CRITICAL ASSESSMENT ON THE SETTLEMENT CATEGORIZATION OF SRI LANKA:

Case of the Nuwara Eliya District Estate Settlements

P.W.N.M. Paranagama

(169183M)

Master of Science in Spatial Planning, Management & Design

Department of Town and Country Planning

University of Moratuwa

Sri Lanka.

December 2020

DECLARATION

Hereby, I, P.W.N.M. Paranagama, declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher education and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also, I hereby grant to University of Moratuwa the non–exclusive right to reproduce and distribute my thesis, in whole or part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

…………………………..

Name of the Student: Mr. P.W.N.M. Paranagama

Registration Number: 169183M

Department of Town & Country Planning

University of Moratuwa

Date - ……………….

CERTIFICATION

I certify herewith that P.W.N.M. Paranagama student in the 2016/2020 group under the registration number 169183M, has prepared this research project under my supervision.

…………………................   …………………................

Dr. Gayani Ranasinghe   Plnr. A.L. Susantha

Principal Supervisor for the Research   Head of the Department,
Project,

Department of Town & Country   Department of Town & Country
Planning,   Planning,

University of Moratuwa.   University of Moratuwa.

Date:…………………................   Date: …………………................

ABSTRACT

Settlements are categorized as urban and rural and various methods are used to define urban settlements and thereby to measure the level of urban in a particular country or city. Sri Lanka adopts a single criteria based on administrative approach and defines all Municipal Councils and Urban Councils are 'urban areas'. In addition to the two categories; urban and rural, Sri Lanka defines another settlement category named 'estates' to identify plantations which are 20 acres or more in extent and with ten or more resident labourers. 30% of estates in Sri Lanka are located in the Nuwara Eliya District and 53% of its population belongs to estate sector. Although, estate communities lived in isolation and totally depended on the estate management for nearly a century, this situation began to change in late 1950s. By the end of 20th century, estate communities well mixed with other sector communities and had begun to move out from estates to town centers. Although, many new town centers are emerging within Nuwara Eliya District, and more of its estate communities now enjoy urban facilities and contribute to urban activities, its urban level was declined from 6.1% in 2001 to 5.6% in 2012. These figures are contradictory to what's observed in ground.

There is indeed an issue with the current definition of 'urban' in Sri Lanka, thus it is the intention of this study to propose a new set of criteria to measure 'urban' and apply it to selected areas in Nuwara Eliya district to measure their actual urban levels. A framework of criteria based on four mandates lifestyle, access to facilities, aspirations and physical setting, was introduced. The application of the proposed criteria revealed that existing estate areas; Maskeliya, Ragala & Kotagala and Bogawanthalawa indicate a higher urban level than that of Thalawakele UC; which is an officially identified urban area

Key words – *estate settlements, urban level, framework of criteria*

ACKNOWLEDGMENT

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

UDA   Urban Development Authority

NEMC   Nuwara Eliya Municipal Council

GN   Grama Niladari

UC   Urban Council

LIST OF APPENDICES

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

A human settlement, a society, a country or region can be classified into two main sectors such as 'Rural' and 'Urban'. There are various definitions for the terms; urban and rural, and the measure of urban and rural varies according to each country, state, region or city based on their contexts and situations. So far there is no universal definition for any of the two terms. Although, many countries basically classify their settlements into the two broad categories namely urban and rural sectors, in Sri Lanka, there is another settlement category named estate sector.

Urban/ Rural distinctions are a fundamental part of census system across the world as most countries distinguish between areas designated as urban and rural and thereby population residing them being classified as urban and rural (Hugo, Champion, & Lattes, 2001). Though there is no universal definition for 'urban', it is usually defined using one or several of the criteria such as; population size threshold, population density, contiguity of built-up areas, political status, proportion of the population in non-agricultural occupations and presence of particular services or activities (Hugo, Champion, & Lattes, 2001). In broad terms, countries adopt demographic, density, administrative, economic and functional approaches to define and measure urban level in their different contexts.

Sri Lanka adopts an administrative approach to define and measure urban level as administrative boundaries are used to demarcate urban and rural areas. As per the official definition adopted by the Department of Census & Statistics in Sri Lanka, areas falling within the Municipal Councils and Urban Councils limits are defined as urban whereas areas falling within Pradeshiya Sabha limits are defined as rural. In addition to urban and rural categories, the Department of Census and Statistic in Sri Lanka has identified another sector named "Estate Sector".

As per the official definition, all plantations which are 20 acres or more in extent and with ten or more resident labourers are identified as estate sector settlements (Department of Census & Statistics Sri Lanka, 2012).

The estate sector settlements emerged in Sri Lanka parallel to establishment of coffee, tea and rubber plantations and coconut cultivations during the British period. The first commercial plot of tea was planted in 1867, on Loolcondera estate, in the Hewaheta mountain range, South of Kandy, by James Taylor (Holsinger, 2002). Shortly, tea plantation was spread out and established in small estates and by 1871, there has been approximately 966 number of estates distributed in 08 districts (Holsinger, 2002). Consequently, many British tea planters began to invest in tea plantation actively contributing to the emergence of more estate settlements.

The estate sector was established in fully or semi-independent structure with very little incorporation with national economy. At that time, land and labour were the only local resources and investment and management were imported. The basic services such as water, roads, power, health, education, and commercial facilities were provided for the community living in the estates by the system. However, with the expansion of estate sector, additional labour was imported from South India in order to fulfill the growing labour demand.

Those who came to Sri Lanka as estate labourers settled as resident labourers in the respective estates and became totally dependent on the management for all aspects of their lives. After the Indian Tamils were brought to the estates, they were accommodated in line rooms with limited space and minimum facilities (Piyarathne, 2008). Each barrack building consisted of 10-12 line rooms and the double line, with back to back housing containing as many as 24 households (Hollup, 1994). The British planters ensured that the Tamils who had migrated to the plantations did not mix with the local communities thus they were geographically and socially isolated in the plantations (Piyarathne, 2008). The Indian Tamils who had migrated emerged as a relatively closed community confined to the territorial boundaries of the plantation (Hollup, 1994).

As the basic facilities such as housing, health care and education were provided within the boundaries of the estates, these communities had limited opportunities to mix with the neighboring communities and at the same time outsiders were not allowed within the estates (Aheeyar, 2006). This tradition enabled the estate sector community to have maintained a distinct identity of their own as they have been living in isolation for more than 200 years while maintaining, protecting and promoting their own language, religion, history, culture and ancient traditions and customs (Vijesandiran & Ramesh, 2016).

However, this isolation caused the estate community to be totally dependent on the estate management to fulfill their all needs and in most cases the estate managements provided their needs at a minimum level. As a result, the estate community suffered from low level of education, housing, health facilities and lack of cultural and recreation facilities. Lack of education limited their opportunities to move out of estates into other sectors.

In 1948, the plantation community were made stateless and were stripped of their civil and political rights marginalizing them from the government administrative machinery and consequently limited their access to mandated public services in general (Vijesandiran & Ramesh, 2016). However, this situation was gradually started to change after1950s as the plantation sector ownership was changed from foreign to local and following to that, the plantation labour force became Sri Lankan citizens and the rigidity of the estate structure was reduced. Gradually, the estate sector started to become a part of the general society.

Meanwhile small junctions like "Kadamandiya" were gradually emerging to facilitate the estate settlements. With the release of rigidity which was there in the previous estate structure, the character of the estate community and settlements was also changed. The main changes were that the estate community were granted the opportunity to mix with outside society and the lessening of residence labour concept. Consequently, there were outside job opportunities available for the estate community

and they began to shift from estate to other sectors and settle around junctions which had been established near the estates.

Since 1980 decade, the new generation of estate community were given higher education facilities and consequently they got job opportunities from skilled, technical and other fields. Also, some of them moved out from estates to the town centers for business purposes. Finally by the end of 20th century, estate communities were well combined with the national society and they participated in other economic activities.

As the new generations of estate communities began to leave estates and estate jobs and settle in nearby junctions and towns, such junctions and towns gradually populated and developed creating more demand for education, health, transport and commercial facilities.

According to the Census & Statistics Department of Sri Lanka, at present, the highest estate population is recorded in Nuwara Eliya District. It was 375,000 in 2102 which is 53% of total district population. Also, the highest percentage (30%) of estate land is recorded from Nuwara Eliya District. Accordingly, the Nuwara Eliya District plays a significant role and is highly concerned with relation to the estate sector.

At the same time, above social, economic and demographic changes in the estate structure were quite evident within Nuwara Eliya District whereas towards the end of 1990s and 2000s, there were number of growing towns and junctions which were progressively indicating many urban characteristics.

Meanwhile, as per the population and housing census in 2012, Sri Lanka's urban population percentage has been increased up to 18% from 14.1% 2001. However, amidst several urbanizing characteristics, the urban level of Nuwara Eliya District has decreased to 5.6% in 2012 from 6.1% in 2001 (Refer Table 1.1).

	2001			2012		
	Urban %	Rural %	Estate %	Urban %	Rural %	Estate %
Sri Lanka	14.6	80.0	5.4	18.3	77.3	4.4
Nuwara Eliya	6.1	40.3	53.6	5.6	42.1	53.3

Table 1.1 Sector wise Population Distribution in Sri Lanka and Nuwara Eliya District

Urban level can be measured based on the population residing in urban areas. Department of Census & Statistics of Sri Lanka adopts an administrative approach and defines all Municipal Council and Urban Council areas as urban and thereby accounts their residential population as the urban population in Sri Lanka. In 2001, there were one Municipal Council; Nuwara Eliya and two Urban Councils; Hatton Dickoya and Thalawakele. Surprisingly, although urbanizing characteristics were well evident in many other places within Nuwara Eliya District, no additional areas have been identified as urban within the last decade. Meanwhile Nuwara Eliya MC population was dropped from 1000 in 2001 to 2012 and also Thalawakele UC population was dropped from 457 in 2001 to 2012.

As a result, the urban level of Nuwara Eliya district was decreased from 6.1% in 2001 to 5.6% in 2012.

Observation is that few emerging town centres such as Maskeliya, Bagawanthalawa, Kotagala, Ragala indicate more urban characteristics compared to designated urban areas within Nuwara Eliya District. However, as per the official definition, these areas are merely classified as estate settlements. Thus the argument is that the current settlement categorization or the urban definition in Sri Lanka does not adequately capture and interpret the actual urban level of the Nuwara Eliya District.

1.2. Resulted problems due to incorrect categorization of settlements

I. **The real development level of these area is not identified**

Urbanization can be identified as a progressive process of economic and social –political development with the force of technological innovation. Accordingly, the level of development is directly related to the level of urbanization of an area. On the other hand, the development of secondary and tertiary sector of the economy has influenced the urban growth and in return the urbanization offers increased opportunities for specialization, production and goods and services. Therefore, most countries have identified the urbanization as a crucial phenomenon of economic and social growth. They believe urban areas are foci and conductive point of social economic development of the country. Therefore, due to weaknesses of the current method or definition of urban in Sri Lanka, the real development level in these up-country areas are not identified.

II. **The people settled in these areas are labeled as estate people regardless whether they enjoy urban facilities or contribute to the urban sector**

Sri Lanka's estate sector people are considered to be one of the most marginalized groups in the country and their socio-economic situation is considerably lower than the rural and urban sectors. Almost 61% of its households fall into the poorest category, whereas it is 8% and 20% respectively in the urban and rural sectors (Institute of Policy Studies of Sri Lanka, 2014). The people residing in the areas categorized as estate settlements are identified and labelled as estate community and thereby automatically regarded as a marginalized group nevertheless they may be enjoying urban facilities and living an urban lifestyle. In real case scenario, such people may feel themselves as urban and may desire to be acknowledged as urban especially as they enjoy urban facilities and contribute to the urban sector. In the same manner, those who live in emerging town centres of Nuwara Eliya District which progressively indicate many urban characteristics

are still labeled as estate community and thereby implicating to be a marginal group. There are number of negative socio-economic and political consequences which adversely affect these communities due to incorrect sector categorization and interpretation. Also, this categorization barricades the estate community's access to several urban amenities and services offered to urban communities by the urban sector local governments and other national and private parties although they are eligible for the same when considering their lifestyle and socio-economic contribution.

III. **Laws and regulations imposed to manage the development of urban areas are not applicable for these town centers and it leads to haphazard development**

Urban Development Authority Law No. 41 of 1978 is applicable to declared urban development areas for promotion of its economic, social and physical development. In Sri Lanka, all Municipal Council and Urban Council areas have been declared as Urban Development Areas. In addition, there are some other areas which have also been declared as Urban Development Areas by the Subject Minister considering their urban characteristics. However, such decisions are case specific and there is no defined mechanism to identify the urban development areas to be declared. In the case of Nuwara Eliya District, there are no additional areas declared except the MC and UC areas.

UDA Law is the most powerful law in the country for promotion and regulation of development as well as to ensure sustainable development in urban areas. In this background, UDA law is not applicable for many growing urban centres in Nuwara Eliya District as they are classified as estate settlements. Thus, there is no particular law to control the haphazard development taking place in these centres. As most of the areas in Nuwara Eliya District are environmentally sensitive and any haphazard development may result serious negative consequences, not having a particular law to regulate developments is a critical issue.

IV. **Funds allocation for the urban infrastructure development through the UDA cannot be utilized for emerging centres as they are considered as non-urban areas.**

UDA has funded about Rs. 950 million for infrastructure and urban Development projects for urban areas within Nuwara Eliya District during the last 4 years period (Nuwara Eliya District Office – UDA, 2020). However, these funds could not be utilized for any development in the emerging centres which are in actual need of funds for several infrastructure developments.

1.3. Objectives of the Study

01. To identify the suitable factors and criteria for demarcating urban areas in Sri Lanka.

02. To measure the level of urbanization of new growing centers in Nuwara Eliya district which are currently categorized as estate sector.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a summary of the reviewed literature in the following order; past and present urban definitions in Sri Lanka, urbanization in the world context and different measures of urbanization.

2.2 Urban Definition in Sri Lanka

According to the Department of Census & Statistics of Sri Lanka, the identification of urban areas has been commenced since 1865. The various definitions and approaches adopted to identify urban areas from 1865 to present is elaborated in the following table.

Table 2.1 The change of urban definition in Sri Lanka over time

Time Period	Description
1865-1900	Municipal Council (MC) and Local Board (LB) areas were considered as urban areas. Colombo, Galle and Kandy areas were the only identified MC areas during that time. Expected characteristics of defined urban areas were water supply & sanitation, street lighting, market facilities and efficient Police service.
1900-1920	Municipal Council and Local Board areas were considered as urban.
1920-1946	35 towns including Municipal Councils, Local Boards, Sanitary Boards and areas administered by Board of Improvement (BOI) were considered as Urban Areas.
1946-1981	42 towns including MC, Urban Council (UC) & LB areas are considered as urban. Town Councils (TC) were established in

Time Period	Description
	1946 under the Town Councils Ordinance No. 3 of 1946 to replace Sanitary Boards. At 1963 Census of Population 51 areas administered by TCs were dignified to "urban" status for the first time. As a result of that number of towns increased from 43 in 1953 to 99 in 1963.
After 1981	Municipal Council defined as urban area. Town councils and Village Councils were combined and established as a District Development Councils. In 1987 these DDCs were converted as Pradeshiya Sabha (PS) by the PS Act No. 15 of 1987.

Source – Department of census & Statistics, 2012

As per the above definitions, the urban population of Sri Lanka was 18% in 1971, 28% in 1981, 14.6% in 2001 and 18.2% in 2012.

2.3. The Urbanization in world context

The Department of Economic and Social Affairs of United Nations mentioned that globally, 54% of people lived in urban areas in 2014 while 30% in 1950 and it is projected, 66% of people will live in urban areas in 2050 (Department of Economic and Social Affairs, United Nations, 2014). Also they state that rural population grows slowly while Urban Population grows rapidly. The world rural population in 2014 was 3.4 billion and they are estimated to be reduced to 3.2 billion in 2050 whereas the world urban population was 3.9 billion in 2014 and it is projected that another 2.5 billion people will be added to the urban population by 2050.

2.4. Measure of "Urbanization"

The urban growth and urbanization can be defined, measured and studied in multiple ways by adopting various approaches such as Demographic approach, Density approach, Economic approach, Administrative approach, Morphology approach and Functional approach (De Silva, Dharshani, & Munasinghe, 2016). Further, urban level of a particular society is measured based on land use pattern, land use type or even in certain cases based on type of local government.

Table 2.2 Type of world urbanization measurement

Criterion	Number countries using the criteria	%
Single Criterion		
Administrative	**89**	**39.0**
Size (population)	**46**	**20.2**
Functional	5	2.2
Economic	0	0.0
Entire Population	6	2.6
Multiple Criteria		
Economic & size	23	10.1
Functional & size	15	6.6
Administrative & size	12	5.3
Administrative & functional	4	1.8
Administrative & economic	2	0.9
Admin, economic and size	2	0.9
No definition	24	10.5
Total	**228**	**100.0**

Source – (De Silva, Dharshani, & Munasinghe, 2016)

Most of the time, the increas**e** of urban population is considered as an urban growth in urban areas. Basically, migration and natural population growth cause the increase of urban population.

Organization for Economic Co-operation and Development (OECD) has introduced a methodology and it defines Local Administrative Units 2s (LAU2s) with a population density below 150 inhabitants per km² as rural and further classifies regions as

predominantly urban, intermediate or predominantly rural based on the percentage of population living in local rural units. Accordingly, a region is predominantly urban (PU), if the share of population living in rural LAU2 is below 15 %: intermediate (IN), if the share of population living in rural LAU2 is between 15 % and 50 % and predominantly rural (PR), if the share of population living in rural LAU2 is higher than 50 % (Eurostat, 2010).

20,000 inhabitants were used as a criterion for distinguishing cities on one hand and the rural sector and small towns on the other (Department of Economic and Social Affairs, UN, 1969). Countries use different definitions to distinguish urban and rural areas recognizing the internal relevance of national definitions and the UN has accepted them and more recently compares the urban populations of different countries as they are nationally defined (Department of Economic and Social Affairs, UN, 1969).

The share of India's population that resided in urban areas in 1991 would be 39% instead of the official figure of 26% if 113 million inhabitants of 13,376 villages with populations of 5,000 or more were classified as urban. The share would be even higher if the Swedish definition of urban (settlements with more than 200 inhabitants) were applied and whereas, in Mexico, the urban population in 2000 was 74.4% when settlements of 2,500 or more were defined as urban. If that threshold was changed to 15,000 or more (Nigeria and Syria, for example, have cut-offs of 20,000), the urban share of the population would drop to 67% (Uchida & Nelson, 2008).

As stated in the World Urbanization Prospects: 2018 Revision, out of 233 countries, 104 adopt single criteria while 66 adopt two criteria and 39 adopt three or four criteria. Among them 121 countries use administrative criteria whereas 59 countries use it as the sole criteria and 62 countries use it as one of the combined criteria. 37 countries use population size/ density criteria as the sole criteria and 71 countries use it combined with one or more criteria (Department of Economic and Social Affairs, UN, 2019).

