



## ASSESSING LAND USE TYPES IN URBAN LANDSCAPES

Lalitha Dissanayake<sup>1\*</sup>, Thilanka Malhengoda<sup>1</sup>

<sup>1</sup>Department of Geography, University of Peradeniya, Peradeniya.

\*Correspondence E-mail: [dissanayakedml2011@gmail.com](mailto:dissanayakedml2011@gmail.com), TP: +94718075726

**Abstract:** The way, how the natural world has adopted to the human needs is considered as the landuse. Kandyan landscape shaped by the people since 14 century to until today and created different types of land uses. Changing patterns of such land uses and sustainability of the city landscape is now questionable. Aim of this study is to assessing the landuse types in Kandy Municipal Council (KMC) area based on human perspectives in order to create sustainable city landscape. Data were gathered through questionnaires with multiple choice answers and in-depth interviews. The sample randomly selected and comprise with fifty numbers including city dwellers, local commuters in KMC area. Results reveal that, their perspectives are basically oriented to balance landscape which is consisting both nature and built up. They expect recreational land use type such as urban parks but undisturbed built environment. The assessment of land use types in an urban landscape based on human perspectives will be beneficial for the urban planners to implementing policies towards creating a sustainable eco-friendly city landscape.

**Key Words:** Human Perspectives; Assessment; Land Use Types; Urban Landscape

### 01. Introduction

Land use planning refers to the process by which a society, through its institutions, decides where, within its territory, different socioeconomic activities such as agriculture, housing, industry, recreation, and commerce should take place. This includes protecting well-defined areas from development due to environmental, cultural, historical, or similar reasons, and establishing provisions that control the nature of development activities ([siteresources.worldbank.org](http://siteresources.worldbank.org)). Land use planning is a potential solution for sustainable use of land in the long term by optimizing the effective use of land resources (Redefining Diversity and Dynamics of Natural Resources Management in Asia, Volume 02, 2017).

A land use is created through the way that how the natural world is adopting to the needs of human beings. Land use describes the various ways in which human beings make use of and manage the land and its resources. Over the course of history, humans

have had a changeable relationship to the land. Early humans are believed to have used the land with little modification for shelter, food gathering, and defensive aims (The Environmental Literacy Council). But with the time passed, human needs have expanded with the urbanization and accordingly the land uses also getting more urbanized.

After the second half of the last century, Urbanization has become a worldwide phenomenon. Urbanization is a complex and multidimensional concept with its spatial, ecological, economic, social and cultural aspects. Since urbanization is widely accepted as a foundation of modernization, it has also caused environmental and socio-economic changes. In the simplest meaning an urban environment is a place where more urban functions are able to identify and high numbers of urban populations live.

Urban landscape is basically formed of open and green spaces within an urban

environment. However, it is not totally independent from the surrounding buildings and structures. Altogether, they form the character and identity of a city, and sense of place (Murat.Z, 2011). Urban Landscape contributes to the cityscape by adding aesthetic and functional values. It supports urban ecology by evolving dynamic and constantly. Urban landscape elements function as separator or connector agents between different landuse. They are able to form a buffer zone between conflicting uses such as industrial and housing areas while they can facilitate movements of citizens throughout the city (Murat.Z, 2011). They have the flexibility to serve for multiple uses and for different group of users in the community.

The classification of a land into its various uses and how these uses change over a period of time provide the background information needed for planning land resources. The basic level of categorization separates them into two major groups as, Urban Landuse and Rural Landuse. Land utilized for residential, commercial, industrial, institutional, transportation, communications and general utilities all belong to the Urban Land use categories (Balasubramanian. A, 2015).

Land use is also related to the study of human trends and movements. Therefore having the human perspectives towards assessing land uses in an urban area is needed when proposing policies for the land uses as well as land development. As human beings we all are able to perceive data, but we are not sure that how we perceive data. We know that visually represented data and information can be easily perceived, but we do not know the way that those visualizations are perceived. Therefore we study perspective to better control the presentation of data and information, and eventually to harness human perspective. Most define perception as a way of regarding situations, facts, etc and judging their relative importance (Collinsdictionary.com).

