynamic, ever changing phenomenon. It is the product of human occupancy of particular places for thousands of years. The visible landscape reflects a culture's organization of space, often over millennia. The land use can be generally classified into urban or build up area, agricultural land, rang land, forest land, water land, wetland, barren land, tundra and perennial snow or ice. Urban land and agricultural land are changing through the development (Gangodawila. C.D, 1988).

Land use involves the management and modification of natural environment or wildness into built environment such as buildings, settlements and semi natural habitats such as arable fields, pasture and managed woods (Thilakaratne, et al, 2013).

Land use change over time is an inevitable phenomenon occurring globally due to both temporary and or permanent interest of the inhabitants in a particular area. The phenomenon could be revealed either in a small or large scale but the most interesting and fundamental observation is that change occurs over time in a particular place. Land-use and land-cover changes are local and place specific, occurring incrementally in ways that often escape our attention (De-Sherbinin, 2002).

Land cover is continually transformed by land-use changes, suggesting that land use is the cause of land cover change and the underlying driving forces remain economic, technological, institutional and demographic factors (De Sherbinin, 2002). Land use and land cover form the basis from which past and present human interaction and their impacts on natural

resources and the environment can be understood.

Geographical Information System (GIS) and remote sensing (RS) are powerful tool that have been widely used for monitoring and detection of land use and land cover change (Anderson et al., 2001; Musaoglu et al., 2002; Tardie and Congalton, 2002). Remote Sensing and GIS technologies now provided the potential for mapping and monitoring the spatial extent of the built environment and the associated urban land use changes. Therefore, in this study attempt has been made to map the extent of land use change in the study area using Geographic Information System.

Manmunai North Divisional Secretariat is located in Batticaloa district. The study area has got both urban and rural regions and in this both areas land use patterns different from one to another. Urban area

is committed with urbanization activities and rural areas are engaged with developments and settlements. Because of these activities earth surface has shown changes. This study however reveals various land use change between 1982 and 2015 in the Manmunai North DS Division and these will therefore assist in quantifying the changes and the direction of change. For the study purpose, primary data and secondary data were utilized.

2. Study area

In Batticaloa distric t, there 14 Divisional Secretariats, Manmunai North is one of them. Total area of Manmunai North secretariat is 37.6 square kilometer. This area consists of 48 GS divisions and 88 villages. Figure 01 shows the study area.

Figure 01: Study area (Manmunai North)
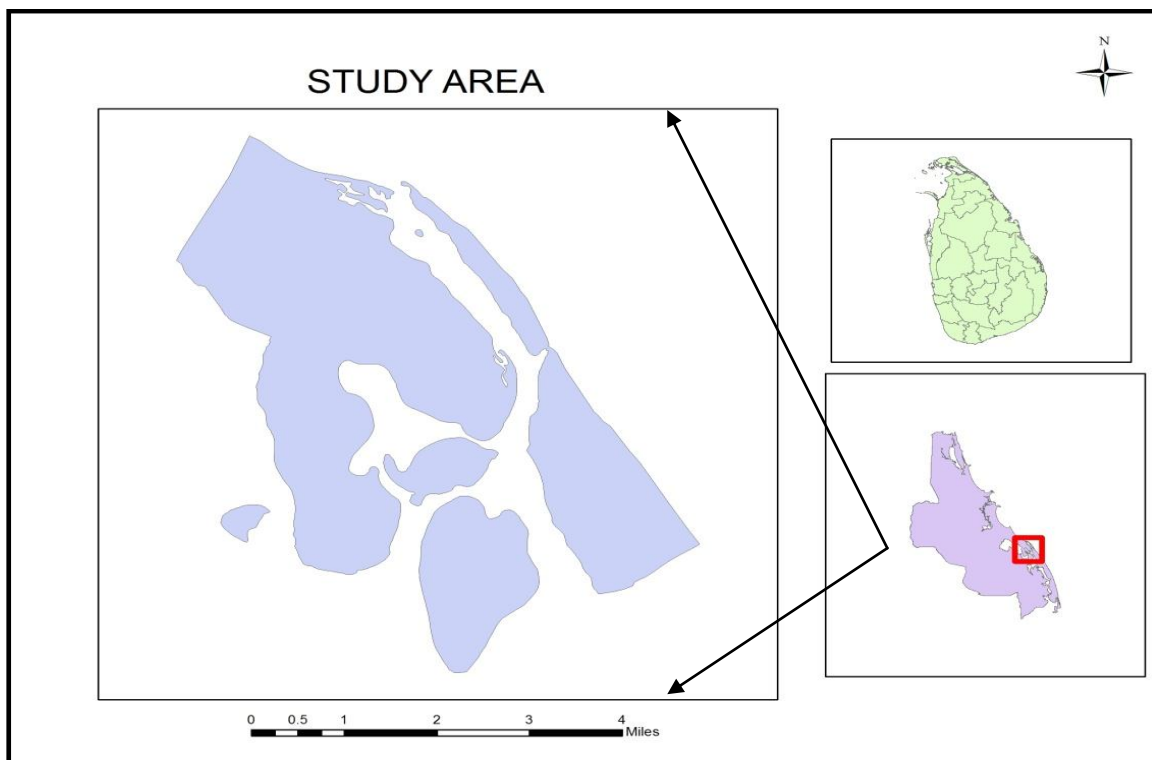
3. Objectives