Davis K. (1965) did not accept the use of single criteria and recognized the internal relevance of national definition (Davis, 1965).

However, the lower limit above which a settlement is considered to be urban varies considerably, ranging between 200 and 50,000 inhabitants. Economic characteristics were part of the criteria used to identify urban areas in 38 countries or areas and criteria related to functional characteristics of urban areas, such as the existence of paved streets, water supply systems, sewerage systems or electric lighting, were part of the definition of urban in 69 cases, but only in eight cases were such criteria used alone (Department of Economic and Social Affairs, UN, 2019).

Some countries including Sri Lanka, Poland, Bangladesh, Pakistan, Thailand, and Roman follow administrative definition for urban. In Thailand all municipal areas are urban and Pakistan defines all localities, which are Metropolitan Cooperations, Municipal Corporations and Municipal Committee area as urban areas (Weeraratne, 2016).

However, such an administrative criterion only determines urban areas based on one aspect. In many cases, inflexibility of the administrative concept has seriously hindered an understanding of national conditions, among them the processes and dimensions of urbanization. Hence, when defined by administrative criteria, urbanization levels and urban population growth rates may be under-reported and growth taking place in urban peripheries, which is beyond the boundaries of 'urban' areas may not be considered as urban activities (UNESCAP, 2013). Additionally, also it should be considered, when some cities' administrative boundaries were not changed within long periods of time, they are likely to misrepresent the actual growth of a city with respect to both its territory and its population (Department of Economic and Social Affairs, United Nations, 2014).

According to the United States census definition, the urban population comprises all persons living in (a) places of 2,500 or more inhabitants incorporated as cities, villages, boroughs (except in Alaska and New York), and towns (except in the New England States, New York, and Wisconsin), but excluding those persons living in the rural portions of extended cities (b) census designated places of 2,500 or more inhabitants; and (c) other territory, incorporated or unincorporated, are included in urbanized areas (USA Census Bureau, 2010).

India uses a combination of criteria as minimum population of 5000, minimum density of 1000 per square kilometer and at least 75% of the adult male population being employed in non-agricultural activities (Weeraratne, 2016).

Swedish definition of urban is minimum of 200 inhabitants may be a city. It is a purely statistical concept. According to that, this country has 85% of urban population.

The Organization of Economic co-operation and Development (OECD) and European Commission has introduced very pragmatic definition namely "Functional Urban Area" as a new approach. According to this definition, population density is used to identify the urban cores and travel-to-work flows to identify the hinterlands whose labour market is highly integrated with the cores. Initially this methodology uses gridded population data to define urbanized areas.

Another alternative solution to a realistic definition for urbanization is Agglomeration Index (Uchida & Nelson, 2008). This methodology uses gridded population data to define urbanized areas or 'urban high-density clusters' over the national territory, ignoring administrative borders as urban cores are defined through gridded population data. An urban core consists of a high-density cluster of contiguous grid cells of 1 km^2 with a density of at least 1,500 inhabitants per km^2 and in some cases lower threshold of 1,000 people per km^2. Further, this methodology also uses commuting data to focus on the relationships among inhabited cores which are physically separated, and economically integrated. Here two urban cores are considered integrated, and thus part of the same polycentric metropolitan area, if more than 15 percent of the residence population of any of the cores commutes to work in the other core. Final step of the methodology consists of delineating the hinterland of the metro areas defined as the 'worker catchment area' of the urban labour market, outside the densely inhabited core. The size of the hinterland, relative to the size of the core, gives clear indications of the influence of cities over surrounding areas. Urban hinterlands are defined as all municipalities with at least 15 percent of their employed residents working in a certain urban core.

Most of the quantitative definitions are based on quantitative or statistical data such as population and population density and do not compare with economic and social complexity. Wirth (1938), argued that the "urban" is not fully or accurately measured by the proportion of population or population density and city is not only dwelling place and work shop of modern man, but it is a initiating and controlling center of economic, cultural and political life.

Henry Lefebvre (1968) argued in his book "Urban Revolution", need of a new theory of 'urban' and he refers to 'urban' in terms of 'urban society'. Lefebvre suggests "urbanization" is a process that the society is moving from agricultural to industrial and then to an urban world. Also he mentioned that "Urban Society" is resulted from the society undergoing through a complete urbanization process. Lefebvre proposed a spatial and chronological hypothetical axis from "0" urbanization to "100" urbanization. There, he refers "0" as pure urbanization and "100" as completed urbanization process. According to this hypothesis each society could be positioned at deferent level of urbanization process and will bear different urban characters rather than being purely urban or rural.
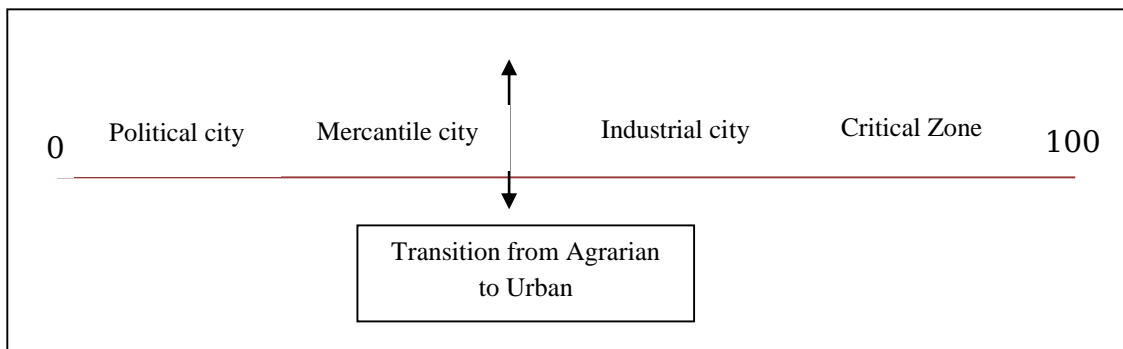
Figure 2.1 Hypothetical Axis of urban introduced by Henry Lefebvre in 1968

Source – The Urban Revolution by Henry Lefebvre (1968)

According to Wirth (1938), Urbanization is not merely about attraction or migration of people into and out of city. It refers to characteristics distinctive of modes of life. Also he highlighted 'urbanism is a way of life' under the sociolinguistic aspect of "urban". Wirth tried to explain that the characteristic of city structure is containing

15

significant urban sociological characters. Urbanism as a way of life reflects an organization of society in terms of division of labour, high level of technology, high mobility, interdependence among the members to full fill the economic activities and social relations. Therefore, when evaluating the urbanization of such areas, these sociological characters resulted from the urban way of life can be incorporated into the criteria. Mainly the way of life can be interpreted in three aspects such as lifestyle, aspiration and access to the facilities (De Silva, Dharshani, & Munasinghe, 2016). However, Wirth did not consider the physical development or the changes of the structural settings while he paid more attention to the sociological approach.

De Silva et al. (2016) defined the "Urban way of life" in terms of three mandates namely; lifestyle, aspiration and access to the facilities. Accordingly, lifestyle represents practice of people's day to day life. The regular behavior and practice of people's daily life define their overall way of life. Thus, way of life includes expressions such as food pattern, cloth pattern, and type of shelter and means of communications. They further define aspiration as what people dream of doing or their ambition of future. Aspiration reflect the real way of life people aspire to have. Aspirations of people are very subjective and it is highly influential thus they may be common to particular society at least to a certain extent.

Access to facilities represents the facilities available in the neighborhood which support their urban way of life. The availability of common public facilities are considered by this mandate. Further, De Silva and others highlighted that there are instances where lifestyle does not depend on level of access to common public facilities as people's real access to facilities highly depend on personal choices and capabilities in fulfilling needs.

De Silva, Dharshani & Munasinghe (2016) further proposed expressions for each mandate employing Maslow's Pyramid of basic human needs as the foundation. They tried to capture all necessary dimensions of a person's way of life. Further they proposed sub expressions under each expression, and accordingly they identified attributes for each expression or sub expression. The proposed expressions are food consumption pattern, clothing pattern, shelter, means of communication, water,

energy consumption, health, solid waste management, education and their sub expressions and attributes are mentioned in table 2.3.

Table 2.3 Mandates, Expressions, Sub expressions and Attributes of Urban Way of Life

Mandate	Expression	Sub expression	Attribute
Lifestyle	Food consumption pattern	Type of food	Percentage of area coverage of GND covered under the 8km buffer from selected globally recognized fast food outlets.
		Daily Marketing Practice	Percentage area coverage of GND under 3km buffer from selected supermarket chain outlets.
	Clothing Pattern	Type of cloth	Percentage area coverage of GND under the 15km buffer from selected fashion stores.
	Shelter	Type of tenure	Percentage of rent/lease household units in a GND.
		No of stories	Percentage of household units with two or more stories in a GND.
		Type of Toilet Facilities	Percentage of household units having inside toilets in a GND.
		Type of toilets	Percentage of household units having water sealed toilets connected to the septic tank or sewerage line in a GND.
	Means of communication	Type of communication equipment use	Percentage of houses having a fixed line telephone.
			Percentage of houses having a mobile telephone.
			Percentage of houses having a

			desktop computer.
			Percentage of houses having a laptop computer.
		Language proficiency	Percentage of population having English language proficiency in a GND.
		Access to internet	Percentage of population having access to internet at house in a GND.
Access to facilities		Drinking water source	Percentage of household units having pipe borne water facility in a GND.
	Energy Consumption	Principle type of lighting	Percentage of household units using electricity from national grid as the principle type of lighting in a GND.
		Type of cooking fuel	Percentage of house hold units using LP gas as the main source of cooking fuel in a GND.
	Health	Type of service	Percentage of area coverage of a GND under the buffer zone of 25km from selected privet hospitals.
	Solid waste disposal	Solid waste disposal method	Percentage of house holdunits where solid waste being collected by local authority in a GND.
Aspirations	Education	Education attainment	Percentage of population with a degree or above education qualifications in a GND.
		Type of school	Percentage of area coverage of a GND under buffer zone of 10km from selected international schools.

Source – De Silva, Dharshani & Munasinghe (2016)

De Silva et al. (2016) evaluated and weighted each attribute in terms of level of urbanization imprint each attribute has, based on identified three factors namely globalization & modernization influence, level of dependency in full filling a need and level of technological influence. However, they considered only secondary data related to social aspects and did not consider any of the physical attributes such as building pattern change, built density, road density and new development trends etc. Also they did not consider functional attributes such as commuter flows.

According to Song et al. (2017), urban form is the combined result of natural, social, and economic factors. In turn, the spatial form of a specific city will exert feedback on its sustainability in economy, society and environment. Also they mentioned that the commuter population contribute largely to the urban form and the scale of the commuters is directly linked with the level of urban.

Therefore, their argument is that type of commuters and the size of commuters should be considered when measuring the urban level of an area. The main urban functions which attract commuters are work, schooling, health and administrative activities. The people living in periphery or outside of the town travel to the town center to enjoy facilities and this depends on the availability of facilities and services in their home towns as well as city center. Therefore, the available facilities and services and its scale can be used to determine the commuter level and size of commuters. Also, the level of urban can be measured using availability of such facilities and services centers.

2.5 Summary of Literature review

Table 2.4 *Summary of Literature review*

No	Reference	Summary
01	Urbanization in Sri Lanka Department of Census and Statistics	MC and UC are considered as urban area and According to the 2012 census report Sri Lanka urban level is 18.2%.
02	World Urbanization Prospects; 2014 Department of Economic and Social Affairs	54% of world population living in urban area in 2014 and it will be 66% in 2050.
03	De Silva et al. (2016)	Urban growth and urbanization can be defined, measured and studied following Demographic approach, Density approach, Economic approach, Administrative approach, Morphology approach and Functional approach
04	Eurostat Regional Yearbook (2010)	Predominantly urban if the share of population living in rural is below 15 %; intermediate, if the share of population living in rural is between 15 % and 50 %; predominantly rural, if the share of population living in rural is more than 50%.
05	Department of Economic and Social Affairs, UN (1969)	20,000 inhabitants were used as a criterion for distinguishing cities on one hand and the rural sector and small towns on the other
06	Davis (1965)	Never accepted the only one criteria and recognize that internal relevance of national

No	Reference	Summary
		definition
07	Department of Economic and Social Affairs, UN (1969)	Recognizing the internal relevance of national definitions UN accepted that different countries have their national definition regarding urban population.
08	World Urbanization Prospects: 2018 Revision,	Out of 233 countries, 104 adopt single criteria while 66 adopt two criteria and 39 adopt three or four criteria.
09	UNESCAP, 2013	When administrative criteria is the sole criteria used to determine urbanization levels and urban population growth rates, then the actual figures and ground picture may be under-reported and growth taking place in urban peripheries will not be captured.
10	Weeraratne, 2016 - Institute of Policy Studies Sri Lanka	Some of countries including Sri Lanka and Poland, Bangladesh, Pakistan, Thailand, and Roman followed administrative definition for urbanization namely
11	USA Census Bureau (2010)	USA has two type of urban area as 1) Urbanize Area (UA) 50,000 or more 2) Urban Clusters (UC) of at least 2,500 and less than 50,000 people.

No	Reference	Summary
12	Weeraratne, 2016 – Institute of Policy Studies Sri Lanka	India uses combine criteria to measure the urban level such as minimum population of 5000, minimum density of 1000 per square kilometer and at least 75% of the adult male population being employed in non-agricultural activities.
13	Organization of Economic co-operation and Development (OECD) (2016)	Introduced a new definition namely "Functional Urban Area" as a new approach to measure the urban level
14	Uchida & Nelson (2008) Chomitzet et al. (2005), Uchidas & Nelson (2008)	Proposed "Agglomeration Index" as a new measure for urbanization
15	Wirth (1938)	"Urban" is not fully or accurately measured by the proportion of population or population density and city is not only dwelling place and workshop of modern man, but it is an initiating and controlling center of economic, cultural and political life.
16	Henry Lefebvre (1968)	"Urbanization" is a process that the society is undergoing from agricultural society to industrial society. Proposed spatial and chronological hypothetical axis from "0" urbanization to "100" urbanization.

No	Reference	Summary
17	Wirth (1938)	The degree to which the contemporary world may be said to be 'urban' is not fully or accurately measured by the proportion of the total population living in cities as the influences which cities exert upon the social life of the man is greater than the ratio of the urban population would indicate. Urbanism as a way of life reflects an organization of society in terms of division of labour, high level of technology, high mobility, interdependence of among the members to fulfill the economic activities and social relations.
18	De Silva, Dharshani & Munasinghe (2016)	Defined "Urban way of life" in terms of three mandates such as lifestyle, aspiration and access to the facilities and further identified expressions for each mandate employing Maslow's Pyramid of basic human needs.

CHAPTER THREE

METHODOLOGY

3.1. Introduction

This chapter explains the research design of the study focusing on the process of developing a framework of criteria to measure the level of urban in the context of Sri Lanka and applying the proposed framework to identify the actual level of urban in selected estate settlements in Nuwara Eliya district. The research methodology is explained in detail with reference to the research question to be addressed. Further the structure and procedure of data collection and analysis technique are explained here.

3.2. Research Question

The following are the three research questions that will be explored within the study in order to achieve the two objectives; 1) To identify the suitable factors and criteria for demarcating urban areas in Sri Lanka and 2) To measure the level of urbanization of new growing centers in Nuwara Eliya district which are currently categorized as estate sector.

1. What criteria and its weights can be used for identifying the urban level.
2. What is the level of urban in estate town centers in Nuwara Eliya district?
3. How to compare the urban level with existing urban areas and estate towns of Nuwara Eliya District?

Accordingly, this research intends to propose a new approach to demarcate urban areas in Sri Lanka based on suitable factors and criteria and consequently evaluate the urban level of selected estate towns in Nuwara Eliya district.

3.3. Method of the Study

01. This research study was carried out in mixed method using both quantitative and qualitative methods. The case study area has been identified covering both estate and urban area of Nuwara Eliya District in the Central Province of Sri Lanka and it mainly includes estate townships; Bagawanthalawa, Maskeliya, Kotagala, Ragala and Norwood towns and urban areas; Thalawakele, Hatton and Nuwara

Eliya. To facilitate smooth analysis, the data was collected at Grama Niladhari Divisions (GND) level.

02. A detailed literature review was carried out in order to achieve the first objective which is to identify the factors and related conditions to be considered for demarcating urban areas in Sri Lanka. According, several methods adopted in different countries of the world and new mixed methods introduced by several international and local scholars and institutes were reviewed. It was intended to identify the knowledge gap in this research area. The existing definition used in Sri Lanka and worldwide were reviewed with strong understanding of the main principles of these definitions. Further, the concept of 'urbanism as a way of life' proposed by Louis Wirth in 1938, an alternative framework to define 'urban' in Sri Lanka proposed by De Silva, Dhashani and Munasinghe in 2016 and 'measures of urban and rural' proposed by Hugo and others in 2001 were reviewed in detail. Following to that, 32 criteria were identified as to cover three main aspects related to urbanization including economic, social and physical conditions.

The next step was to identify suitable weights for each criteria and this was done based on the opinions of town planning experts in Sri Lanka. A structured questionnaire was sent to selected 50 town planning experts asking them to assign suitable weights for each criteria based on their opinion. A weight scoring scale of 1 to 5 was used and the score assigned by the highest number of respondents for a criteria was taken as its final weight.

03. The second objective of the study is to measure the level of urbanization of new growing centers in Nuwara Eliya district which are currently categorized under the estate sector. Accordingly, a framework composed of mandates, expressions, sub-expressions and attributes which is similar to what was proposed by De Silva and others in 2016 was developed to measure the urban level while incorporating the criteria evaluated and scaled by the town planning experts. The main

development to the 2016 framework is the addition of a fourth mandate namely physical setting. Accordingly, the four mandates of the framework are lifestyle, aspirations, access to facilities and physical setting. Under the four mandates, there are 10 expressions, 19 sub-expressions and 29 attributes. The 29 attributes were derived by narrowing down the 32 attributes evaluated by the town planning experts based on the weights assigned by them. The 10 expressions are; food consumption pattern, clothing pattern, shelter, means of communication, water consumption, energy consumption, health facilities, solid waste disposal, education facilities and physical development.

04. After finalizing the framework, GND wise data was collected for each attribute and analyzed to obtain a relative value compared to the population size of the GND for each attribute.

05. Following to that, the relative value of each attribute was multiplied by the respective weighted score and accordingly, derived the weighted value of the attribute. As the last step, the composite value which is the sum of the final values of the attributes was taken as equal to the urban level of the considered GND.

The above explained calculations and respective formulas are as follows.