This study focuses land uses of Kandy city since it has emerged over the history as a

multifunctional urban landscape in various stages. Kandy is renowned as one of the most beautiful and world heritage city with numerous esthetic and cultural values. Kandy remains as a historical cum cultural icon as a result of it being the last seat of political power of the Sinhalese and the location of the temple of tooth relic which is the most sacred place of Buddhists (Hennayake et.al). Except the religious value nowadays Kandy has emerged as a center for numerous functions including cultural, religious, socio-economic and ecological functions. Therefore Kandy has a unique identity among other cities in Sri Lanka.

Kandy is located in the Cities place category with the GPS coordinates of 7° 17' 29.1048" N and 80° 38' 12.1056" E and approximately 515m which similar to 1690 feet of elevation from the mean sea level. Kandy Municipal Council area, which is located in Kandy District, Central Province is spread over 26.45 Square Kilometer which similar to 2645 hectares. Geographically the study area belongs to tropical rain forest zone since the temperature is between 24°C-25°C and the precipitation is between 1700mm-2400mm. Therefore a temperate climatic condition remains within Kandy Municipal Council area.

Now Kandy has emerged as the second-largest city of the island and the capital of Central Province of modern Sri Lanka with 102,459 of total population (2012 census) and 26722 housing units (2012 census) including 45 GN Divisions and 21 Urban areas (UDA development report, 2018-2030). Its geographic location has made it a major transportation hub in the island while Kandy being the gateway to the Central Highlands of Sri Lanka, the city can be reached by major motorways in every direction of the island. Kandy has now grown out to encompass Peradeniya, home to the University of Peradeniya and the Botanical Gardens, Katugasthota to north, and east to Kundasale, Tennekumbura and Gurudeniya.

Kandy remains as a historical cum cultural icon and therefore many significance changes have occurred during its evolutionary

process from its beginning up to now in the fields of socio-economic, cultural, political and more significantly in term of land uses etc. Then the outcome of this study has covered a deep knowledge about the changes of the land uses in Kandy City, with go beyond the regular spatial and temporal study. Since human beings are the most dominant living organism on an urban environment, their perspectives directly affect on making changes both negative and positive. Since this research is based on human perspectives, urban planners should pay their attention for what people seek for their comfortable and healthy urban lifestyles. Therefore this study will provide new direction for new city constructions, proper landuse planning and urban development for policy making process and decision making approaches towards sustainable eco city constructions.

## 02. Research Problem

Over a five-hundred year period the landscape of Kandy has been built by the citizens, destroyed by foreign armies and rebuilt yet again (Duncan.J, 1990). According to that Kandyan landscape is changing over many centuries. However making a balance between the land use policy planning and the human perspectives in order to creating a sustainable cityscape for Kandy is still questionable.

## 03. Objective

Objective of this study is to assess the land use types in Kandy Urban Landscape based on human perspectives in order to creating a sustainable eco-friendly cityscape for Kandy.

## 04. Methodology

Six Different land use types were identified through the field observations and secondary sources in Kandy City area as:

1. Agricultural Land Uses
2. Residential Land Uses
3. Ecological Land Uses
4. Commercial Land Uses
5. Recreational Land Uses
6. Tourism Land Uses

To assess the land use types in the study area based on human perspectives, human perspectives gathered through questionnaire with multiple choice answers and in-depth interviews. The sample randomly selected and comprise with fifty numbers including city dwellers, local commuters in Kandy Municipal Council area. Since this study is based on human perspectives, results have analyzed qualitatively.

## 04. Results and Discussion

Landscape of Kandy remains as the present day historical and cultural center in the island due to the Temple of Tooth being located here, the last kingdom of Sri Lanka and now a world heritage site is shaped by agendas (Dissanayake et.al). Therefore Kandy has constantly maintained a unique identity amongst the other cities in the country.