The research was designed to achieve the following main and specific objectives. The main purpose of the study is to

identify changes of land use patterns. The research also has the following specific objectives as to identify present and past land use pattern of Manmunai North D.S Division and to prepare past and present land use map for the study area.

4. Data collection and Methodology

Data are generally classified as primary and secondary. The primary data was obtained by field surveys and by actual measurements recorded during the fieldwork. Secondary data was collected from published and unpublished data sources. Statistical data had collected from Manmunai North D.S Division, got the basic map of land use from Survey Department. Satellite image is collected from Earth Explorer. Collected data was analyzed manually as well as by using Remote sensing and Arc GIS 10.4.

Knowledge of both remote sensing and Geographical Information Systems (GIS) were used to generate the land use maps of the period in consideration (1982-2015). After preparation of Land Use maps of 1982 and 2015 calculate the area in square hectares of each land use type in each year in order to determine the change and percentage of change in the total area covered in the land use types. Figure 2 shows methodology used in this research

Figure 02: Methodology used in this research
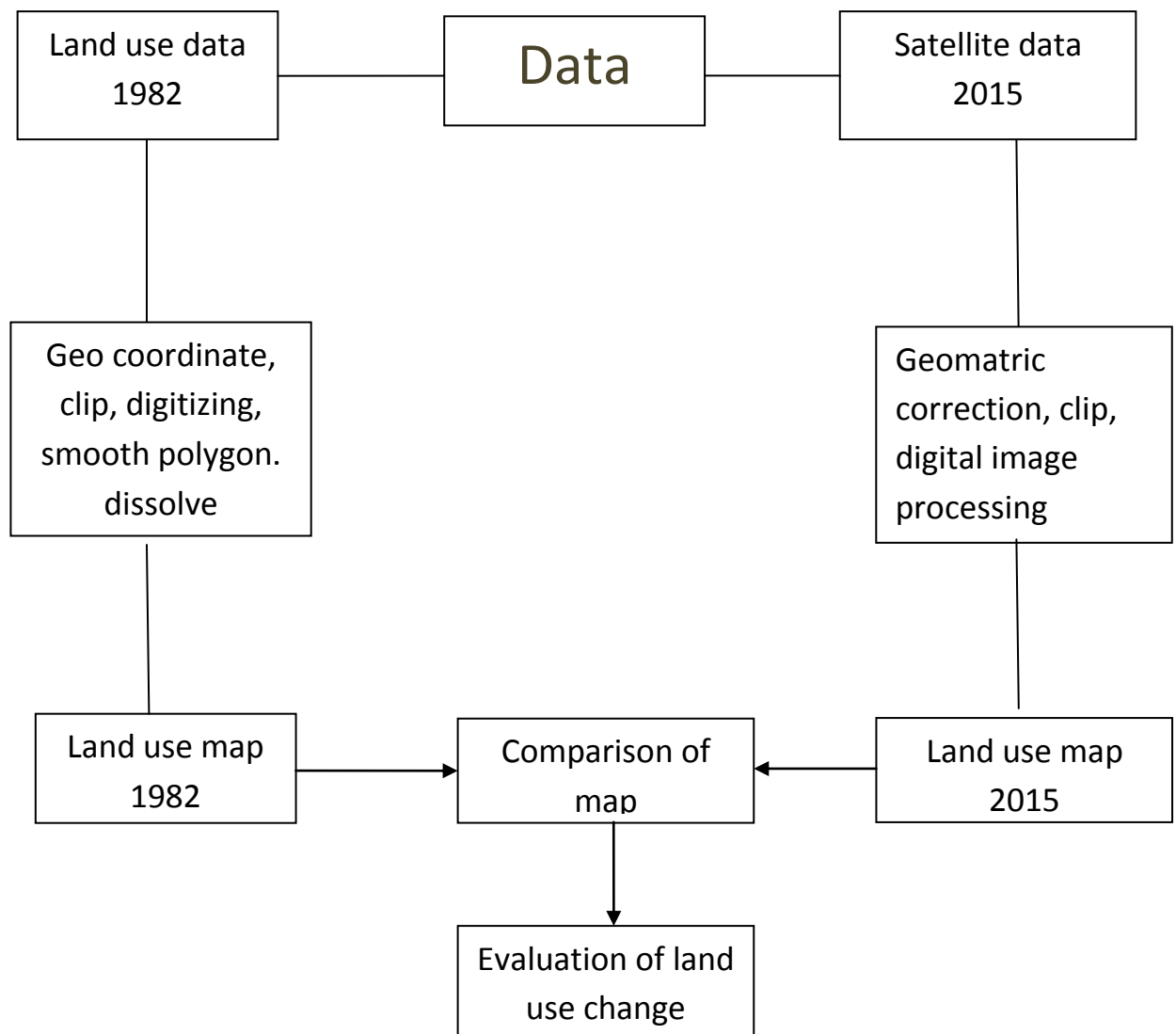
5. Literature review

Lubowski et el. (2008) they analyzed on What Drives Land-Use Change in the United States? A National Analysis of Landowner Decisions. They have found that urban areas were increased as the increase in urban net returns. like that the decline in crop net returns as the most important reason to decline in the crop land. Furthermore, they identified that the increase in forest areas due to the fact that rise in timber net returns as the most important factor driving.

The study conducted on Evaluation of land use/land cover changes in Mekelle City in Ethiopia using Remote Sensing and GIS. Findings showed that farm land and sparse land are reduced in Ethiopia. urban area is expanded by engulfing the rural farm lands in different time periods with the increase in human population. Similarly, grass land and bare lands are also spread in Ethiopia Tahir (2016).

Eludoyin, et al. (2011) they have conducted a study on GIS Assessment of Land Use and Land Cover Changes in Nigeria. The study reveals that farmland, mangrove, primary forest and sparse vegetation are reduced over time whereas secondary forest, built up area and water increased. Further they recommended that laws should be promulgated to stop illegal increase of construction of any form.