Attribute Value – X_n

Example – If value for Attribute 1; Available branded food court = 24, then $X_1 = 24$

Relative Value - R_n

Whereas;

$$R_n = \frac{Attribute\ Value}{Considered\ Population\ Size} = \frac{X_n}{P}$$

where P = Considered No. of Population

Weighted Value - W_n

$$W_n = R_n \times w_n$$

where w_n = Weight assigned for each Attribute

Composite Value = $\sum W_n$

Composite Value = Urban Level of the GND

3.4. Research design

Figure 3.1 Research design

```
┌─────────────────────────────────────────────────────────┐
│      Selection of the study area and topic for the research │
└─────────────────────────────────────────────────────────┘
                        │
                        ▼
        ┌──────────────────────────┐
        │      Background study      │
        └──────────────────────────┘
                        │                    ┌──────────────────────────┐
                        │                    │ Identification of the research │
                        │                    │      problem and gap       │
                        │                    └──────────────────────────┘
                        ▼
        ┌──────────────────────────┐        ┌──────────────────────────┐
        │   Comprehensive literature │        │     Identify relevant      │
        │           review           │        │   theories and criterions  │
        └──────────────────────────┘        │  used to measure level of  │
                        │                    │     urban/ urbanization     │
                        │                    ├──────────────────────────┤
                        ▼                    │   Published resources       │
        ┌──────────────────────────┐        │    International case        │
        │    Case study area selection │        │   studies and guidelines    │
        │                            │        └──────────────────────────┘
        │    Study area- Nuwara Eliya │
        │   District Existing Urban area │
        │      and estate towns        │        ┌──────────────────────────┐
        └──────────────────────────┘        │    Finalize the criteria    │
                        │                    │   and its weighted score    │
                        ▼                    │      by using expert         │
        ┌──────────────────────────┐        │          opinions            │
        │      Data collection        │        └──────────────────────────┘
        └──────────────────────────┘
            │                   │
   ┌──────────────────┐   ┌──────────────────┐  ┌──────────────────────────┐
   │  Secondary Data   │   │   Primary Data   │  │   Questionnaire survey    │
   └──────────────────┘   └──────────────────┘  │    to finalize the         │
            │                                     │   criteria and weighted    │
            ▼                                     │   score for measuring      │
   ┌──────────────────────────┐                  │      the urban level        │
   │      Data analysis         │◄───────────────└──────────────────────────┘
   │                            │◄───────┐
   │   Use Quantitative and     │        │      ┌──────────────────────────┐
   │   qualitative data for     │        └──────│   Preparation of           │
   │    each criteria and       │               │   relevant maps            │
   │   evaluate final Urban     │               │    and data sets            │
   │   Level of Each GN         │               └──────────────────────────┘
   │        division            │
   └──────────────────────────┘
                        │
                        ▼
        ┌──────────────────────────┐
        │     Development of          │
        │   framework of criteria to  │
        │  measure urbanization and   │
        │   evaluate the actual urban │
        │   level of estate towns in  │
        │     Nuwara Eliya district   │
        └──────────────────────────┘
```

The proposed set of criteria and attributes and their respective weights derived to achieve the objective 01 are shown in the table 3.1.

Table 3.1 Proposed Framework of Mandates, Expressions, Sub-expressions & Attributes

Mandates	Expressions	Sub expressions	Attributes			Weighted score
Lifestyle	Food consuming Pattern	Type of food	Available branded food courts relative to size of population			5
			Available hotels, restaurants, past food outlets, food courts (Non-Branded) relative to size of population	Area more than 100sqm	Area less than 100 SQM	4
				Area less than 100sqm	Area more than 100 SQM	
		Daily marketing	Available branded super market chain outlets relative to size of population			4
			Available retail and whole sale shops relative to size of population	Area more than 100 sqm	Area less than 100 sqm	3
				Area less than 100 sqm	Area more than 100 sqm	
	Cloth Pattern	Type of textile	Available textile shops relative to size of population	Area more than 100 sqm	Area less than 100 sqm	5
				Area less than 100 sqm	Area more than 100 sqm	

Mandates	Expressions	Sub expressions	Attributes	Weighted score
	Shelter	Type of tenure	Rented houses relative to size of population	3
		Type of storeys	Houses with two or more stories relative to size of population	4
		Type of Toilet Facilities	Household units having inside toilets facilities relative to size of population	3
		Type of toilet	House hold units having water sealed toilets connected sewerage pit relative to size of population.	2
	Means of Communication	Type of communication equipment use	Houses having fixed line telephones relative to size of population	2
			Houses having mobile telephones relative to size of population	2
			Houses having desktop computers relative to size of population	3
			Houses having laptop computers relative to size of population	3
		Language proficiency	Population with English language proficiency relative to size of population	3
		Access to internet	Population having access to internet facility at household units relative to size of population	3
Access to Facility	Water	Drinking water source	Household units having pipe born water relative to size of population	2
	Energy Consumption	Type of lighting	Household units having national electricity grid power connection relative to size of population	2
		Type of Cooking	Household units using LP gas or electricity as the main source of cooking fuel relative to size of	2

Mandates	Expressions	Sub expressions	Attributes	Weighted score
		Fuel	population	
	Health	Type of service	No. of beds available in government hospital relative to size of population	2
			Available private hospitals relative to size of population.	3
			Available dispensaries relative to size of population.	3
	Solid waste	Solid waste disposal method	Household units where solid waste being collected by local authority relative to size of population.	3
Aspiration	Education	Education attainment	Population with a degree or above qualification relative to size of population.	3
			Government school children relative to size of population.	2
Physical Setting	Physical Development	Density	Population density per hectares relative to size of population	5
			Area covered by building relative to house hold units.	5
			Area covered by roads relative to size of population.	5
		Growth Rate	Population growth rate in last ten years. (%)	1
		Available Commercial Banks	Available Commercial Banks relative to size of population	4

CHAPTER FOUR

DATA COLLECTION, ANALYSIS AND DISCUSSION

4.1. Introduction

This chapter presents the data collection, analysis, results and the interpretations. The chapter elaborates on the background information and context analysis of selected case study areas, the factors considered for selecting the case study areas, derivation of criteria and respective weights based on the experts' opinion through the questionnaire survey, identification of final attributes and respective weights, finalizing the framework to measure urban level, application of the framework and the final results including the urban level of selected GNDs. Finally, the chapter compares the final urban values of existing urban and non-urban areas categorized as per the current definition.

4.2 The Context analysis based on secondary data sources

Initially the context of selected case study area was evaluated with reference to their historical evolution, locational importance, existing physical setting and general socio-economic and functional characteristics etc. The selected case study areas include Nuwara Eliya Municipal Council (MC), Hatton Dickoya Urban Council (UC), Thalawakele Urban Council and 05 estate townships; Maskeliya, Bagowanthalawa, Ragala, Kotagal and Norwood.

4.2.1. Nuwara Eliya Municipal Council Area

Nuwara Eliya town was declared as a Municipal Council area in 1948 and the Nuwara Eliya MC was declared as an Urban Development Area by the Gazette Notification No. 38/16 dated 1st of June 1979 as per the Urban Development Authority Act No. 41 of 1978. Nuwara Eliya MC Area comprises of 12 Grama Niladari Divisions distributed in 25km^2 extent of area (Urban Development Authority, 2019).

Figure 4.1 Nuwara Eliya Municipal Council

Source - Nuwara Eliya District Office, UDA

Table 4.1 GN divisions Nuwara Eliya Municipal Council Area

	Grama Niladari Division	**Division No.**
1	Bambarakale	535K
2	Hawaeliya east	535H
3	Hawaelliya North	535G
4	Hawaeliya west	535F
5	Kalapura	535N
6	Kalegala	535C
7	Magasthota	535A
8	Nuwaraeliya	535
9	Nuwaraelliya central	535D
10	Nuwaraeliya west	535L
11	Sandathanne	535E
12	Kalukale	535B

Source –Department of Census and Statistics -2017

According to the legends, the history of Nuwara Eliya goes back to the oldest settlements in prehistoric period of Sri Lanka. In "Ramayana" written in India, it says that the king Rawana who governed Sri Lanka abducted Queen Seetha and hid her at a location nearby Nuwara Eliya.

There is a belief that the kings who ruled Sri Lanka visited Nuwara Eliya area for leisure and tourism. A historical notice which prohibits the public from entering to the central hill area is still there and it proves the above fact. John Davy who was a state doctor in 1818 AD during the British government, explored Nuwara Eliya and identified that its environment and climatic conditions are same as in England. Consequently, the British started to build guest houses and developed the area as a leisure and tourism destination (Urban Development Authority, 2019).

Edward Barns who governed Sri Lanka in 1828 AD further recognized importance of Nuwara Eliya as a leisure destination and began to build British Victorian type buildings in Nuwara Eliya. During the same period, William Gregory started to build Gregory Lake and Samuwel Baker started cultivation in Magasthota lands. Mr. Losan who was a state supervisor started building houses in the middle of the town. The buildings constructed at that time have now been identified as conserved buildings within the town area (Urban Development Authority, 2019).

After independence, migration towards Nuwara Eliya gradually increased and settlement development took place in the area. Upcountry vegetable cultivation and pears cultivation were introduced in Nuwara Eliya in the first half of the 20th century and potato cultivation was started in the year 1969 (Urban Development Authority, 2019).

The National Physical Plan which was prepared by the National Physical Planning Department of Sri Lanka in 2012, introduced Nuwara Eliya town as a second category town in the national hierarchy of towns in Sri Lanka. Also, Nuwara Eliya has been recognized as a highly sensitive area by the same plan (National Physical Planning Department, 2011). According to the amended National Physical Plan in 2018, Nuwara Eliya town has been identified as a strategically developable town. It has

estimated an expected population growth of one hundred thousand by the year 2050 (National Physical Planning Department, 2018).

Nuwara Eliya town is positioned in a strategic location of the national road network, as it directly connects with Colombo via Gampola/ Kandy and Hatton & Avissawella and with Kandy via Ragala & Walapane and with southern province via Welimada & Bandarawela. Compared to the other towns of the island Nuwara Eliya town center has comparatively good internal road system and higher road density.

Compared to other areas of the island, Nuwara Eliya experiences low temperature as well as low intensity of rainfall. Annual average temperature is about 20^0 and the highest temperature which is about 21^0 is recorded in the months of January, February and March and lowest temperature which is about 4^0 is in the month of December.

As Nuwara Eliya is located in hilly area, it inherits picturesque scenic views including mountain slopes, narrow hilltops, valleys, mountain gaps and waterfalls in and around Nuwara Eliya town. The highest elevated point within the area is 2100 m from Mean Sea Level (MSL) and lowest elevation is 1400 m from MSL.

Nuwara Eliya town is the district capital of Nuwara Eliya district as well as the administrative town. In addition, it is one of the most attractive tourism destinations in the country as well as in the world and in terms of environmental sensitivity, Nuwara Eliya is significantly important for many ecological functions which are important for the entire island. When studying demographics of the town, the oldest record was found to be in 1881 where population was 1791 and no. of houses was 264 (Department of Census & Statistics Sri Lanka, 2012).

Table 4.2 – Past and Present Population Data of Nuwara Eliya District

	Grama Niladari Division	Population (2002)	Population (2012)	2012 Population growth	Population (2017)	2017 Population related to 2002
1	Bambarakale	3557	3143	-1.23	3340	-0.42
2	Hawaelliya E	2337	2273	-0.24	2416	0.24
3	Hawaeliay N	2686	2216	-1.94	2355	-0.88

4	Hawaeliya W	1888	2072	0.93	2202	1.03
5	Kalukale	1131	1093	-0.35	1162	0.18
6	Kalegaala	1874	1829	-0.25	1944	0.24
7	Maagasthota	1578	1408	-0.75	1496	-0.10
8	Nuwaraeliya	1878	1290	-3.69	1371	-2.08
9	Nuwaraeliya	4712	4292	-0.93	4561	-0.22
10	Nuwaraeliya	4540	2481	-0.24	4637	0.24
11	Sandathanne	2803	2816	0	2993	0.43
12	Kalapura	3210	3465	0.77	3682	0.92
	Total	32194	28378		32159	

Source - Nuwara Eliya District Office, UDA

When considering the economic activities of the Nuwara Eliya MC area, most of the people are engaged in tourism and related services. Nearly 25% of the people are engaged agriculture, 18% and 14% are respectively engaged in tourism and tourism related services (Urban Development Authority, 2019).

4.2.2. Hatton Dickoya Urban Council Area

Hatton town is located within the Nuwara Eliya District limits in the central province. Hatton town is met when travelling to Nuwara Eliya from Colombo via Awissawella. Hatton town is well connected to the national transport network both by road and railway.

Hatton was founded by the British during the colonial British era. The name 'Hatton' derived from a village in Aberdeenshire, Scotland. A number of the tea estates in the area are also named after Scottish villages. And it was formed as a service supplying center for the tea estate in up country. The Hatton region was initially used for coffee plantations in earlier period of 19th century, which proved unsuccessful. Then started the cultivation of tea around 1825-1935 (Urban Development Authority, 2018).

In 1820 to 1835 the most attractive service center was Dickoya town and gradually the activities were shifted to Hatton town center. A small "Kadamandiya" was established in the town center (currently known as the Main Street). An association named "Hatton Trust" was formed for these commercial developments. Meanwhile the public market was opened in 1868 and it was arranged to transport their productions from the highlands to Colombo via railway. Then the Hatton Railway

Station was opened on 4th June 1884 and Hatton became a main commercial and distribution hub (Urban Development Authority, 2018).

Gradually the attraction to Hatton was increased and commercial development took place. Fuel distribution center, machinery supply center and machinery repairing centers were also established in Hatton town by the end of 19th century. In middle of 20th century, the commercial and residential activities also marked a significant growth and town councils, police station, court complex, St. Gabriel Convent College, St, Bosco Boys College and prison were established. These new activities were a major reason to attract people from estates and villages located in the surrounding area of Hatton town. (Urban Development Authority, 2018)

Currently the town acts as a main service providing center for the surrounding catchment community. The catchment population is about 300,000.

Hatton is the main commercial and one of the major administrative towns of the Nuwara Eliya District. It has highlighted multi-cultural and multi ethnic town characteristics. Especially, the Hatton Urban Council area can be identified as one of the areas having most varied ethnic distribution among the surrounding GN divisions.

The composition of the population in Hatton, in terms of ethnicity, during the year of 2018 was characterized by 73% Indian Tamil, 13% Sinhala, 7% Sri Lankan Tamil, 7% Muslim and another 0.1% composed by other ethnicity groups (Department of Census & Statistics Sri Lanka, 2012). (Figure 08)
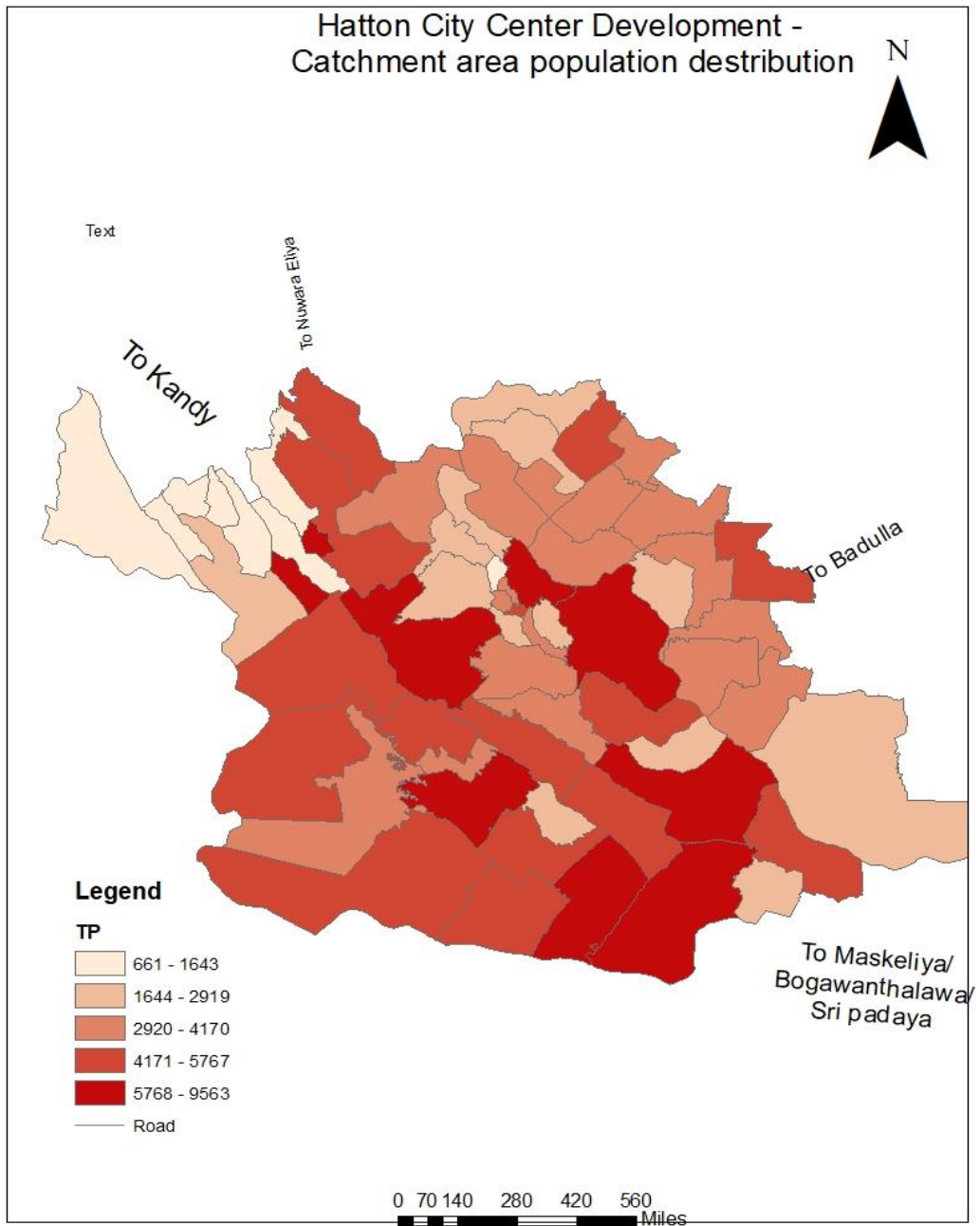
Figure 4.2 Catchment Population of Hatton Urban Council

Source: Department of Census & Statistics, 2012
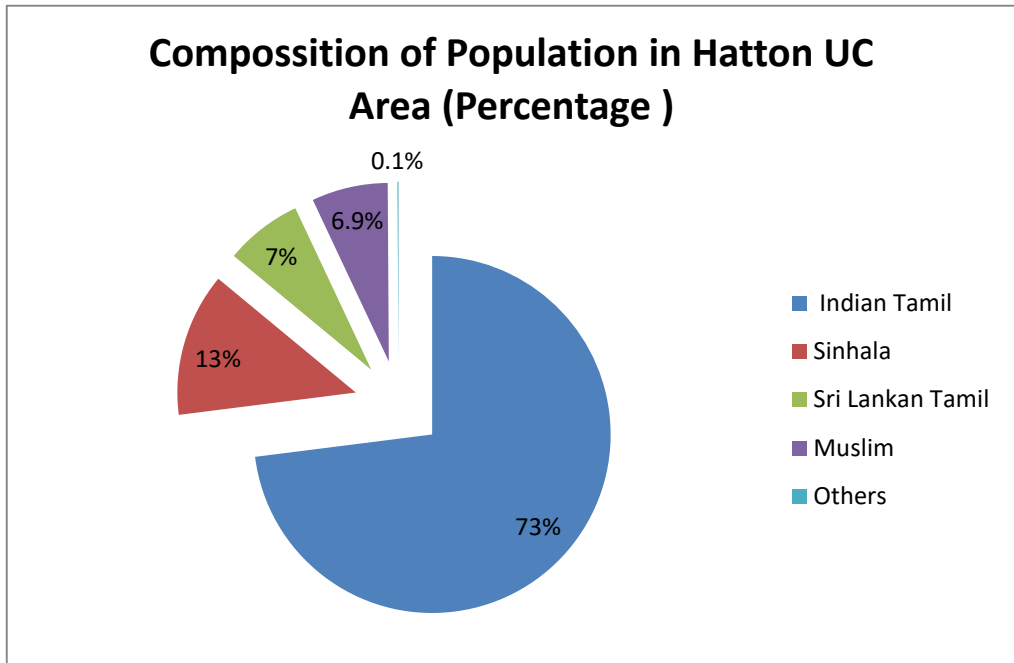
Figure 4.3 Population composition in Hatton UC area