Landscape, in its simplest meaning, is an assemblage of both nature and culture. Carl Sauer in his work on, "Morphology of Landscape" elaborates that culture acts as an agent of change on the natural landscape, thus gradually producing a cultural landscape; 'culture is the agent, the nature as the medium and the cultural landscape as the result'. The interplay between nature and culture is thus imbued within the process of landscape formation (Amarasooriya et.al). Therefore a considerable change has occurred on the Kandy Urban Landscape during its evolutionary process in term of creating different land use types. The evolution of Kandy Cityscape is driven basically based on few factors. Those factors are the leading factors which have caused for the change of land use types within the city. Those factors are,

- Increasing Population
- Evenly distributed Buildings

Population was limited in the past Kandy city when comparing to the present context. Most of them lived in rural areas which were far away from the city center and the king's most trusted people were residing in the heart of

the city, who were known as king's noblemen. Building distribution of the ancient Kandy City was limited to certain areas encompassing the holy temple of tooth, dewala, the palace and the people of the highest caste (Ekanayake.M, 2018). After the colonial period all main service centers including administrative institutions, financial centers, health centers and educational centers were concentrated in to Kandy City as it was declared as the Capital of the Kandy District.

Therefore the demand for lands of Kandy City went up and most number of people tends to reside in Kandy City. According to the census

report of 2012, Kandy Municipal Council area is home for 102,459 totals of permanent residents. Since the land and its resources are limited, now the city is exceeding its carrying capacity. Due to the limited land extent, now illegal settlements have spread over hilly areas by reducing the emerald environment and the Ecological Sensitivity within Kandy Municipal Council area.

Period	Types of Land Uses				
	Natural vegetation	Water Bodies	Home Gardens	Agricultural Lands	Built up Areas
<b>Before 1312</b>	<b>79%</b>	<b>20%</b>			<b>1%</b>
<b>1312-1815</b>	<b>60%</b>	<b>15%</b>	<b>10%</b>	<b>5%</b>	<b>10%</b>
<b>1815-1948</b>	<b>35%</b>	<b>13%</b>	<b>16%</b>	<b>20%</b>	<b>16%</b>
<b>1948 &amp; After</b>	<b>18%</b>	<b>12%</b>	<b>35%</b>	<b>10%</b>	<b>25%</b>