The study analyzed more than 50 years of land cover and land use changes in North Western Ethiopia. The result revealed that woody vegetation reduced even though there were no changes in the area of agriculture land. Even if deforestation took place between the period of 1970s and 1980s, though there is an increasing trend since then. Furthermore, the study found whether because of population pressure and land use policies led to changes in land use (Eleni et al., 2013).
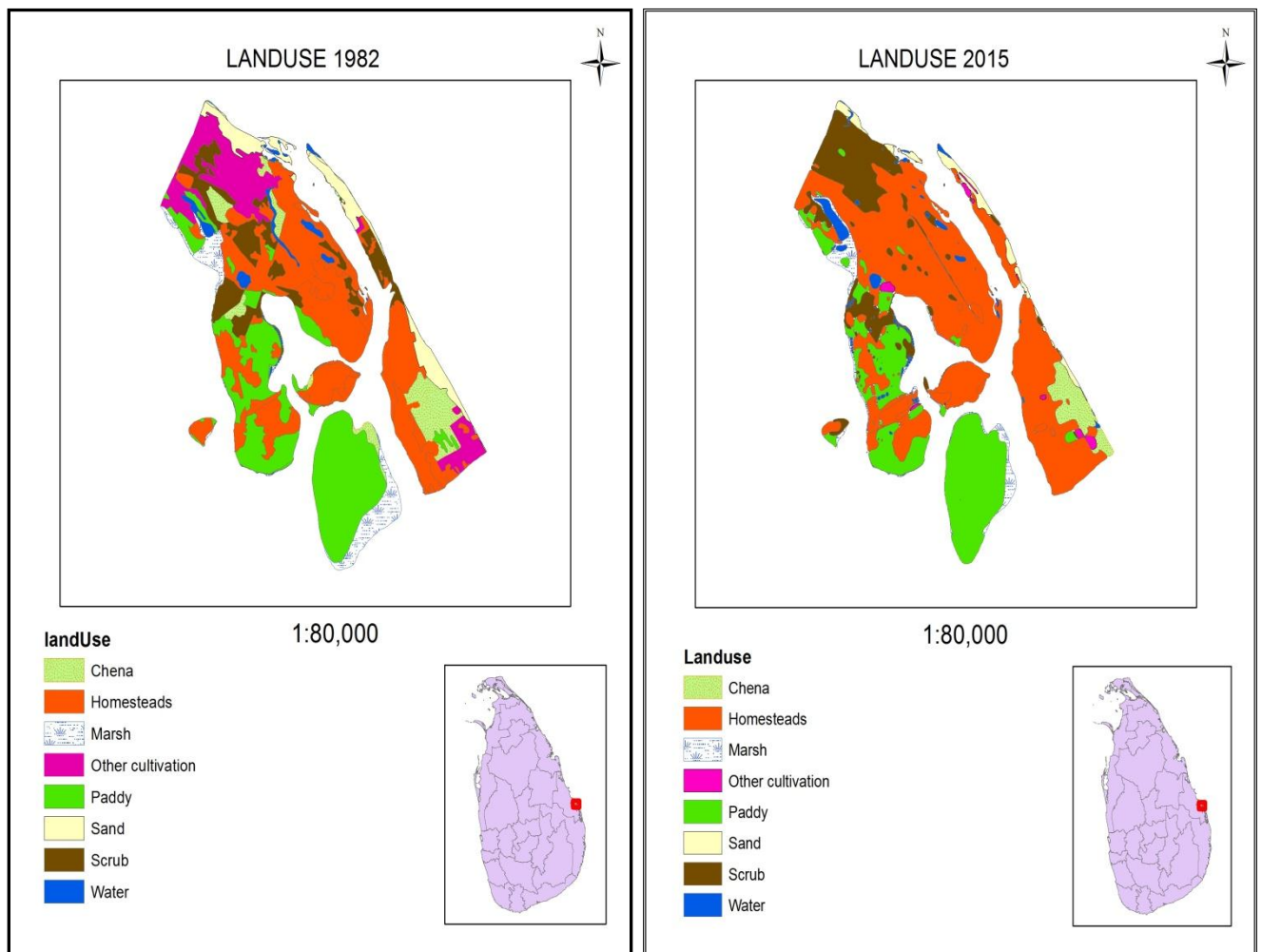
Urban sprawl refers to some types of uncoordinated land use resulting from lack of integrated and holistic approach in regional planning. Information related to the rate of growth, pattern and extent of sprawl is required by urban planners to provide basic amenities such as water, sanitation, electricity, etc. Urban sprawl increases traffic problems, depletes local resources and destroys open space. This paper provides a valuable basis to understand the major issues faced by urban citizens in India as a consequence of land use changes. The suggested solutions are very helpful for the strategic planning in future (Chawla, 2012).