Source: Department of Census & Statistics, 2012
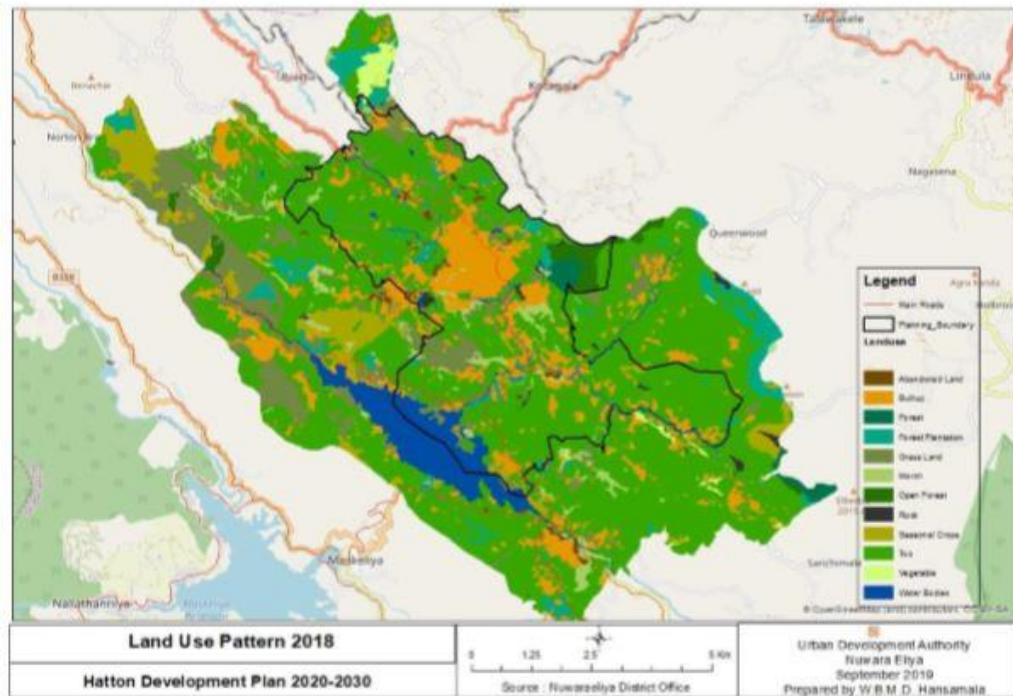
Figure 4.4 Land use of Hatton Urban Council Area and Sorrounding

Source: Nuwara Eliya District Office - UDA

Also when considering the land use of Hatton and surrounding, the Hatton UC area represents commercial and residential uses while surroundings represent tea cultivation and other uses.

4.2.3. Thalawakele Urban Council Area

Thalawakele town is located in Nuwaara Eliya District in Central province and it is situated on A7 Colombo Nuwara Eliya Road. The altitude of Thalawakele is 1,198 meters and is one of the largest tea growing areas in Sri Lanka. This town also began to grow as an estate facility center in British period. The catchment population of Thalawakele is about 75,000 and most of them are estate workers. Thalawakele Urban Council carries 17,000 number of population and it is about 18 % of the Nuwara Eliya District's urban population. Majority of population of Thalawakele are Indian Tamils who are workers of neighboring tea estates. Thalawakele Urban Council was established in the year1938. (Urban Development Authority, 2013)

Main changing point of the growth of Thalawakele town was the establishment of Thalawakele Railway Station which is one of the major stops of up country railway line. The town is the gateway to the Tea Research Institute of Sri Lanka. The mean annual temperature is around 18˚C and annual rainfall is around 2500mm in the area and this climate is perfect for tea cultivation.

The last major hydro-electricity project in Sri Lanka, Upper Kothmale Dam, is located within the Thalawakele Urban Council limits and significant development occurred in town as a result of this project. Housing development and infrastructure development were some of the major activities fulfilled by the project.
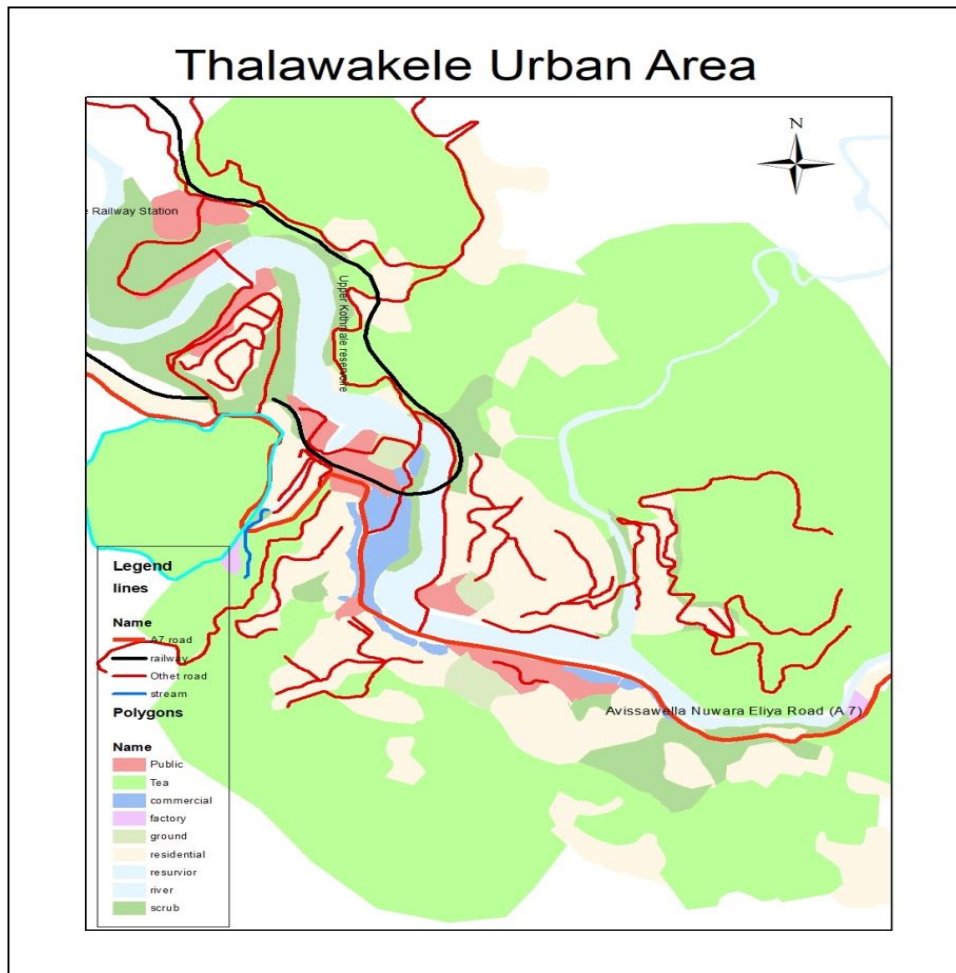
Figure 4.5 Thalawakele Urban Council Area

Source: Nuwara Eliya District Office - UDA

4.2.4. Maskeliya Town Area

Maskeliya is another emerging town in the Nuwara Eliya District. The town was established in the British period in order to provide required services for the surrounding estates. It has beautiful natural landscapes with waterfalls, water reservoir, mountains and forest. Maussakele water reservoir is located adjoining to the town and the most popular mountain named Adam's Peak is also located facing to Maskeliya town. The old Maskeliya town was initially located where the Moussakele reservoir is now located. The reservoir was built five decades ago in the place where the old Maskeliya town was.

Maskeliya town is located in the southern part of the central hills and at the corner of the Nuwara Eliya District. About 70 000 peoples live in 15 number of GN Divisions in the surrounding of Maskeliya town visit there to fulfill their daily requirements. According to the Census 2012, 90% of catchment people of Maskeliya town are engaged in plantation sector and thereby categorized as estate sector population (Department of Census & Statistics Sri Lanka, 2012). But several urban characteristics are evident in Maskeliya town.

4.2.5 Bogawanthalawa Town Area

Bogawanthalawa is a small town center located in Nuwara Eliya district towards the east the side of the hill country. It is at 1514 m elevation above sea level. Majority of the land is used as tea estates and this town was established and expanded as an estate facility center. The town area comprises of 2 GN divisions with 6500 number of population (Department of Census & Statistics Sri Lanka, 2012).

Bogawanthalawa town is located at the eastern edge of the Nuwara Eliya district. About 15,000 peoples live in 14 numbers of GN Divisions in the surrounding of Bogawanthalawa town and these people visit the town for their daily needs. According to the Census, 2012, 95 percent of catchment people are engaged in the plantation sector and they have been categorized as estate sector population (Department of Census & Statistics Sri Lanka, 2012).

Tea cultivation in Bogawanthalawa area was started in 1885 and in the meantime a small service center was established in Boagawanthalawa. Currently this town center acts as a service center for the surrounding estate community and about 25,000 of daily commuting population has been recorded (Nuwara Eliya District Office of UDA, 2019).

Figure 4.6 Bogawanthalawa town center

Source: Google Maps, 2020

4.2.6. Kotagala Town Area

Kotagala is a small-town center located in Nuwara Eliya District. It is at the 1247 m elevation above sea level and located on Colombo - Nuwara Eliya Main Road (A7). Majority of the land is used as tea estates and this town center was established and expanded as an estate facility center. The town area comprises in 2 GN divisions with 1758 of population (Department of Census & Statistics Sri Lanka, 2012).

The Devon and St. Clair's waterfalls which are famous tourist attractions are located in Kotagala area. Kotagala town was established and grew as an estate service center following the independence in Sri Lanka, although earlier it was a small service center.

Population Density of the Kotagala Area

Ginigathhena

Bogahawatta

Dehigasthenna

Mount Vernon

Watawala

Nagasena Dimbula

Vidulipura North

Ruwanpura
Rosella

Kudu Oya Kotagala

Dreton

Kiriwaneliya Lethant
Vidulipura South

Welioya

Panmen Watta

Yulefield

Lethant

Hatton West
Hatton North

Kottellena

Shanon

Hatton South

Dickoya Dickoya

Annfield

Lethant

Dickoya South

Maussakele

Vanaraja

Kotagala and sorrounding population
gnselect
TP

661 - 1250
1251 - 2228
2229 - 2871
2872 - 4170
4171 - 5249
5250 - 7053

Figure 4.7 Kotagala Town Center

Source: Nuwara Eliya District Office of UDA

4.3 Study area

The case study area includes selected urban and estate settlements in Nuwara Eliya District of Central Province of Sri Lanka. The particular urban and estate settlements were selected as case study area based on the following factors.

- As to represent both existing urban areas (as per the current definition) and emerging town centres in the existing estate settlements
- Emerging towns were identified based emerging urban characteristics such as high population, built up & road density, concentrated nodal developments both based on field observations and spatial mapping and analysis as shown in Figures 4.8. 4.9. 4.10, 4.11 and 4.12.
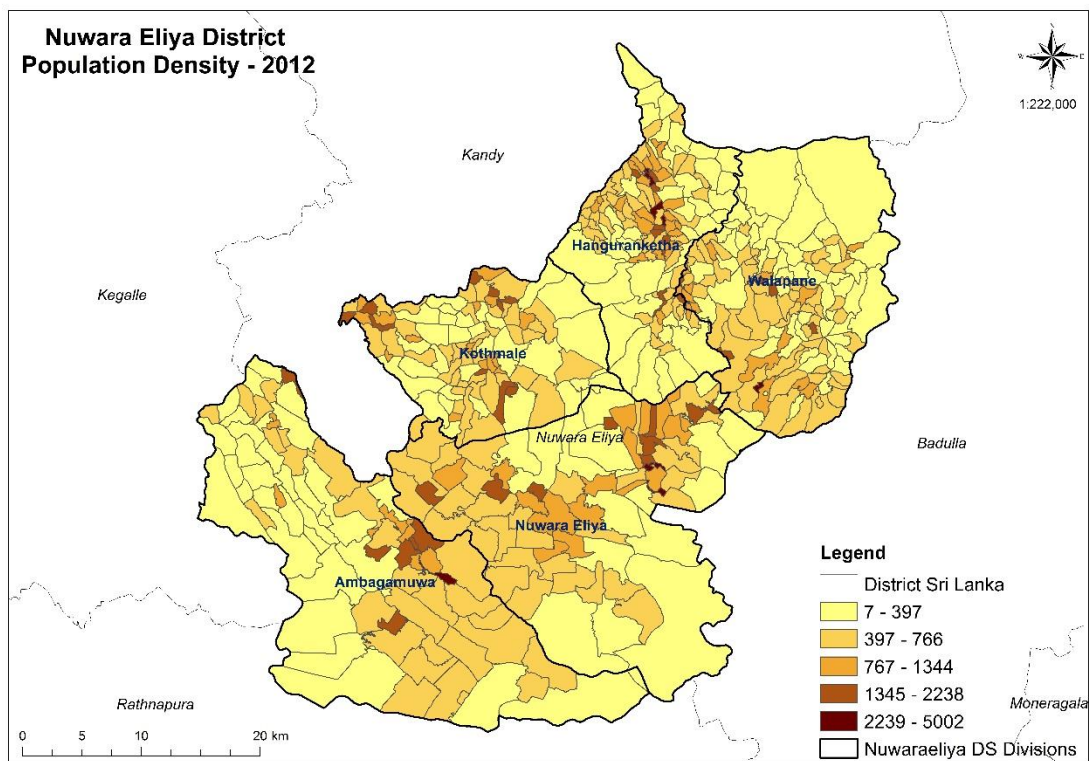
Figure 4.8 Nuwara Eliya District Population Density, 2012 (Population per Sq.km)
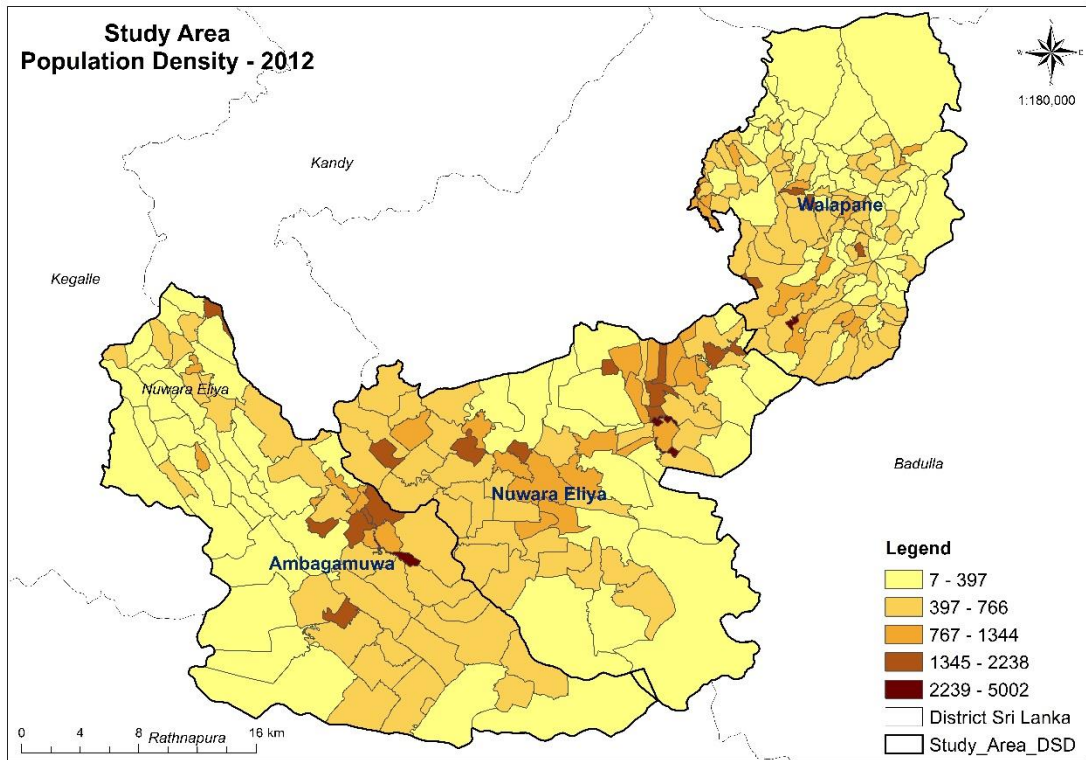
Figure 4.9 Study area Population Density, 2012 (Population per Sq.km)
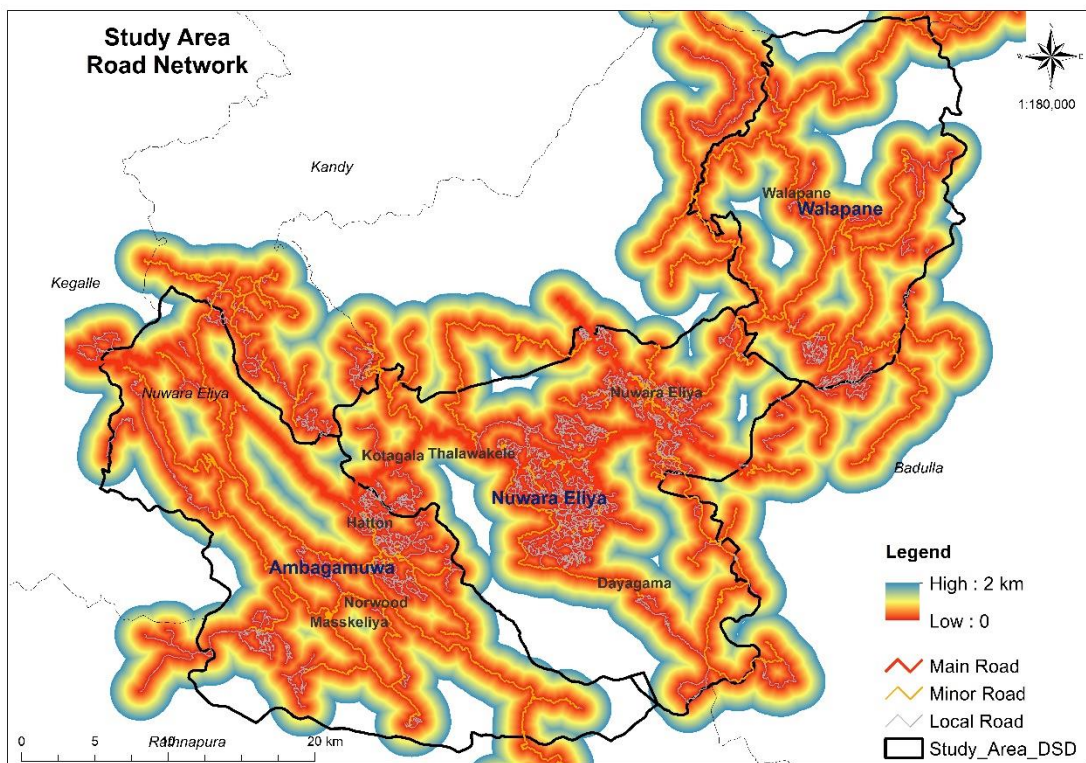
Figure 4.10 Road Density within study area
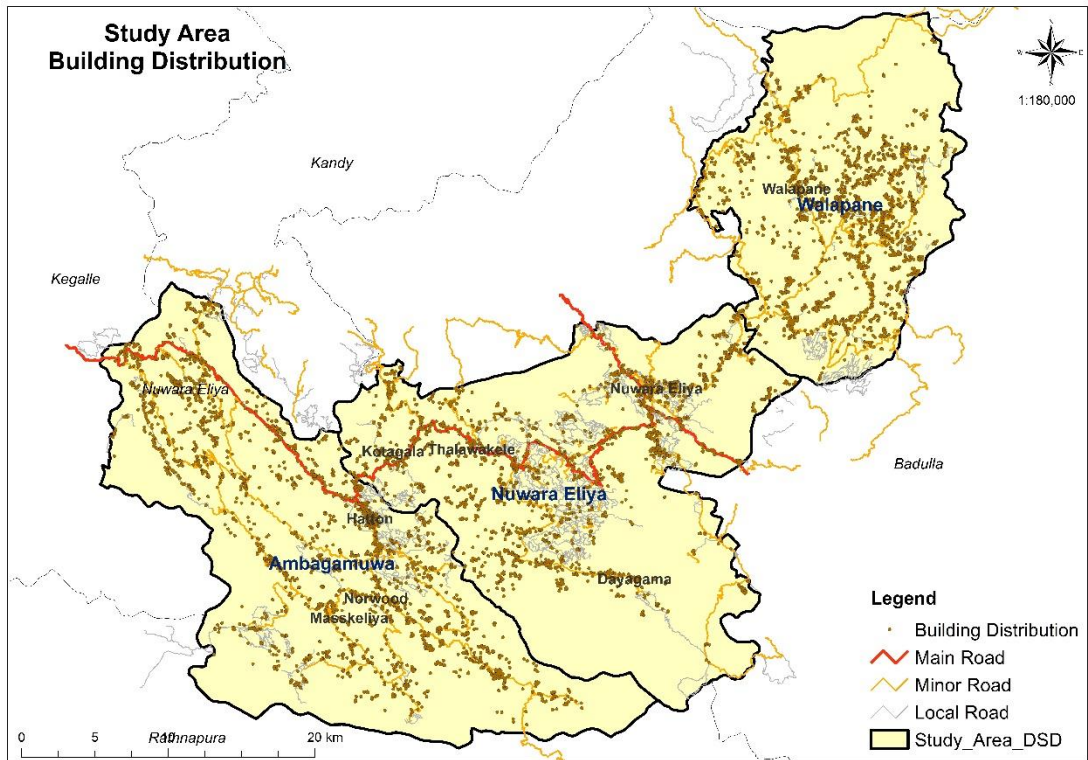
Figure 4.12 Building Distribution in study area
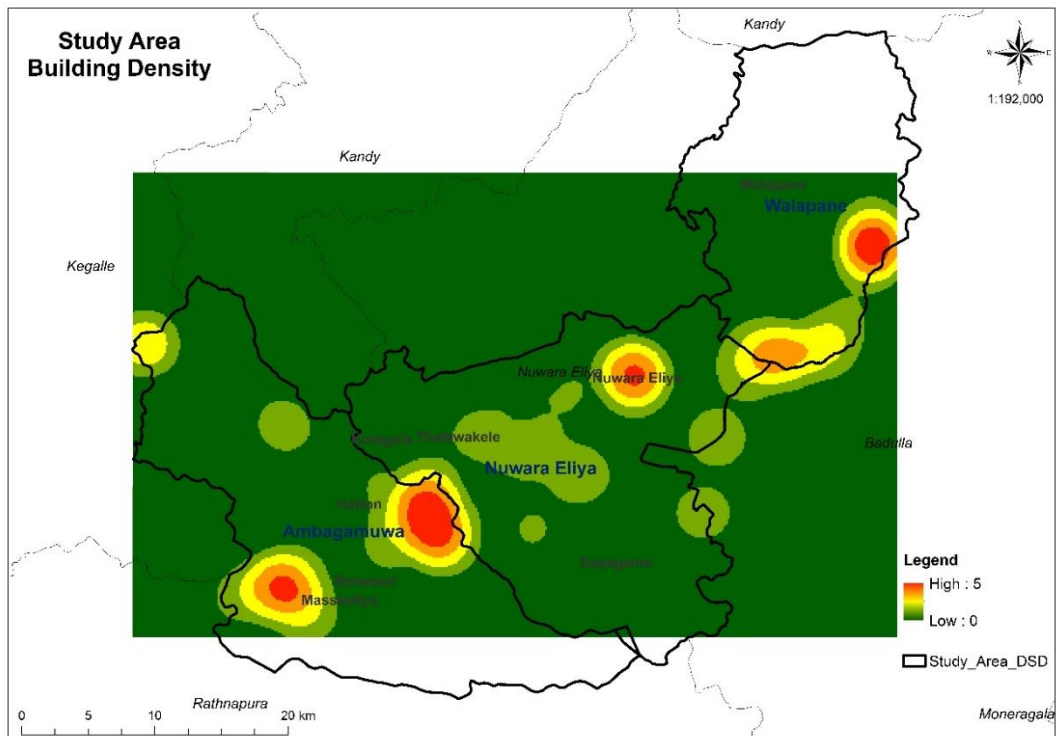
Figure 4.11 Clusters with higher building density within study area