Table 01: Changes of Land Uses over four time periods

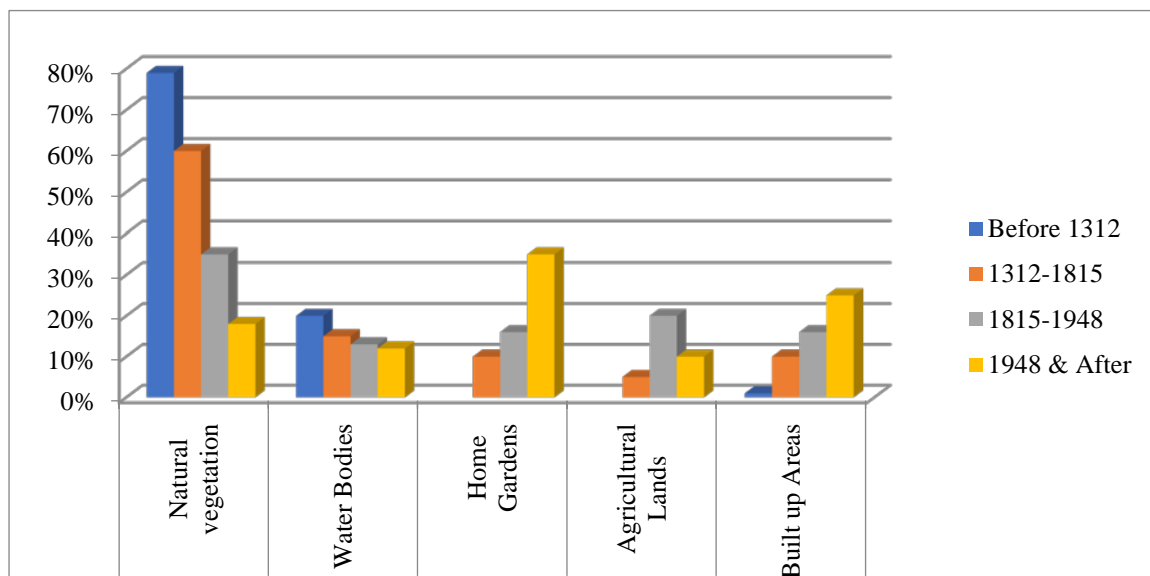


Fig.01: Changes of Land Use Types over Four Time Periods

The information which has mentioned in the table 01 and figure 01 are evident of the change of Land Uses in Kandy Municipal Council area over time. Before beginning of Kandyan Kingdom in 1312, 79% of the present land extent of Kandy Municipal Council area was covered up with natural vegetation and at the same time human interference for the natural environment was limited to 1%. 20% of water bodies were existed before 1312.

Natural vegetation was reduced by 19%, by the kingdom era. According to that 60% of natural vegetation cover was existed during the period of 1312-1815. The existed water bodies were reduced by 5%. According to the historical records, there were some buildings in Kandy city including Temple of Tooth, the palace, Dewala and houses of king's noblemen. Therefore the built-up area had increased up to 10%. As a result of that home gardens also recorded as 10% during the same time. Even though there were no records about agricultural lands before 1312, 5% of agricultural lands were remained in the kingdom era.

Natural vegetation cover was reduced further by the time of British era and it was reported as 35%. According to that the natural

vegetation which was existed before 1312, was reduced by 44% by the time of British era. Human interference was increased significantly up to 16% by reducing the extent of water bodies also. Due to the increased human interference, home gardens and agricultural lands were increased by considerable amounts. Since the British governors contributed to the up-country plantations, agricultural land uses were increased by 15%.

An outstanding improvement of human interference can be identified after the independence. Therefore built up area has spread over 25% of land extent in the Kandy City by reducing the Natural vegetation, water bodies and agricultural lands. The population was gradually increased at that time. But the land area was limited and therefore the natural vegetation cover was removed for the purpose of building constructions. Since people were engaged with any other occupations, some agricultural lands were abandoned. Therefore the agricultural lands were reduced by 10%. Since settlements were increased, home gardens were increased by an outstanding rate and 35% of home gardens were available after 1948.

The above mentioned statics are very evident to identify that the Land Uses on an urban environment are affected by the human interference in order to changing the cityscape.