6. Result

Land use maps from of 1982 and 2015 were produced and trend analysis was carried out to compare the land use type (Fig. 03 and 04). Change detection is a process that measures how the attributes of a particular area have changed between two – time- periods.

This research finding land use changes in two-time period. This area has number of land use. In the time period, some land use has decrease and some land use has increase. Significant changes have been observed between 1982 and 2015 (Figure 03 & 04). The various land cover types Homesteads show almost a similar trend with dramatic increase in their areas.

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**Figure 03 & 04: Comparison of Land Use Map (1982 – 2015)**

The aggregated area of different classes was calculated and verified with the total area of the study area. After preparation of land use maps of 1982 and 2015, area of each types was compared to analysis the change in the land use type (Table 01, chart 01)

Table 01: Changes in land use in Manmunai North (1982-2015)

Land use	1982		2015		Changes (1982 -2015)
	Area (hectares)	Percentage	Area (hectares)	Percentage	Percentage
Homesteads	1438.22	36.73	2010.36	53.40	33.82
Chena	260.28	6.65	134.01	3.56	-7.46
Marsh	199.03	5.08	117.94	3.13	-4.79
Paddy	946.63	24.18	813.85	21.62	-7.84
Other cultivation	409.93	10.47	33.48	0.89	-22.24
Sand	232.53	5.94	93.84	2.49	-8.19
Scrub	362.94	9.27	471.93	12.53	6.44
Water	66.07	1.69	89.59	2.38	9.19
Total	**3915.63**	**100**	**3765.23**	**100**	

Chart 1. Changes in land use in Manmunai North (1982-2015)

Land use change 1982-2015
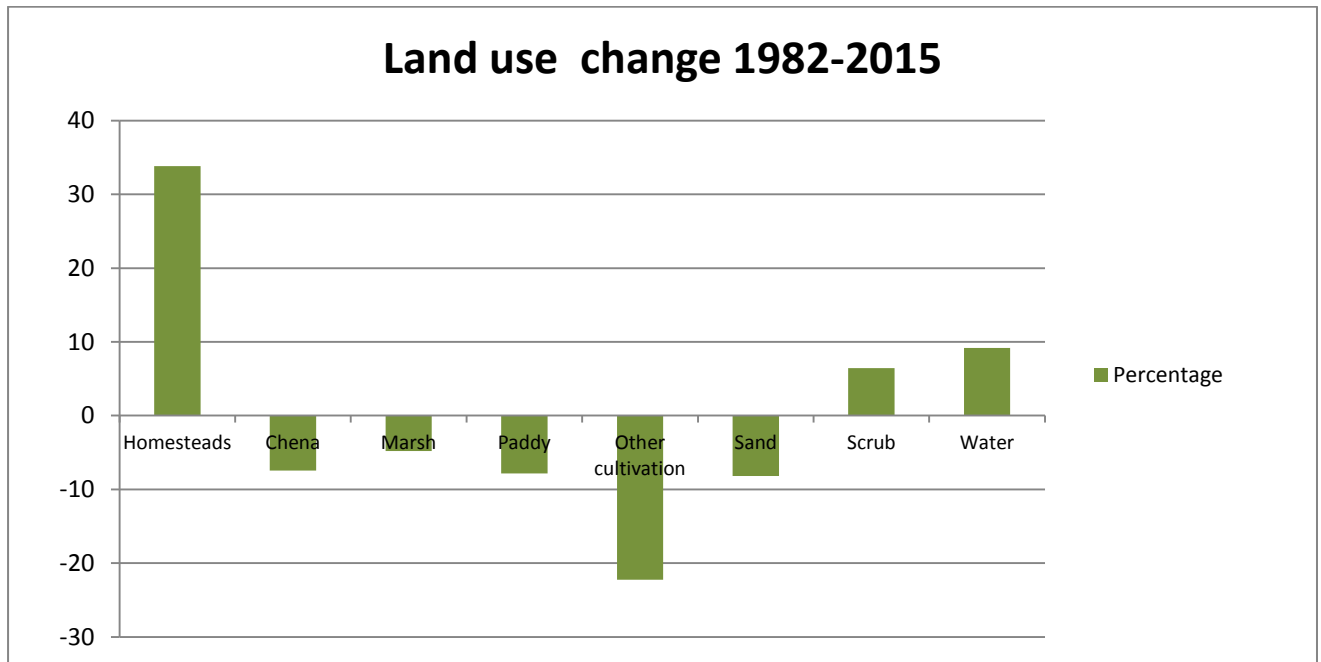
Considering the result of the analysis in table 1 & chat 1 it is clearly observed that, the change detection was made from 1982 to 2015. When the 2015 land use classification compared with 1982 land use classification there is change that shows both increase and decrease in particular land use. The land use categories show increase are Homesteads, scrub and water. The average rates (hectares) of change for these are 572.4 (33.82%), 108.99 (6.44%), 155.66 (9.19%) respectively.