The selected towns and their respective GN Divisions, no. of houses, housing units and population are given in the Table 4.3.

Table 4.3 Selected Towns and GN Divisions

Name of the town	GN Division	Houses	Household units	Population 2012
Nuwara Eliya MC	Bambarakele 535K	773	787	3143
	Hawaeliya East 535H	561	580	2273
	Hawaeliya North 535G	537	542	2216
	Hawaeliya West 535F	488	490	2072
	Kalapura 535N	832	840	3465
	Kalukele 535B	287	289	1093
	Kelegala 535C	442	453	1829
	Magasthota 535A	373	377	1408
	Nuwara Eliya 535	264	272	1290
	Nuwara Eliya Central 535D	993	1017	4292
	Nuwara Eliya West 535L	569	578	2481
	Sandathenna 535E	668	683	2816
Hatton UC	Hatton North 319B	1836	1852	7636
	Hatton South 319D	970	973	3762
	Hatton west 319C	500	511	2011
	Hatton East 319E	1075	1092	4941
	Dickoya 319A	808	825	3481
	Dickoya South 319	816	828	3339
Thalawakele	Thalawakele(p)475E	993	1004	4111
	Barewel(p)475X	803	820	3381
	Holyrood(p)475S	821	843	3393
Bogawanthalawa	Bogawanthalawa South(p)319F	1422	1439	6248
Kotagala	Kotagala475	1241	1254	5044
	Devon(p)475C	756	767	3227
Maskeliya	Maskeliya(p)320A	921	929	3851
	Brownslow(p)320N	1099	1113	4507
Norwood	Norwood(p)322	1549	1562	6612
Ragala	Ragala(p)533	432	439	1914

Source: Department of Census & Statistics 2017

4.4. Identification of the criteria to measure the urban level

As mentioned in the section 3.2.2., 32 criteria were derived after detail reviewing of literature and those 32 criteria were evaluated adopting a scoring method by selected 50 number of professional town planners. The evaluation was carried out in the mode of a structured questionnaire survey and the questionnaire is given in the annexure 01. The findings of the questionnaire survey which indicate the weights assigned by the town planning experts are given in the Table 4.4.

Table 4.4 Final result of the survey

No	Criteria	No. of participants marked each score					Total partici- pant
		1	2	3	4	5	
01	Population growth rate	34	11	1	4	0	50
02	Area covered by road	1	1	6	13	29	50
03	Building density	2	3	3	8	34	50
04	Population density	5	2	3	6	34	50
05	Available branded food court	3	2	5	14	26	50
06	Available hotel, restaurant, past food place, food court	7	1	4	32	6	50
07	Available branded super market	4	1	6	32	9	50
08	Available retail and whole sale shops	9	36	1	1	3	50
09	Available textile shops	5	8	32	1	4	50
10	Tenant house holders	2	8	33	6	1	50
11	Houses with two or more stories	4	2	7	34	3	50
12	Household units having inside toilets facilities	5	9	33	2	1	50
13	Household units having water sealed toilets connecting sewerage pit	4	36	6	3	1	50
14	Houses having fix line telephone	1	36	7	4	2	50

No	Criteria	No. of participants marked each score					Total partici-pant
		1	2	3	4	5	
15	Houses having mobile telephone	5	34	5	3	3	50
16	Houses having desktop computer	1	8	34	5	2	50
17	Houses having lap top computer	2	6	37	2	3	50
18	Population fluent with English language	0	5	40	5	0	50
19	Population having access to internet facility	1	9	30	6	4	50
20	Household unit having pipe born water	4	32	8	3	3	50
21	House hold units having national electricity grid power connection	8	32	6	2	2	50
22	House hold units using LP gas or electricity as a main source of cooking fuel	6	36	4	3	1	50
23	No of beds available in government hospital	4	42	2	1	1	50
24	Available privet hospitals relative.	2	1	43	2	2	50
25	Available dispensaries.	4	8	33	4	1	50
26	Household units where solid waste being collected by local authority	3	2	39	4	2	50
27	Population with a degree or above qualification	2	6	27	14	1	50
28	Number of Government school children	2	42	2	3	1	50

No	Criteria	No. of participants marked each score					Total partici-pant
		1	2	3	4	5	
29	Available Commercial Banks	2	3	4	32	9	50

Accordingly, the finalized weights of each criteria were derived by considering the highest scores assigned by the town planning experts for a particular criteria. Further, the initial 32 number of criteria were reduced to 29 based on the assigned values. The Table 4.2 includes the final 29 criteria and their respective weights.

Table 4.5 Final weighted score for each criterion

No	Criteria	Weight
1	Population growth rate	1
2	Area covered by Road	5
3	Building density	5
4	Population Density	5
5	Available branded food court	5
6	Available hotel, restaurant, past food place, food court	4
7	Available branded super market	4
8	Available retail and whole sale shops	3
9	Available textile shops	6
10	Tenant house holders	3
11	Houses with two or more stories	4
12	Household units having inside toilets facilities	3
13	Household units having water sealed toilets connecting sewerage pit	2
14	Houses having fix line telephone	2
15	Houses having Mobile telephone	2
16	Houses having desktop computers	3
17	Houses having lap top computers	3
18	Population fluent with English language	3
19	Population having access to internet facility	3
20	Household unit having pipe born water	2
21	Household units having national electricity grid power connection	2
22	Household units using LP gas or electricity as a main source of cooking fuel	2

23	No. of beds available in government hospital	2
24	Available privet hospitals relative.	3
25	Available dispensaries.	3
26	Household units where solid waste being collected by local authority	3
27	Population with a degree or above qualification	3
28	Government school children	2
29	Available Commercial Bank	4

4.5. Collection of Data

As described in the section 3.2.3, above finalized 29 criteria were included under suitable sub-expressions as their attributes. The complete framework of mandates, expressions, sub-expressions and attributes are given in the Table 4.6. These attributes were used to measure the urban level of selected GNDs of the case study area.

Table 4.6.5. Collection of Data

Mandate	Expression	Sub expression	Attributers			Weighted score
Lifestyle	Food consuming Pattern	Type of food	Available branded food courts relative to size of population			4
			Available hotels, restaurants, past food outlets, food courts (Non Branded) relative to size of population	Area more than 100 m^2	Area less than 100 m^2	1
				Area less than 100 m^2	Area more than 100 m^2	2
		Daily marketing	Available branded super market chain out lets relative to size of population			4
			Available retail and whole sale shops relative to size of population	Area more than 100 m^2	Area less than 100 m^2	1
				Area less than 100 m^2	Area more than 100 m^2	2

Mandate	Expression	Sub expression	Attributers			Weighted score
	Cloth Pattern	Type of textile	Available textile shops relative to size of population	Area more than 100 m^2	Area less than 100 m^2	1
				Area less than 100 m^2	Area more than 100 m^2	2
	Shelter	Type of tenure	Tenant householders relative to size of population			3
		Type of storeys	Houses with two or more stories relative to size of population			4
		Type of Toilet Facilities	House hold units having inside toilets facilities relative to size of population			3
		Type of toilet	House hold units having water sealed toilets connecting sewerage pit relative to size of population.			2
	Means of Communication	Type of communication equipment use	Houses having fix line telephone relative to size of population			3
			Houses having Mobile telephone relative to size of population			3
			Houses having desktop computer relative to size of population			3
			Houses having lap top computer relative to size of population			3
		Language proficiency	Population with English language proficiency relative to size of population			3
		Access to internet	Population having access to internet facility at house hold units relative to size of population			4
Access to Facility	Water	Drinking water source	Household unit having pipe born water relative to size of population			3
	Energy Consumption	Type of lighting	Household units having national electricity grid power connection relative to size of population			3
		Type of Cooking Fuel	Household units using LP gas or electricity as a main source of cooking fuel relative to size of population			2
	Health	Type of service	No. of beds available in government hospital relative to size of population			4

Mandate	Expression	Sub expression	Attributers	Weighted score
			Available privet hospitals relative to size of population	3
			Available dispensaries relative to size of population	2
	Solid waste	Solid waste disposal method	Household units where solid waste being collected by local authority relative to size of population	2
Aspiration	Education	Education attainment	Population with a degree or above qualification relative to size of population	3
			Government school children's relative to size of population	2
Physical Setting	Physical Development	Density	Population density per hectares relative to size of population	3
			Area covered by building relatively house hold units	4
			Area covered by roads relative to size of population	2
		Growth Rate	Population growth rate in last ten years (%)	3
		Available Commercial Banks	Available Commercial Banks relative to size of population	1

4.5. Collection of data for attributes

The secondary data was separately collected for each attribute for each selected GN division of the study area. Data obtained from Department of Census & Statistics and the respective local authorities were the main sources of information.

The collected data and the respective Relative Values of each attribute of Bambarakele GN division are shown in the Table 4.7 as an example.

Table 4.7 Data analysis of Bamabarakele GN division

	1	2	3	4	5		6				7		8			
		House	House hold unit	Population	Available branded food court relative to size of population		Available hotel, restaurant, past food place, food court (Non Branded) relative to size of population				Available branded super market chain out lets relative to size of population		Available retail and whole sale shops relative to size of population			
							less than 100sqm		More than 100sqm				less than 100sqm		More than 100sqm	
GN Division					No	Relative value	No	Relative value	No	Relative value	No	Relative value	No	Relative value	No	Relative value
Bambarakele 535K	773	787	3143	1	0.000318	12	0.003818	8	0.002545	0	0	14	0.004454	5	0.00159	

9				10		11		12		13		14	
Available textile shops relative to size of population				Tenant house holders relative to size of population		Houses with two or more stories relative to size of population		Household unit having inside toilets facilities relative to size of population		Household units having water sealed toilets connecting sewerage pit relative to size of population		Houses having fixed line telephone relative to size of population	
less than 100sqm		More than 100sqm											
No	Relative value	No	Relative value	No	Relative value	No	Relative value	No	Relative value	No	Relative value	No	Relative value
6	0.001909	2	0.000636	102	0.032453	79	0.025135	330	0.104995	457	0.145402	351	0.111677

15		16		17		18		19		20	21		
Houses having Mobile telephone relative to size of population		**Houses having desktop computer relative to size of population**		**Houses having lap top computer relative to size of population**		**Population with English language proficiency relative to size of population**		**Population having access to internet facility at house hold units relative to size of population**		**Household units having pipe born water relative to size of population**		**Household units having national electricity grid power connection relative to size of population**	
No	**Relative value**	**No**	**Relative value**	**No**	**Relative value**	**No**	**Relative value**	**No**	**Relative value**	**Relative value**	**No**	**Relative value**	**No**
756	0.240535	93	0.02959	63	0.020045	377	0.119949	175	0.055679	0.178810	562	0.229399	721

22			23		24		25	26		27		28	
Household units using LP gas or electricity as a main source of cooking fuel relative to size of population		**No. of beds available in government hospital relative to size of population**		**No. of Privet hospitals .Available privet hospitals relative to size of population.**		**Available dispensaries relative to size of population.**		**Household units where solid waste being collected by local authority relative to size of population.**		**Population with a degree or above qualification relative to size of population.**		**Government school children's relative to size of population.**	
Relative value	**No**	**No**	**Relative value**	**No**	**Relative value**	**No**	**Relative value**	**Relative value**	**No**	**Relative value**	**No**	**No**	**Relative value**
0.13204	415	0	0	0	0.0000	3	0.00095	0.20172	634	0.0203627	64	50	0.015908

29		30	31		32		33	
Population density per hectares relative to size of population		**Area covered by building relative to household units.**	**Area covered by road relative to size of population**		**Population growth rate in last ten years (%)**		**Available Commercial Banks relative to size of population**	
No	**Relative value**	**Relative value**	**No**	**Relative value**	**No**	**Relative value**	**No**	**Relative value**
21	0.006682	0.000406607	0.11	3.5E-05	-0.0123	-0.00039	0	0

The above relative values of each criteria were multiplied by its weight in order to derive the Weighted Values of each attribute and these values obtained for the Bambarakele GN division are shown in the Table 4.8. Then the sum of the weighted values of all attributes which is the Composite Value is equal to the Urban Level of the particular GND.