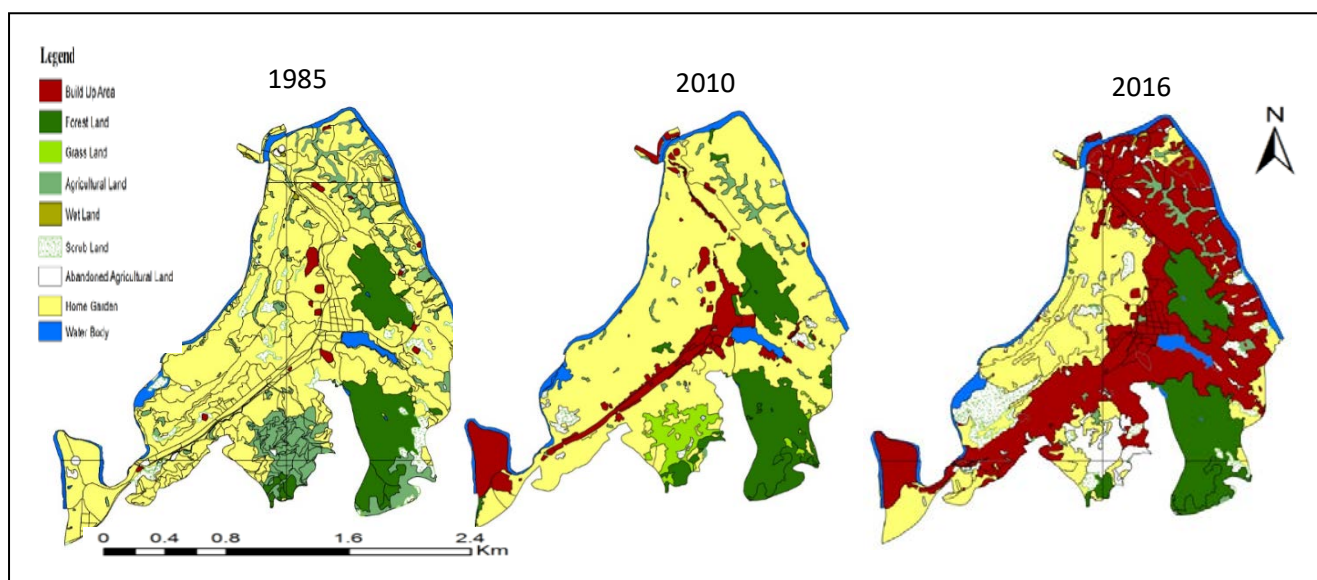


Fig.02: Maps of Land use changes in Kandy Municipal Council Area

According to the figure 02, Home Gardens were the highly distributed Land Use in Kandy City in 1985. Since very few built up patches are concentrated in the city center, development activities might be less in that time. According to the distribution of land uses, human interference for the eco-environment seems to be very low in 1985.

Comparing to the distribution of the Land Uses in Kandy Municipal Council area in 1985, it is impossible to identify an outstanding change of the same land uses in 2010. But it is able to identify a significant improvement of built up area and it has spread from Katugasthota to Peradeniya as a development strip. Human interference for changing the eco environment in 2010 seems to be high rather than 1985 in Kandy City.

Land uses in Kandy Municipal Council area have conspicuously changed by 2016 and the development activities seems to be distributed over two third of land extend by decreasing the other land uses in the area.

Due to the high scale of human involvement, the development strip from Katugasthota to Peradeniya has expanded to the surrounding areas.

Present land extent of Kandy Municipal Council area is 2645 hectares. Within that land extend 92.64% is covered with development activities while limiting other land uses to 7.36% of land area. That small amount of land area is consisted of 60.11% home gardens due to the highly distributed settlements, 17.15% of agricultural lands, 11% forest area and 4.3% water bodies. According to these statistical evidences, two third of total land area is affected by human interference in order to decreasing the ecologically sensitive land uses from the Kandy Municipal Council area. This unequally distributed land uses prove that the Ecological Sensitivity in Kandy Municipal Council area is unbalanced. If it is balanced, there should be 50%-50% opportunities for both development activities and Ecological Sensitive Areas within the city.