On other hand, the land use category chena, marsh, paddy, other cultivation, sand are degreased by hectares of 126.27 (7.46), 81.09 (4.79), 132.78 (7.84%), 376.48 (22.24%), 138.69 (8.19%). Total land of the study area is 3915.63 hectares in 1982. In this total amount 1692.37 hectares (43.22%) has changed in 2015.

The Homesteads areas in the study area increase over time in term of spatial extent and thid in turn constitutes some effect on their land use patterns. Construction and other development are main activities to change the land utilization in the area. Most of other cultivation land was change for settlement in this area. Sand and marsh areas was reduced by coastal erosion in this area. On the other hand, some people remove their chena land for settlement purpose. This area conformed that development have both advantage and disadvantages. Advantages are in this area developed Settlement, road facilities and developed important buildings. Disadvantages are loss of vegetation cover, land quality, conflict and disaster. Due to the human activities, some mangroves land filling in this area purpose by settlement. When the heavy rains in this area it is effected here.

7. Conclusion

The study reveals that the land use in the study area changed shows variation during the time period 1982 to 2015 that comparison has made. Some land use classes that shows increasing changes in comparison. Land use of homesteads, scrub and water sources has been

increasing in this study area. Paddy, marsh, chena, other cultivation, and sand land area are decreased in this area. Decreasing change pattern of other cultivation shows whereas land use of homesteads has been increasing during the period of comparison. The study area conformed that development have both advantage and disadvantages through land use change.

8. References

Eludoyin, O.S Wokocha, C.C. and Ayolagha, G. (2011). GIS Assessment of Land Use and Land Cover Changes in OBIO/AKPOR L.G.A., Rivers State, Nigeria, Research Journal of Environmental and Earth Sciences, 3(4): 307-313

Tahir, M, Imam, E., and Hussain, T. (2013). Evaluation of land use/land cover changes in Mekelle City, Ethiopia using Remote Sensing and GIS, Computational Ecology and Software, 3(1): 9-16.

Lubowski, R, N. Plantinga,A, J. and Stavins, R, N. (2008). What Drives Land-Use Change in the United States? A National Analysis of Landowner Decisions, Land EconomicsBoard of Regents of the University of Wisconsin System, 84 (4): 529–550.

Eleni, Y. Wolfgang, W. Michael, E. Dagnachew, L. and Günter, B. (2013). Identifying Land Use/Cover Dynamics in the Koga Catchment, Ethiopia, from Multi-Scale Data, and Implications for Environmental Change, ISPRS International Journal of Geo-Information, 2, 302-323.

Chawla, S. (2012). Land Use Changes in India and its Impacts on Environment, Journal of Environment, 1:1, 14-20.

Thamayanthi, N. (2014). Land use changes in the urban areas of Vavuniya district. Retrieved May, 20, 2015, from http://www.pdn.ac.lk/ipurse/ proceeding book SH/711.pdf.