Table 4.8 Measurement of Urban level of Bambaralele GN division

Mandate	Expression	Sub expression	Attributers		Weighted score	Bambarakele 535K	
						Value	Value with weight
Lifestyle	Food consuming Pattern	Type of food	Available branded food court relative to size of population		5	0.000	0.002
			Available hotel, restaurant, past food place, food court (Non-Branded) relative to size of population	Area more than 100sqm	1	0.004	0.004
				Area less than 100sqm .	2	0.003	0.005
		Daily marketing	Available branded super market chain out lets relative to size of population		4	0.000	0.000
			Available retail and whole sale shops relative to size of population	Area more than 100sqm	1	0.004	0.004
				Area less than 100sqm	2	0.002	0.003
	Cloth Pattern	Type of textile	Available textile shops relative to size of population	Area more than 100sqm .	1	0.002	0.002
				Area less than 100sqm .	3	0.001	0.002
	Shelter	Type of tenure	Tenant householders relative to size of population		3	0.032	0.097
		Type of storeys	Houses with two or more stories relative to size of population		4	0.025	0.101
		Type of Toilet Facilities	Household units having inside toilets facilities relative to size of population		3	0.105	0.315

		Type of toilet	Household units having water sealed toilets connecting sewerage pit relative to size of population.	2	0.145	0.291
	Means of Communication	Type of communication equipment use	Houses having fix line telephone relative to size of population	2	0.112	0.223
			Houses having Mobile telephone relative to size of population	2	0.241	0.481
			Houses having desktop computer relative to size of population	3	0.030	0.089
			Houses having lap top computer relative to size of population	3	0.020	0.060
		Language proficiency	Population with English language proficiency relative to size of population	3	0.120	0.360
		Access to internet	Population having access to internet facility at house hold units relative to size of population	3	0.056	0.167
Access to Facility	Water	Drinking water source	Household unit having pipe born water relative to size of population	2	0.179	0.358
	Energy	Type of lighting	House hold units having national electricity grid power connection relative to size of population	2	0.229	0.459
		Type of Cooking Fuel	House hold units using LP gas or electricity as a main source of cooking fuel relative to size of population	2	0.132	0.264
	Health	Type of service	No of beds available in government hospital relative to size of population	2	0.000	0.000
			Available privet hospitals relative to size of population.	3	0.000	0.000
			Available dispensaries relative to size of population.	3	0.001	0.003
	Solid	Solid waste disposal method	Household units where solid waste being collected by local authority relative to size of population.	3	0.202	0.605
Aspiration	Education	Education attainment	Population with a degree or above qualification relative to size of population.	3	0.020	0.061
			Government school children's relative to size of population.	2	0.016	0.032
Physical Setting	Development	Density	Population Density per hectares relative to size of population	5	0.007	0.033
			Area covered by building relatively house hold units.	5	0.000	0.002

53

		Area covered by Road relative to size of population.	5	0.000	0.000
	Growth Rate	Population growth rate in last ten years. (%)	1	0.000	0.000
	Available Commercial Banks	Available Commercial Banks relative to size of population	4	0.000	0.000
Total				1.687	4.022

As per the Table 4.8, the Urban Level of Bambarakele GN division is 4.022. The final urban levels derived for the GNDs in the study area based on the above analysis are given in the Table 4.9 and spatially indicated in the Figure 4.13.

Table 4.9 Final Urban Value of selected towns

GN Division	Urban Value	Area	Existing Category
Devon(p)475C	0.596	Kotagala	Estate
Kalapura 535N	0.725	Nuwara Eliya	Urban
Barewel(p)475X	0.932	Thalawakele	Urban
Dickoya 319A	1.025	Hatton	Urban
Brownslow(p)320N	1.483	Maskeliya	Estate
Holyrood(p)475S	1.486	Thalawakele	Urban
Sandathenna 535E	1.559	Nuwara Eliya	Urban
Norwood(p)322	1.664	Noewood	Estate
Hatton East 319E	1.772	Hatton	Urban
Hatton west 319C	1.776	Hatton	Urban
Dickoya South 319	2.142	Hatton	Urban
Bogawanthalawa South(p)319F	2.247	Bogawanthalawa	Estate
Kalukele 535B	2.343	Nuwara Eliya	Urban
Nuwara Eliya Central 535D	2.577	Nuwara Eliya	Urban
Nuwara Eliya West 535L	2.660	Nuwara Eliya	Urban
Hawaeliya East 535H	3.020	Nuwara Eliya	Urban
Thalawakele(p)475E	3.066	Thalawakele	Urban
Kotagala475	3.276	Kotagala	Estate
Ragala(p)533	3.503	Ragala	Estate
Maskeliya(p)320A	3.513	Maskeliya	Estate
Magasthota 535A	3.564	Nuwara Eliya	Urban
Hatton North 319B	3.641	Hatton	Urban
Kelegala 535C	3.769	Nuwara Eliya	Urban
Bambarakele 535K	4.022	Nuwara Eliya	Urban

Hatton South 319D	4.131	Nuwara Eliya	Urban
Hawaeliya West 535F	4.131	Nuwara Eliya	Urban
Hawaeliya North 535G	5.701	Nuwara Eliya	Urban
Nuwara Eliya 535	6.176	Nuwara Eliya	Urban
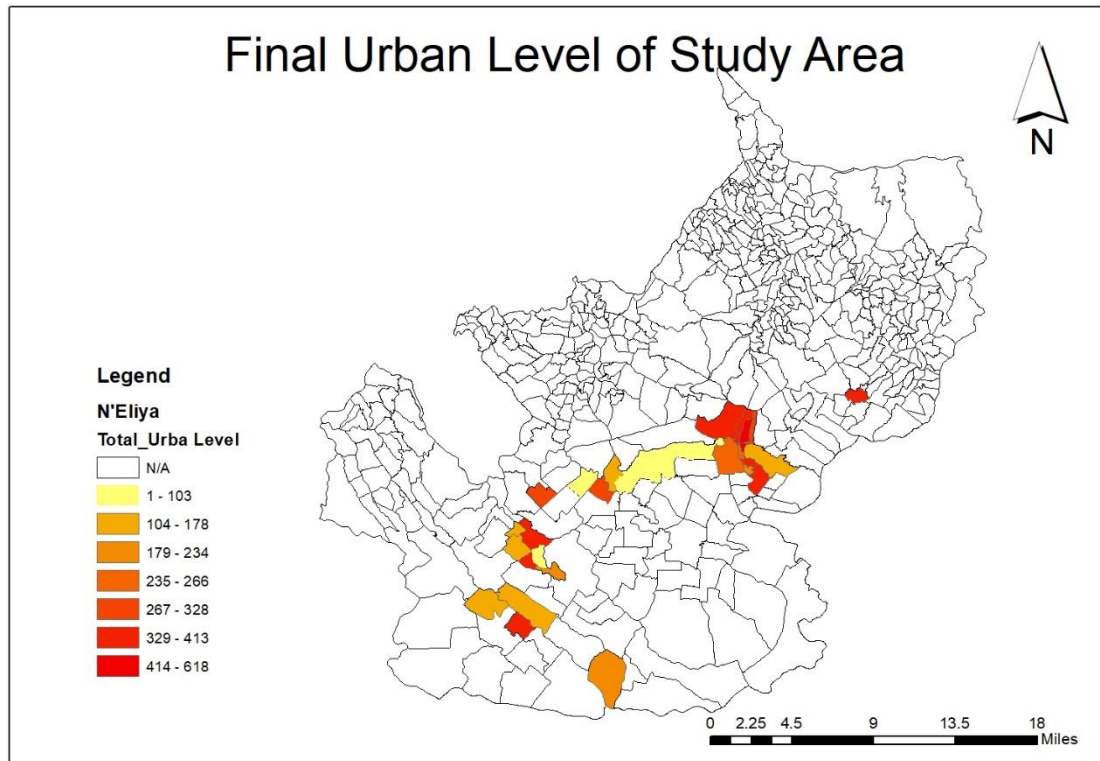
Figure 4.13 Urban Level of Study area

The graph in the Figure 4.14 represents and compares the final Urban Level values of both existing urban and non-urban GNDs as per the current definition.
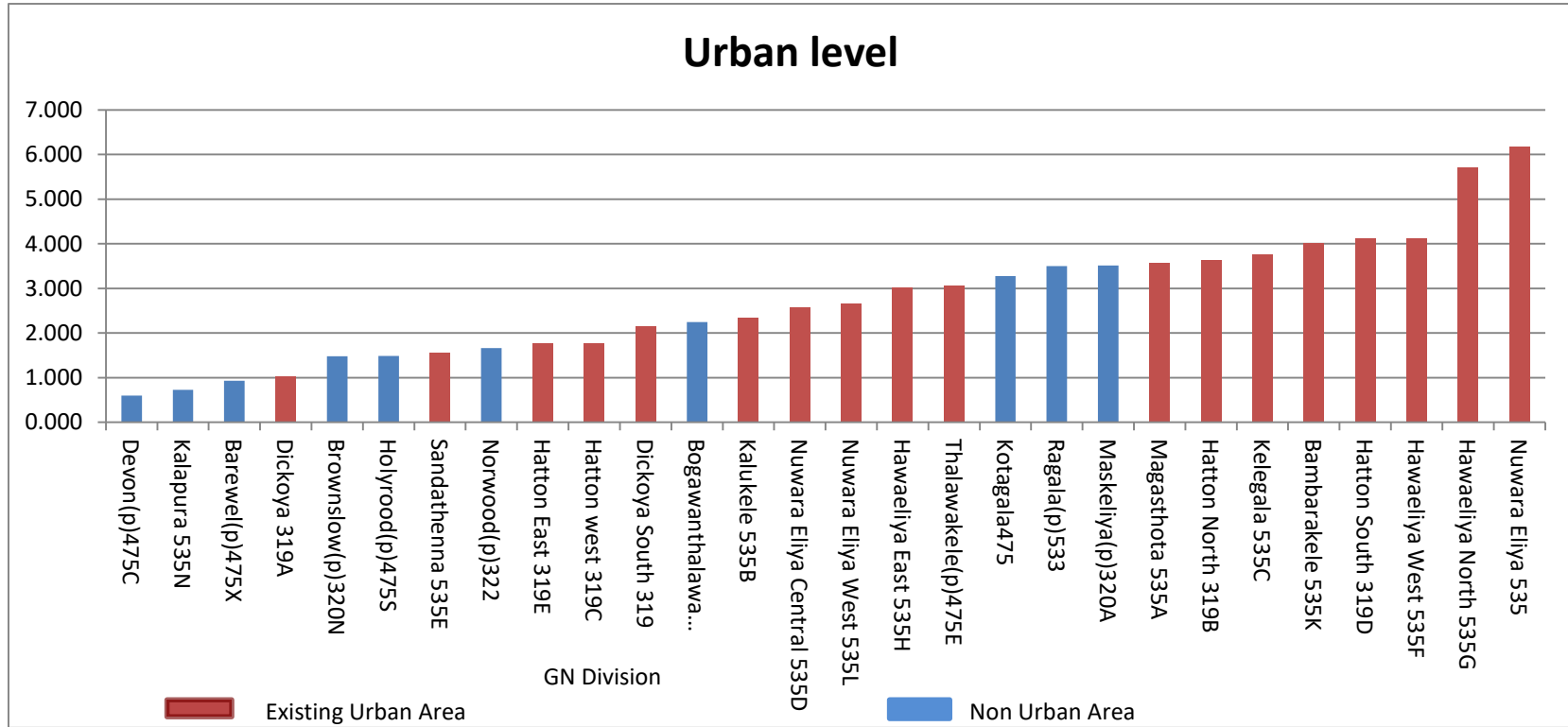
Figure 4.14 Urban Level of Selected GN divisions

According to the above derived final urban level values, the average urban value of the exiting Municipal Council of Nuwara Eliya and Urban Councils of Hatton and Thalawakele can be analyzed as follows (Table 4.10).

Table 4.10 Urban Level of Existing Urban Areas

Urban Area	GN Division	Urban Value	Total value	Average value
Nuwara Eliya MC	Bambarakele 535K	4.022	40.247	3.354
	Hawaeliya East 535H	3.020		
	Hawaeliya North 535G	5.701		
	Hawaeliya West 535F	4.131		
	Kalapura 535N	0.725		
	Kalukele 535B	2.343		
	Kelegala 535C	3.769		
	Magasthota 535A	3.564		
	Nuwara Eliya 535	6.176		
	Nuwara Eliya Central 535D	2.577		
	Nuwara Eliya West 535L	2.660		
	Sandathenna 535E	1.559		
Hatton UC	Hatton North 319B	3.641	14.487	2.414
	Hatton South 319D	4.131		
	Hatton west 319C	1.776		
	Hatton East 319E	1.772		
	Dickoya 319A	1.025		
	Dickoya South 319	2.142		
Thalawakele UC	Thalawakele(p)475E	3.066	5.485	1.828
	Barewel(p)475X	0.932		
	Holyrood(p)475S	1.486		

The graph in the Figure 4.15 shows the comparison of final urban level values of each GND with the average urban value of existing urban areas.
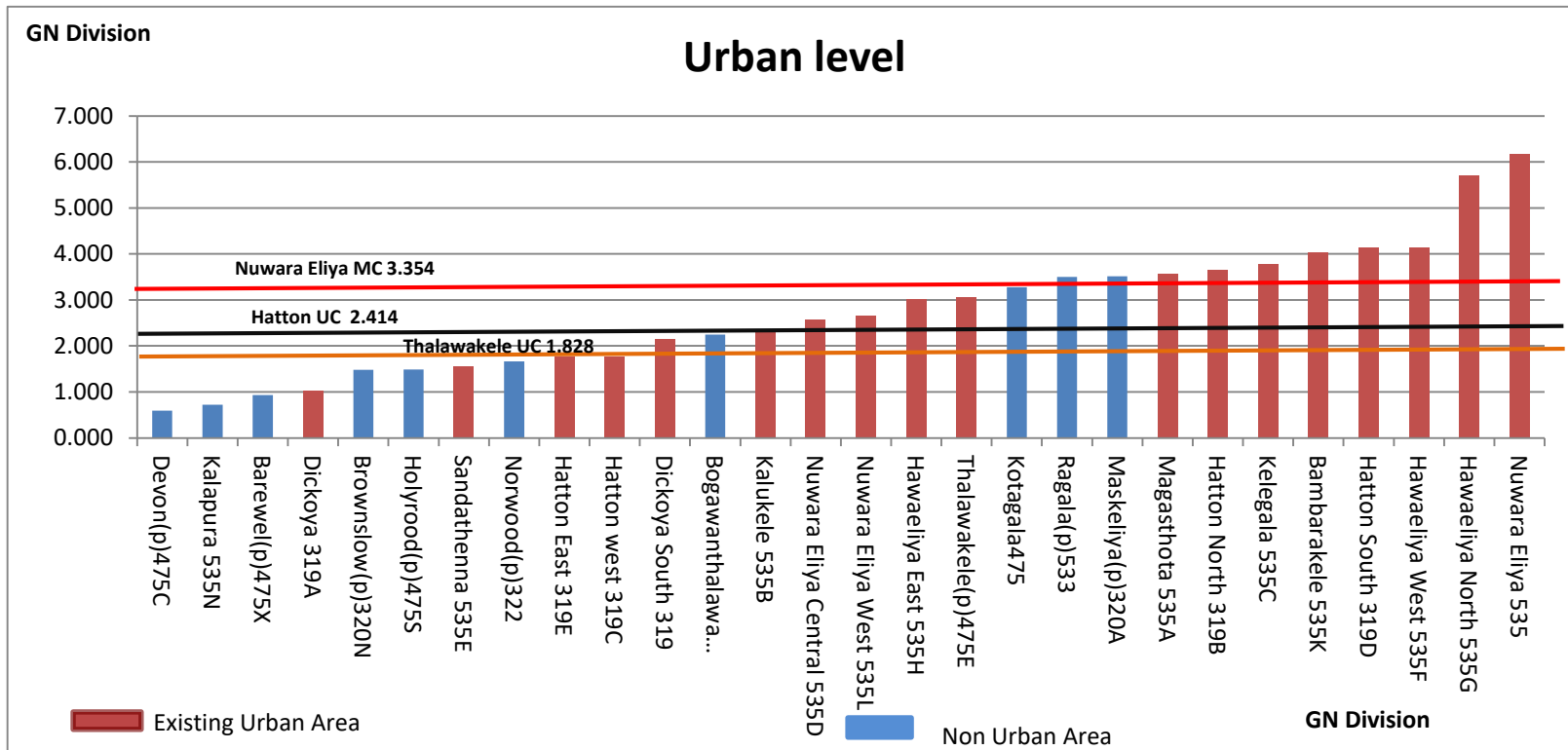
Figure 4.15 Urban Level of Selected GN divisions and existing urban area

CHAPTER FIVE

CONCLUSION

The study intended to achieve two objectives, first to identify the suitable factors and criteria for demarcating urban areas in Sri Lanka and second to measure the level of urbanization of new growing centers in Nuwara Eliya district which are currently categorized as estate sector.

With relation to the first objective, it could be identified through the literature survey that there is no universal definition to measure the level of urban and countries adopt various single or multi-criteria methods based on approaches such as demographic, density, economic, administrative, morphology and functional in order to define and measure the level of urban in their unique contexts. Sri Lanka adopts an administrative approach where all Municipal Council and Urban Council Areas are considered 'urban' and accordingly, the urban level in Sri Lanka was found to be 18.2% in 2012. This figure is contradicting with the rapid urbanization and urban characteristics emerging all over the country. In the case of Nuwara Eliya District, only 5.6% of its population were recorded to be urban in 2012 and this figure was 6.1% in 2001. Although, there are number of growing urban centers in the District, the official definition has failed to capture real urbanization and urban growth happening there. These figures misinterpret the real urbanization scenario and unreasonably designate a portion of population who actually enjoy urban facilities and contribute to the urban sector as 'estate sector' population causing many consequent issues.

In this context, the study intended to identify suitable criteria to measure the level of urbanization in the Sri Lankan context and apply it to the selected areas in the Nuwara Eliya District to find their actual urbanization level. The set of criteria proposed by this study were mainly derived and based on the 'Alternative framework to measure the level of urbanization in Sri Lanka' introduced by De Silva, Dharshani & Munasinghe in 2016. They used a people centric approach with social criteria to define the level or urbanization based on the concept 'urban way of life' which is measured by three

mandates; lifestyle, access to facilities and aspirations. The framework included expressions, sub-expressions and attributes under the three mandates, and these attributes were used to measure the urban level of a particular context. The same framework was adopted to this study with the use of many of its attributes while introducing a new mandate named 'Physical Setting' to evaluate and consider the physical aspects of a context when measuring its urbanization level.   The attributes initially identified based on the literature survey were evaluated by 50 number of Town Planning Experts using a scoring method and final 29 attributes were derived.

One of the major findings is that the interviewed Town Planning Experts had been more biased towards physical attributes and had assigned relatively higher scores to them.

After applying the proposed set of attributes, it was identified that the highest urban level which is 6.2 was recorded from Nuwara Eliya GND and the next highest were from Hawaeliya North (5.7), Hawaeliya West (4.1) and Bambarakele (4.0) and they are all located in the Nuwara Eliya town center.

An important finding was that although, Nuwara Eliya MC, Hatton UC and Thalawakele UC have been designated in to the same 'urban' status by the administrative definition, they have three different average urban levels such as; Nuwara Eliya MC – 3.3, Hatton UC – 2.4 & Thalawakele UC – 1.8. On the other hand, the urban levels of current non-urban areas (Estates); Maskeliya, Ragala & Kotagala and Bogawanthalawa are higher than the urban level of Thalawakele UC; which has been designated as an urban area

Further, there are few designated urban areas such as Dickoya, Sandathenna, Haton East and Hatton West which indicate urban levels lower than the urban level of Thalawakele UC which is 1.8.