## Assessment of Land Use Types in Kandy Municipal Council Area Based on Human Perspectives



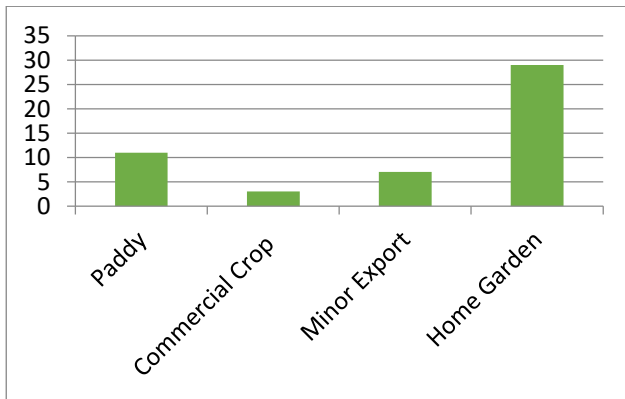


Fig.03: Human perspective of Agricultural Land Use

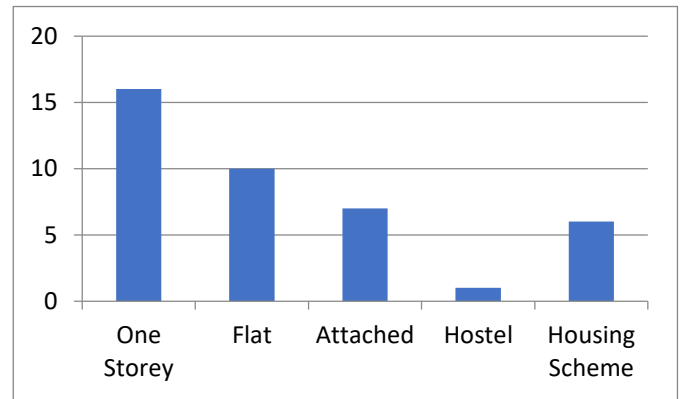


Fig.04: Human perspective of Residential Land Use

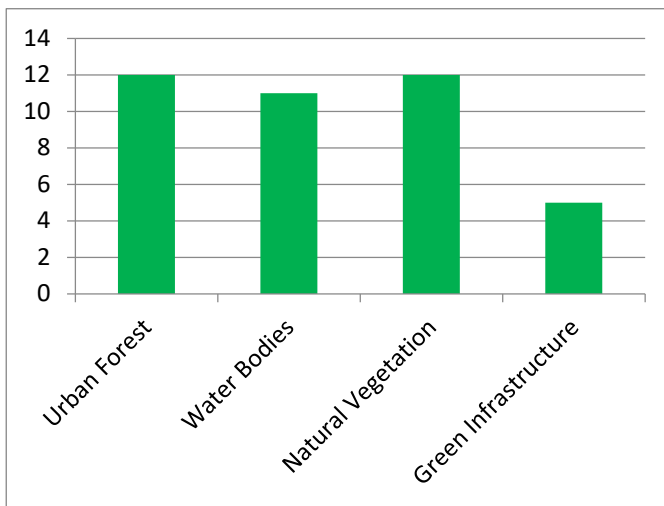


Fig.05: Human perspective of Ecological Land Use

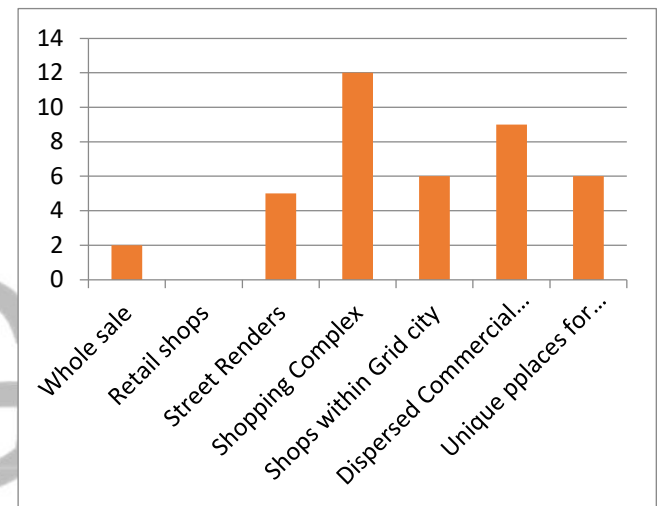


Fig.06: Human perspective of Commercial Land Use

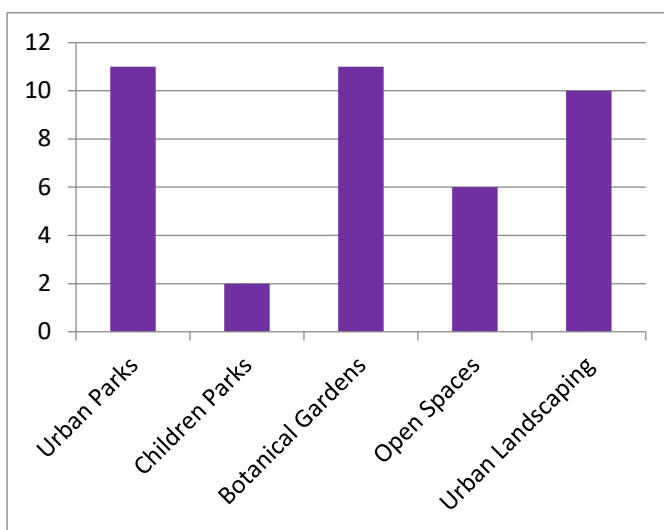


Fig.07: Human perspectives of Recreational Land Use

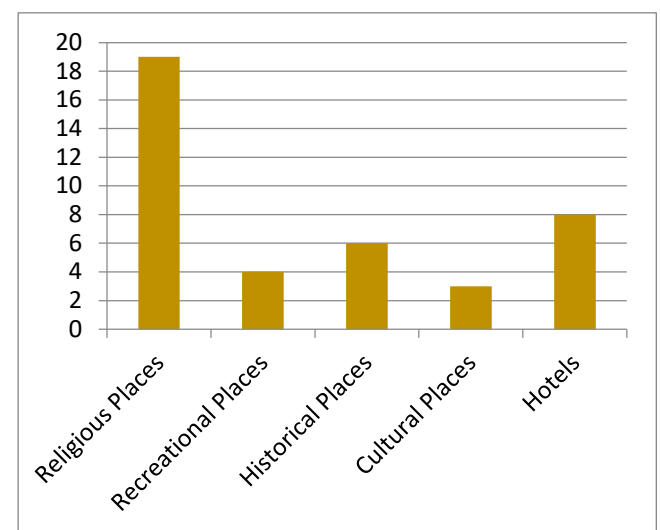


Fig.08: Human perspectives of Tourism Land Use

Table 02: Summary of Assessing Land Uses in Kandy Municipal Council area based on Human perspectives

Human Perception		
Land Use Type	Highest Preference	Lowest Preference
Agricultural	Home Garden	Commercial Crop Cultivation
Residential	One Storey	Hostels
Commercial	Shopping Complex	Retail Shops
Ecological	Urban Forest & Natural Vegetation	Green Infrastructure
Recreational	Urban Park	Children Park
Tourism	Religious Places	Cultural Places

## 05. Conclusion

Kandy is renowned as one of the most beautiful world heritage city with numerous cultural and aesthetic values and now it has emerged as the second largest city in Sri Lanka. Since Kandy remains as a cum cultural icon as a result of being the last seat of political power of the Sinhalese and the location of the Temple of the tooth, it has constantly maintained a unique identity among other cities in the country.

Kandyan landscape has evolved overtime and it is able to identify its major changes in terms of changing land uses. At the beginning Kandy consisted of large percentage of patches, considerable amount of natural stream corridors and limited area of building metrics. But in the current situation, its evolutionary process and it's