The above findings prove that the current administrative approach used to define and measure the level of urban in Sri Lanka is not appropriate and it extremely misinterprets the real urbanization taking place in the country. Especially, this issue in the definition hinders many potentials for development and in most cases, unreasonably

categorizes settlements and its population as estate or rural regardless the fact they may be contributing to the urban sector and enjoying urban facilities. This barricades such people from accessing many more urban facilities and opportunities. In the case of Nuwara Eliya district, where a majority of estate community is living, this contributes to marginalization of such communities in an indirect way.

However, another finding was that inclusion of physical attributes is equally important and social attributes alone would not interpret the actual urban level correctly. It was the opinion of many of the interviewed Town Planning Experts and this was well evident in their responses.

On the other hand, it is important to further discuss and study whether it is required to have another settlement category named 'Estate' in Sri Lanka. In most countries, only two categories remain such as urban and rural and even this is challenged as many scholars have proved with evident that there is no clear cut settlement categories as urban and rural but there is a continuum of urbanization and urban and rural are just the extremes of that continuum. In that case, further studies need to be carried out to evaluate the need of another settlement category named 'estate' in Sri Lanka.

In addition, it is required to do further studies to identify the bench mark to define urban status within the scale of urban level and to identify which attributes are more contributing for the existing estate areas to attain a higher urban level. Also, it is important to study the contribution of social and physical attributes to the composite urban level and their significance for defining urban status. Another extension to this study could be the applying the same analysis for other estate areas beyond the limits of Nuwara Eliya District and making a comparison of the results.

References

Aheeyar, M. (2006). *Preliminary Investigation on the Issues Related to Poverty and Marginalization of Estate Sector Communities in Badulla and Nuwara Eliya Districts: Final Report.* Practical Action Consulting.

Davis, K. (1965). The urbanization of the human population. *Scientific American 2013.03*, 40-53.

De Silva, M., Dharshani, G., & Munasinghe, J. (2016). Defining 'Urban' among Urbanizing Rural: The Case of Sri Lankan Urbanization. *"Building the Future - sustainable and resillient environments" - Proceedings of the 9th International Conference of Faculty of Architecture Research (FARU)* (pp. 288-303). Colombo: University of Moratuwa, Sri Lanka.

Department of Census & Statistics Sri Lanka. (2012). *Sri Lanka Census of Population and Housing, 2011.* Retrieved from Department of Census & Statistics Sri Lanka: http://www.statistics.gov.lk/pophousat/cph2011/index.php?fileName=Concepts andDefinitions&gp=StudyMaterials&tpl=2#:~:text=Estate%20sector,estate%20 comprise%20the%20rural%20sector.

Department of Economic and Social Affairs, UN. (1969). *Growth of the World's Urban and Rural Population, 1920 - 2000.* New York: United Nations.

Department of Economic and Social Affairs, UN. (2019). *World Urbanization Prospects: The 2018 Revision.* New York: United Nations.

Department of Economic and Social Affairs, United Nations. (2014). *World Urbanization Prospects: 2014 Revision, Highlights.* New York: United Nations.

Eurostat. (2010). *Eurostat Statistics Books, Eurostat regional yearbook 2010.* Belgium: European Commission.

Hollup, O. (1994). *Bonded labour: Caste and Cultural Identity among Tamil Plantation Workers in Sri Lanka.* Colombo: Charles Subasinghe and Sons.

Holsinger, M. (2002). *Thesis on the History of Ceylon Tea.*

Hugo, G., Champion, A., & Lattes, A. (2001). New Conceptualisation of Settlement for Demography: Beyond the Urban/ Rural Dichotomy. *Paper Prepared for Session 42, IUSSP Conference*.

Lefebvre, H. (1968). *The Urban Revolution.* Paris.

National Physical Planning Department. (2011). *National Physical Plan - 2030.* Colombo: National Physical Planning Department, Sri Lanka.

National Physical Planning Department. (2018). *The Updated National Physical Planning Policy and the Plan - 2050.* Colombo: National Physical Planning Department, Sri Lanka.

Piyarathne, A. (2008). Longing for equal status: impact of housing intervention on identity and status of Indian origin Tamil resettlers from two selected plantations in Sri Lanka. *Sri Lanka Journal of Social Sciences 2008/2009 31/32 (1&2)*, 47-63.

Song , Y., Shao, G., Song, X., Liu, Y., Pan, L., & Ye, H. (2017). The Relationships between Urban Form and Urban Commuting: An Empirical Study in China. *Sustainability 2017, 9, 1150*.

Uchida, H., & Nelson, A. (2008). *Agglomeration Index: Towards a New Measure of Urban Concentration.*

UNESCAP. (2013). *Urbanization in Central Asia: Challenges, Issues and Prospects; Analytical Report 2013/03.* UNESCAP.

Urban Development Authority. (2013). *Thalawakele Development Plan (The Draft).* Nuwara Eliya: Urban Development Authority, Sri Lanka.

Urban Development Authority. (2018). *Hatton Development Plan (The Draft).* Nuwara Eliya: Urban Development Authority, Sri Lanka.

Urban Development Authority. (2019). *Nuwara Eliya Development Plan - 2019-2030.* Nuwara Eliya: Urban Development Authority, Sri Lanka.

USA Census Bureau. (2010).

Vijesandiran, S., & Ramesh, R. (2016). Local Government Services and Social Margins: The Case of Plantation Community in Sri Lanka. *Journal of Politics and Law; Vol. 9, No. 10; 2016*, 59-71.

Weeraratne, B. (2016). *Re-defining Urban in Sri Lanka.* Colombo: Institute of Policy Studies Sri Lanka; Working Paper Series No. 23.

Wirth, L. (1938). Urbanism as a Way of Life. *The American Journal of Sociology; Volume 44, No. 01*, 1-24.

Master of Science in Spatial Planning, Management & Design, Department of Town and country planning, University of Moratuwa

01. Name of the Scholar – P.W.Nilantha Paranagama

02. Research topic - **Critical Assessment on the Settlement Categorization of Sri Lank:** Case of the Nuwara Eliya District estate settlements

03. Type of survey - Expert Judgment

Introduction

As a master student, currently I have engaged in the research work for the final dissertation report. As a part of my research, I am trying to introduce a new criteria to measure   the urbanization level of Sri Lanka and use it to evaluate the current settlement categorization with special focus on the estate sector in Sri Lanka considering Nuwara Eliya District Estate Towns as the case study.

In most of the countries, urbanization is generally measured in terms of their urban population, however it is difficult to find a universal definition for the term urban. Many countries apply different approaches to measure the urban level based on demography, density, administrative, economical and functional level of the area. This questionnaire consists of a set criteria which have been proposed by different scholars and which are already used by different countries.

You are kindly requested to fill the attached questionnaire sheet by assigning scores as mentioned below for each criteria considering their suitability and effectiveness for measuring Urbanization in Sri Lanka.

    1 - Very low importance

    2 - Low importance

    3 - Moderate importance

    4 - High importance

5. Very high importance

Questionnaire

1. **What criteria can be used to identify the urban level in Sri Lanka.**

   (Following criteria were identified from the literature review.

   Please assign a weighted score for each criteria considering their importance to measure urbanization in Sri Lanka)

No	Criteria	Weighted score				
		1	2	3	4	5
01	Population growth rate					
02	Area covered by roads					
03	Building density					
04	Population density					
05	Available branded food court					
06	Available hotel, restaurant, past food place, food court					
07	Available branded super markets					
08	Available retail and whole sale shops					
09	Available textile shops					
10	Tenant house holders					
11	Houses with two or more stories					
12	Household units having inside toilets facilities					

13	Household units having water sealed toilets connecting sewerage pit					
14	Houses having fix line telephone					
15	Houses having Mobile telephone					
16	Houses having desktop computer					
17	Houses having lap top computer					
18	Population with English language					
19	Population having access to internet facility					
20	Household unit having pipe born water					
21	Household units having national electricity grid power connection					
22	Household units using LP gas or electricity as a main source of cooking fuel					
23	No. of beds available in government hospital					
24	Available private hospitals					
25	Available dispensaries					
26	Household units where solid waste being collected by local authority.					
27	Population with a degree or above education qualification					

28	No. of government school children					
29	Available Commercial Banks					

Appendices 02- Data collecting sheet for each GN divisions

Name of the town	GN Division	House	House hold unit	Population 2012	Available branded food court relative to size of population		Available hotel, restaurant, past food place, food court (Non Branded) relative to size of — less than 100sqm		More than 100sqm		Available branded super market chain out lets relative to size of population		Available retail and whole sale shops relative to size of population — less than 100sqm		More than 100sqm	
Nuwara Eliya mc	Bambarakele 535K	773	787	3143	1	0.000318	12	0.003818	8	0.002545	0	0	14	0.0044543	5	0.00159084
	Hawaeliya East 535H	561	580	2273	1	0.00044	14	0.0061593	9	0.00396	1	0.00044	32	0.0140783	10	0.00439947
	Hawaeliya North 535G	537	542	2216	0	0	13	0.0058664	10	0.004513	0	0	41	0.0185018	16	0.00722022
	Hawaeliya West 535F	488	490	2072	0	0	16	0.007722	11	0.005309	0	0	32	0.015444	18	0.00868726
	Kalapura 535N	832	840	3465	0	0	4	0.0011544	3	0.000866	0	0	7	0.0020202	4	0.0011544
	Kalukele 535B	287	289	1093	0	0	3	0.0027447	1	0.000915	0	0	8	0.0073193	3	0.00274474
	Kelegala 535C	442	453	1829	0	0	4	0.002187	2	0.001093	0	0	12	0.006561	6	0.00328048
	Magasthota 535A	373	377	1408	2	0.00142	9	0.006392	7	0.004972	0	0	8	0.0056818	4	0.00284091
	Nuwara Eliya 535	264	272	1290	1	0.000775	16	0.0124031	11	0.008527	0	0	31	0.024031	14	0.01085271
	Nuwara Eliya Central 535D	993	1017	4292	2	0.000466	18	0.0041938	12	0.002796	2	0.000466	41	0.0095527	13	0.00302889
	Nuwara Eliya West 535L	569	578	2481	0	0	19	0.0076582	11	0.004434	1	0.000403	38	0.0153164	12	0.00483676
	Sandathenna 535E	668	683	2816	0	0	3	0.0010653	1	0.000355	0	0	10	0.0035511	4	0.00142045
Hatton UC	Hatton North 319B	1836	1852	7636	1	0.000131	57	0.0074646	22	0.002881	1	0.000131	414	0.0542169	22	0.00288109
	Hatton South 319D	970	973	3762	0	0	23	0.0061138	15	0.003987	2	0.000532	116	0.0308347	120	0.03189793
	Hatton west 319C	500	511	2011	0	0	27	0.0134262	10	0.004973	0	0	39	0.0193933	12	0.00596718
	Hatton East 319E	1075	1092	4941	0	0	15	0.0030358	18	0.003643	0	0	32	0.0064764	38	0.00769075
	Dickoya 319A	808	825	3481	0	0	14	0.0040218	13	0.003735	0	0	54	0.0155128	14	0.00402183
	Dickoya South 319	816	828	3339	0	0	16	0.0047919	5	0.001497	0	0	38	0.0113807	9	0.00269542
Thalawakele	Thalawakele(p)475E	993	1004	4111	1	0.000243	28	0.006811	11	0.002676	1	0.000243	214	0.0520555	38	0.00924349
	Barewel(p)475X	803	820	3381	0	0	6	0.0017746	2	0.000592	0	0	16	0.0047323	9	0.00266193
	Holyrood(p)475S	821	843	3393	0	0	8	0.0023578	3	0.000884	0	0	28	0.0082523	7	0.00206307
Bogawanthalawa	Bogawanthalawa South(p)31	1422	1439	6248	1	0.00016	38	0.0060819	24	0.003841	2	0.00032	98	0.015685	29	0.00464149
Kotagala	Kotagala475	1241	1254	5044	1	0.000198	14	0.0027756	11	0.002181	1	0.000198	52	0.0103093	18	0.0035686
	Devon(p)475C	756	767	3227	0	0	4	0.0012395	2	0.00062	0	0	12	0.0037186	5	0.00154943
Maskeliya	Maskeliya(p)320A	921	929	3851	1	0.00026	29	0.0075305	18	0.004674	2	0.000519	104	0.027006	61	0.01584004
	Brownslow(p)320N	1099	1113	4507	0	0	4	0.0008875	2	0.000444	0	0	16	0.00355	9	0.00199689
Norwood	Norwood(p)322	1549	1562	6612	0	0	12	0.0018149	8	0.00121	0	0	18	0.0027223	11	0.00166364
Ragala	Ragala(p)533	432	439	1914	0	0	22	0.0114943	10	0.005225	1	0.000522	61	0.0318704	24	0.01253918

Available textile shops relative to size of population				Tenant house holders relative to size of population		Houses with two or more stories relative to size of population		House hold unitS having inside toilets facilities relative to size of population		House hold units having water sealed toilets connecting sewerage pit relative to size of population .		Houses having fix line telephone relative to size of population		Houses having Mobile telephone relative to size of population		Houses having desktop computer relative to size of population		Houses having lap top computer relative to size of population	
less than 100sqm		More than 100sqm																	
6	0.00191	2	0.00064	102	0.032453	79	0.025135	330	0.104995	457	0.1454	351	0.11168	756	0.24053	93	0.02959	63	0.02004454
8	0.00352	2	0.00088	149	0.065552	52	0.022877	374	0.16454	187	0.08227	179	0.07875	457	0.20106	48	0.02112	34	0.01480862
12	0.00542	5	0.00226	152	0.068592	58	0.026173	114	0.051444	423	0.19088	151	0.06814	498	0.22473	47	0.02121	32	0.01453971
14	0.00676	2	0.00097	158	0.076255	71	0.034266	375	0.180985	113	0.05454	133	0.06419	468	0.22587	35	0.01689	29	0.01413127
3	0.00087	1	0.00029	53	0.015296	5	0.001443	215	0.062049	617	0.17807	90	0.02597	805	0.23232	21	0.00606	50	0.01440693
6	0.00549	1	0.00091	54	0.049405	14	0.012809	252	0.230558	37	0.03385	105	0.09607	268	0.2452	14	0.01281	17	0.0157548
4	0.00219	2	0.00109	76	0.041553	43	0.02351	211	0.115364	242	0.13231	185	0.10115	425	0.23237	24	0.01312	27	0.01449973
3	0.00213	2	0.00142	52	0.036932	32	0.022727	347	0.246449	30	0.02131	114	0.08097	362	0.2571	28	0.01989	22	0.01589489
11	0.00853	4	0.0031	88	0.068217	59	0.045736	245	0.189922	27	0.02093	98	0.07597	235	0.18217	62	0.04806	16	0.01227907
12	0.0028	5	0.00116	212	0.049394	129	0.030056	632	0.147251	385	0.0897	654	0.15238	990	0.23066	201	0.04683	60	0.01388164
11	0.00443	3	0.00121	200	0.080613	62	0.02499	375	0.151149	203	0.08182	398	0.16042	560	0.22572	211	0.08505	34	0.01376058
2	0.00071	0	0	181	0.064276	35	0.012429	378	0.134233	305	0.10831	201	0.07138	651	0.23118	62	0.02202	40	0.01423295
20	0.00262	6	0.00079	363	0.047538	288	0.037716	841	0.110136	1011	0.1324	1254	0.16422	1798	0.23546	224	0.02933	110	0.0144264
8	0.00213	20	0.00532	229	0.060872	148	0.039341	658	0.174907	315	0.08373	454	0.12068	959	0.25492	178	0.04732	58	0.01547049
8	0.00398	4	0.00199	100	0.049727	13	0.006464	227	0.112879	284	0.14122	125	0.06216	490	0.24366	31	0.01542	30	0.01491795
22	0.00445	15	0.00304	254	0.051407	179	0.036227	60	0.012143	1032	0.20886	411	0.08318	1055	0.21352	245	0.04959	65	0.01305404
8	0.0023	3	0.00086	14	0.004022	39	0.011204	348	0.099971	477	0.13703	217	0.06234	790	0.22695	18	0.00517	48	0.01392703
8	0.0024	3	0.0009	84	0.025157	136	0.040731	587	0.175801	241	0.07218	118	0.03534	804	0.24079	24	0.00719	49	0.01466307
15	0.00365	17	0.00414	145	0.035271	117	0.02846	318	0.077353	686	0.16687	312	0.07589	978	0.2379	98	0.02384	60	0.01449282
5	0.00148	2	0.00059	25	0.007394	107	0.031647	277	0.081928	543	0.1606	302	0.08932	785	0.23218	65	0.01923	48	0.01425022
4	0.00118	2	0.00059	95	0.027999	48	0.014147	93	0.027409	750	0.22104	201	0.05924	814	0.23991	24	0.00707	49	0.01451813
24	0.00384	19	0.00304	235	0.037612	295	0.047215	411	0.065781	1028	0.16453	854	0.13668	1405	0.22487	32	0.00512	85	0.01365557
16	0.00357	9	0.00178	285	0.056503	257	0.050952	291	0.057692	963	0.19092	741	0.14691	1203	0.2385	36	0.00714	74	0.01476209
3	0.00093	1	0.00031	55	0.017044	20	0.006198	37	0.011466	730	0.22622	259	0.08026	748	0.23179	18	0.00558	45	0.0140564
51	0.01324	22	0.00571	115	0.029862	177	0.045962	485	0.125941	444	0.11529	365	0.09478	902	0.23422	101	0.02623	55	0.01434952
2	0.00044	1	0.00022	75	0.016641	97	0.021522	639	0.141779	474	0.10517	152	0.03373	898	0.19925	98	0.02174	66	0.01463057
9	0.00136	4	0.0006	178	0.026921	87	0.013158	310	0.046884	1252	0.18935	658	0.09952	1254	0.18966	123	0.0186	93	0.01405626
17	0.00888	3	0.00157	82	0.042842	112	0.058516	417	0.217868	22	0.01149	104	0.05434	398	0.20794	22	0.01149	26	0.01354232