converted to extremely different landscape structure and cultural behavior.

Since human beings are playing a decisive role in Kandy urban environment as the dominant living organism, human interference is increased within the city in terms of changing the land use types. Conducted interviews have proved that the human perspectives of assessing land use types in Kandy Municipal Council area is going towards balancing the nature and development in order to create a sustainable eco-friendly cityscape for Kandy. This assessment will be beneficial for the city planners and policy makers in order to implementing new land use policies and development strategies to the Kandy City.

## References

Amarasooriya, I., Dissanayake, L and Hennayake, N., (2018). Tracing landuse changes in the Kandy landscape through ecological cum morphological perspective, In: *Training Workshop for Urban Landuse Ecological Planning*.pp.34-36.

Balasubramanian, A., (2015). Categories of Land Uses (PDF). Available at: Researchgate.net

Dissanayake, L. and Jurgen, B. (2018). Challenges for urban landscape; case of

Kandy, Sri Lanka, In: *Training Workshop for Urban Landuse Ecological Planning*. p.24.

Duncan, J. (1990). The City as a Text: The Politics of the Landscape Interpretation in the Kandyan Kingdom. Cambridge: Cambridge University Press, p.59.

Human Perception and information processing (PDF). Available at: www.ifs.tuwein.ac.at (Accessed 10, December, 2018).



Kandy Development Plan Report for 2018-2030, Urban Development Authority.

Redefining Diversity and Dynamics of Natural Resources Management in Asia, Volume 02, 2017.

Land Use Planning-World Bank Group.  
Available at: [siteresource.worldbank.org](http://siteresource.worldbank.org)

© GSJ