Population with English language proficiency relative to size of population		Population having access to internet facility at house hold units relative to size of population		Household unit having pipe born water relative to size of population		House hold units having national electricity grid power connection relative to size of population		House hold units using LP gas or electricity as a main source of cooking fuel relative to size of population		No of beds available in government hospital relative to size of population		No of Privet hospitals .Available privet hospitals relative to size of population.		Available dispensaries relative to size of population.		Household units where solid waste being collected by local authority relative to size of population.		Population with a degree or above qualification relative to size of population.	
377	0.11995	175	0.05568	0.178810	562	0.229399	721	0.13204	415	0	0	0	0.0000	3	0.00095	0.20172	634	0.0203627	64
269	0.11847	112	0.04936	0.225693	513	0.250770	570	0.14738	335	0	0	0	0.0000	6	0.00264	0.23889	543	0.0268368	61
258	0.11632	150	0.06785	0.160199	355	0.239170	530	0.12545	278	0	0	0	0.0000	4	0.00181	0.23646	524	0.0311372	69
234	0.11305	117	0.05653	0.228282	473	0.232625	482	0.15203	315	650	0.31371	0	0.0000	12	0.00579	0.22973	476	0.0342664	71
241	0.06963	125	0.03602	0.075036	260	0.208081	721	0.02367	82	0	0.00000	0	0.0000	1	0.00029	0.00952	33	0.0046176	16
138	0.12604	55	0.04989	0.244282	267	0.253431	277	0.15371	168	0	0.00000	0	0.0000	0	0.00000	0.19213	210	0.0118939	13
97	0.05317	97	0.05317	0.246036	450	0.238928	437	0.16676	305	0	0.00000	0	0.0000	0	0.00000	0.23346	427	0.0235101	43
179	0.12716	90	0.06358	0.259943	366	0.258523	364	0.16406	231	0	0.00000	0	0.0000	1	0.00071	0.21378	301	0.0241477	34
127	0.09823	63	0.04912	0.202326	261	0.203101	262	0.14961	193	0	0.00000	1	0.0008	3	0.00233	0.18217	235	0.0263566	34
477	0.11105	348	0.08098	0.195014	837	0.224837	965	0.16752	719	0	0.00000	2	0.0005	6	0.00140	0.22740	976	0.0279590	120
273	0.11008	239	0.09632	0.197904	491	0.198710	493	0.13301	330	0	0.00000	0	0.0000	2	0.00081	0.19307	479	0.0378879	94
207	0.07354	127	0.04507	0.169744	478	0.216619	610	0.07528	212	0	0.00000	0	0.0000	0	0.00000	0.11257	317	0.0124290	35
716	0.09377	753	0.09858	0.165925	1267	0.230225	1758	0.12271	937	0	0.00000	0	0.0000	4	0.00052	0.19395	1481	0.0275013	210
340	0.09024	378	0.10056	0.150984	568	0.264487	995	0.17650	664	0	0.00000	1	0.0003	5	0.00133	0.18288	688	0.0398724	150
145	0.0721	145	0.0721	0.105420	212	0.228245	459	0.06216	125	0	0.00000	1	0.0005	4	0.00199	0.00945	19	0.0089508	18
419	0.08485	280	0.05657	0.182149	900	0.208460	1030	0.08217	406	0	0.00000	0	0.0000	4	0.00081	0.14066	695	0.0147743	73
218	0.06267	154	0.0441	0.137891	480	0.201379	701	0.03160	110	250	0.07182	0	0.0000	2	0.00057	0.01523	53	0.0086182	30
171	0.05132	122	0.03666	0.111111	371	0.232105	775	0.07308	244	0	0.00000	0	0.0000	2	0.00060	0.08056	269	0.0083857	28
477	0.11594	258	0.0628	0.154950	637	0.230358	947	0.08830	363	0	0.00000	0	0.0000	4	0.00097	0.12795	526	0.0155680	64
137	0.04038	145	0.04275	0.041704	141	0.228335	772	0.01686	57	22	0.00651	0	0.0000	2	0.00059	0.09080	307	0.0079858	27
131	0.03872	140	0.04113	0.151194	513	0.233716	793	0.07574	257	0	0.00000	0	0.0000	0	0.00000	0.12467	423	0.0235780	80
683	0.10924	412	0.066	0.114277	714	0.218790	1367	0.11396	712	28	0.00448	0	0.0000	3	0.00048	0.17350	1084	0.0126440	79
596	0.1181	323	0.06397	0.116971	590	0.234338	1182	0.13541	683	22	0.00436	0	0.0000000	4	0.00079	0.14036	708	0.0273592	138
295	0.09137	151	0.04685	0.023551	76	0.205144	662	0.01704	55	0	0.00000	0	0.0000	0	0.00000	0.00124	4	0.0086768	28
350	0.09088	221	0.0574	0.156063	601	0.234744	904	0.16074	619	35	0.00909	0	0.0000	4	0.00104	0.17917	690	0.0148014	57
176	0.03901	209	0.04633	0.134236	605	0.223652	1008	0.02640	119	0	0.00000	0	0.0000	1	0.00022	0.00266	12	0.0064344	29
496	0.07497	294	0.04451	0.123866	819	0.212795	1407	0.03917	259	0	0.00000	0	0.0000	1	0.00015	0.05082	336	0.0077132	51
130	0.06771	65	0.03386	0.053814	103	0.224660	430	0.13950	267	0	0.00000	0	0.0000	2	0.00104	0.16876	323	0.0000000	

Government school children's relative to size of population.		Population Density per hectares relative to size of population		Area covered by building relatively house hold units.	Area covered by Road relative to size of population.		Population growth rate in last ten years.(%)		Available Commercial Banks relative to size of population	
50	0.01591	21	0.006681514	0.000406607	0.11	3.49984E-05	-0.0123	-0.00039	0	0
600	0.26397	45	0.019797624	0.000782759	0.18	7.91905E-05	0.00699	0.000308	0	0
3700	1.66968	57	0.025722022	0.000756458	0.2	9.02527E-05	-0.01905	-0.00086	1	0.000451
1000	0.48263	29	0.013996139	0.000812245	0.17	8.20463E-05	0.009343	0.000451	1	0.000483
0	0.00000	4	0.001154401	0.000291667	0.05	1.443E-05	0.007673	0.000221	0	0
50	0.04575	24	0.021957914	0.000297347	0.11	0.00010064	-0.00341	-0.00031	0	0
1200	0.65610	51	0.02788409	0.000170858	0.12	6.56096E-05	-0.00409	-0.00022	0	0
800	0.56818	29	0.020596591	0.000211648	0.15	0.000106534	-0.0075	-0.00053	0	0
2500	1.93798	15	0.011627907	0.000294574	0.25	0.000193798	-0.03686	-0.00286	4	0.003101
650	0.15144	16	0.003727866	7.26934E-05	0.28	6.52377E-05	-0.00929	-0.00022	5	0.001165
600	0.24184	12	0.004836759	0.000129786	0.21	8.46433E-05	-0.00235	-9.5E-05	2	0.000806
0	0.00000	5	0.001775568	6.46307E-05	0.11	3.90625E-05	0.000462	1.64E-05	0	0
6500	0.85123	18	0.002357255	5.51336E-05	0.28	3.66684E-05	0.008116	0.000106	2	0.000262
3500	0.93036	72	0.019138756	0.000112174	0.26	6.91122E-05	-0.00411	-0.00011	5	0.001329
650	0.32322	22	0.010939831	0.000176032	0.27	0.000134262	0.018632	0.000927	2	0.000995
0	0.00000	154	0.03116778	5.76806E-05	0.3	6.07165E-05	0.012124	0.000245	1	0.000202
0	0.00000	8	0.00229819	4.53893E-05	0.17	4.88365E-05	0.028979	0.000832	1	0.000287
1500	0.44924	25	0.007487272	3.68374E-05	0.18	5.39084E-05	-0.01415	-0.00042	0	0
3000	0.72975	13	0.003162248	5.71637E-05	0.18	4.3785E-05	0.000219	5.33E-06	3	0.00073
0	0.00000	6	0.001774623	3.6084E-05	0.05	1.47885E-05	-0.00537	-0.00016	0	0
0	0.00000	11	0.003241969	3.27144E-05	0.051	1.50309E-05	0.008358	0.000246	0	0
2100	0.33611	25	0.00400128	7.33035E-05	0.31	4.96159E-05	0.003193	5.11E-05	4	0.00064
3000	0.59477	15	0.00297383	5.84853E-05	0.23	4.55987E-05	0.015424	0.000306	2	0.000397
0	0.00000	8	0.002479083	3.47072E-05	0.18	5.57794E-05	0.001405	4.35E-05	0	0
1950	0.50636	22	0.005712802	0.000106985	0.34	8.82888E-05	0.000887	2.3E-05	4	0.001039
120	0.02663	7	0.00155314	2.99534E-05	0.11	2.44065E-05	-0.00472	-0.0001	0	0
2100	0.31760	7	0.001058681	4.37084E-05	0.19	2.87356E-05	0.012631	0.000191	2	0.000302
1800	0.94044	17	0.008881923	0.000163009	0.29	0.000151515	-0.01012	-0.00053	4	0.00209

Appendices 03- Data analyzing sheet for each GN divisions

mandate	Expression	Sub expression	Attributers		Weight	Bambarakele 535K Value	Value with weight	Hawaeliya East 535H Value	Value with weight	Hawaeliya North 535G Value	Value with weight	Hawaeliya West 535F Value	Value with weight	Kalapura 535N Value	Value with weight	Kalukele 535B Value	Value with weight	Kelegala 535C Value	Value with weight	Magasthota 535A Value	Value with weight	Nuwara Eliya 535 Value	Value with weight
Lifestyle	Food consuming Pattern	Type of food	Available branded food court relative to size of population		5	0.0003	0.0016	0.0004	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0071	0.0008	0.0039
			Available hotel, restaurant, past food place, food court (Non Branded) relative to size of population	Area less than 100 sqm.	1	0.0038	0.0038	0.0062	0.0062	0.0059	0.0059	0.0077	0.0077	0.0012	0.0012	0.0027	0.0027	0.0022	0.0022	0.0064	0.0064	0.0124	0.0124
				Area more than 100 qsm.	2	0.0025	0.0051	0.0040	0.0079	0.0045	0.0090	0.0053	0.0106	0.0009	0.0017	0.0009	0.0018	0.0011	0.0022	0.0050	0.0099	0.0085	0.0171
		Daily marketing	Available branded super market chain out lets relative to size of population		4	0.0000	0.0000	0.0004	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
			Available retail and whole sale shops relative to size of population	Area less than 100 sqm.	1	0.0045	0.0045	0.0141	0.0141	0.0185	0.0185	0.0154	0.0154	0.0020	0.0020	0.0073	0.0073	0.0066	0.0066	0.0057	0.0057	0.0240	0.0240
				Area more than 100 sqm.	2	0.0016	0.0032	0.0044	0.0088	0.0072	0.0144	0.0087	0.0174	0.0012	0.0023	0.0027	0.0055	0.0033	0.0066	0.0028	0.0057	0.0109	0.0217
	Cloth Pattern	Type of textile	Available textile shops relative to size of population	Area less than 100 sqm.	1	0.0019	0.0019	0.0035	0.0035	0.0054	0.0054	0.0068	0.0068	0.0009	0.0009	0.0055	0.0055	0.0022	0.0022	0.0021	0.0021	0.0085	0.0085
				Area more than 100 sqm.	3	0.0006	0.0019	0.0009	0.0026	0.0023	0.0068	0.0010	0.0029	0.0003	0.0009	0.0009	0.0027	0.0011	0.0033	0.0014	0.0043	0.0031	0.0093
	Shelter	Type of tenure	Tenant house holders relative to size of population		3	0.0325	0.0974	0.0656	0.1967	0.0686	0.2058	0.0763	0.2288	0.0153	0.0459	0.0494	0.1482	0.0416	0.1247	0.0369	0.1108	0.0682	0.2047
		Type of storey's	Houses with two or more stories relative to size of population		4	0.0251	0.1005	0.0229	0.0915	0.0262	0.1047	0.0343	0.1371	0.0014	0.0058	0.0128	0.0512	0.0235	0.0940	0.0227	0.0909	0.0457	0.1829
		Type of Toilet Facilities	House hold unitS having inside toilets facilities relative to size of population		3	0.1050	0.3150	0.1645	0.4936	0.0514	0.1543	0.1810	0.5430	0.0620	0.1861	0.2306	0.6917	0.1154	0.3461	0.2464	0.7393	0.1899	0.5698
		Type of toilet	House hold units having water sealed toilets connecting sewerage pit relative to size of		2	0.1454	0.2908	0.0823	0.1645	0.1909	0.3818	0.0545	0.1091	0.1781	0.3561	0.0339	0.0677	0.1323	0.2646	0.0213	0.0426	0.0209	0.0419
	Means of Communication	Type of communication equipment use	Houses having fix line telephone relative to size of population		2	0.1117	0.2234	0.0788	0.1575	0.0681	0.1363	0.0642	0.1284	0.0260	0.0519	0.0961	0.1921	0.1011	0.2023	0.0810	0.1619	0.0760	0.1519
			Houses having Mobile telephone relative to size of population		2	0.2405	0.4811	0.2011	0.4021	0.2247	0.4495	0.2259	0.4517	0.2323	0.4646	0.2452	0.4904	0.2324	0.4647	0.2571	0.5142	0.1822	0.3643
			Houses having desktop computer relative to size of population		3	0.0296	0.0888	0.0211	0.0634	0.0212	0.0636	0.0169	0.0507	0.0061	0.0182	0.0128	0.0384	0.0131	0.0394	0.0199	0.0597	0.0481	0.1442
			Houses having lap top computer relative to size of population		3	0.0200	0.0601	0.0148	0.0444	0.0145	0.0436	0.0141	0.0424	0.0144	0.0432	0.0158	0.0473	0.0145	0.0435	0.0159	0.0477	0.0123	0.0368
		Language proficiency	Population with English language proficiency relative to size of population		3	0.1199	0.3598	0.1185	0.3554	0.1163	0.3490	0.1131	0.3392	0.0696	0.2089	0.1260	0.3781	0.0532	0.1595	0.1272	0.3815	0.0982	0.2947
		Access to internet	Population having access to internet facility at house hold units relative to size of population		3	0.0557	0.1670	0.0494	0.1481	0.0679	0.2036	0.0565	0.1696	0.0360	0.1081	0.0499	0.1497	0.0532	0.1595	0.0636	0.1907	0.0491	0.1473
Access to Facility	Water	Drinking water source	Household unit having pipe born water relative to size of population		2	0.1788	0.3576	0.2257	0.4514	0.1602	0.3204	0.2283	0.4566	0.0750	0.1501	0.2443	0.4886	0.2460	0.4921	0.2599	0.5199	0.2023	0.4047
	Energy Consumption	Type of lighting	House hold units having national electricity grid power connection relative to size of population		2	0.2294	0.4588	0.2508	0.5015	0.2392	0.4783	0.2326	0.4653	0.2081	0.4162	0.2534	0.5069	0.2389	0.4779	0.2585	0.5170	0.2031	0.4062
		Type of Cooking Fuel	House hold units using LP gas or electricity as a main source of cooking fuel relative to size of		2	0.1320	0.2641	0.1474	0.2948	0.1255	0.2509	0.1520	0.3041	0.0237	0.0473	0.1537	0.3074	0.1668	0.3335	0.1641	0.3281	0.1496	0.2992
	Health	Type of service	No of beds available in government hospital relative to size of population		2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3137	0.6274	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
			Available privet hospitals relative to size of population.		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0023
			Available dispensaries relative to size of population.		3	0.0010	0.0029	0.0026	0.0079	0.0018	0.0054	0.0058	0.0174	0.0003	0.0009	0.0000	0.0000	0.0000	0.0000	0.0007	0.0021	0.0023	0.0070
	Solid waste	Solid waste disposal	Household units where solid waste being collected by local authority relative to size of		3	0.2017	0.6052	0.2389	0.7167	0.2365	0.7094	0.2297	0.6892	0.0095	0.0286	0.1921	0.5764	0.2335	0.7004	0.2138	0.6413	0.1822	0.5465
Aspiration	Education	Education attainment	Population with a degree or above qualification relative to size of population.		3	0.0204	0.0611	0.0268	0.0805	0.0311	0.0934	0.0343	0.1028	0.0046	0.0139	0.0119	0.0357	0.0235	0.0705	0.0241	0.0724	0.0264	0.0791
			Government school children's relative to size of population.		2	0.0159	0.0318	0.2640	0.5279	1.6697	3.3394	0.4826	0.9653	0.0000	0.0000	0.0457	0.0915	0.6561	1.3122	0.5682	1.1364	1.9380	3.8760
Physical Setting	Physical Development	Density	Population Density per hectares relative to size of population		5	0.0067	0.0334	0.0198	0.0990	0.0257	0.1286	0.0140	0.0700	0.0012	0.0058	0.0220	0.1098	0.0279	0.1394	0.0206	0.1030	0.0116	0.0581
			Area covered by building relatively house hold units.		5	0.0004	0.0020	0.0008	0.0039	0.0008	0.0038	0.0008	0.0041	0.0003	0.0015	0.0003	0.0015	0.0002	0.0009	0.0002	0.0011	0.0003	0.0015
			Area covered by Road relative to size of population.		5	0.0000	0.0002	0.0001	0.0004	0.0001	0.0005	0.0001	0.0004	0.0000	0.0001	0.0001	0.0005	0.0001	0.0003	0.0001	0.0005	0.0002	0.0010
		Growth Rate	Population growth rate in last ten years.(%)		1	-0.0004	-0.0004	0.0003	0.0003	-0.0009	-0.0009	0.0005	0.0005	0.0002	0.0002	-0.0003	-0.0003	-0.0002	-0.0002	-0.0005	-0.0005	-0.0029	-0.0029
		Available Commercial Banks	Available Commercial Banks relative to size of population		4	0.0000	0.0000	0.0000	0.0000	0.0005	0.0018	0.0005	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0124
Total						1.687	4.022	2.030	4.849	3.384	7.483	2.576	5.965	0.971	2.162	1.816	4.398	2.389	5.448	2.427	5.702	3.576	7.927

mandate	Expression	Sub expression	Attributers		Weight	Bambarakele 535K Value	Bambarakele 535K Value with weight	Hawaeliya East 535H Value	Hawaeliya East 535H Value with weight	Hawaeliya North 535G Value	Hawaeliya North 535G Value with weight	Hawaeliya West 535F Value	Hawaeliya West 535F Value with weight	Kalapura 535N Value	Kalapura 535N Value with weight	Kalukele 535B Value	Kalukele 535B Value with weight	Kelegala 535C Value	Kelegala 535C Value with weight	Magasthota 535A Value	Magasthota 535A Value with weight	Nuwara Eliya 535 Value	Nuwara Eliya 535 Value with weight
Lifestyle	Food consuming Pattern	Type of food	Available branded food court relative to size of population		5	0.0003	0.0016	0.0004	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0071	0.0008	0.0039
			Available hotel, restaurant, past food place, food court (Non Branded) relative to size of population	Area less than 100 sqm.	1	0.0038	0.0038	0.0062	0.0062	0.0059	0.0059	0.0077	0.0077	0.0012	0.0012	0.0027	0.0027	0.0022	0.0022	0.0064	0.0064	0.0124	0.0124
				Area more than 100 qsm.	2	0.0025	0.0051	0.0040	0.0079	0.0045	0.0090	0.0053	0.0106	0.0009	0.0017	0.0009	0.0018	0.0011	0.0022	0.0050	0.0099	0.0085	0.0171
		Daily marketing	Available branded super market chain out lets relative to size of population		4	0.0000	0.0000	0.0004	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
			Available retail and whole sale shops relative to size of population	Area less than 100 sqm.	1	0.0045	0.0045	0.0141	0.0141	0.0185	0.0185	0.0154	0.0154	0.0020	0.0020	0.0073	0.0073	0.0066	0.0066	0.0057	0.0057	0.0240	0.0240
				Area more than 100 sqm.	2	0.0016	0.0032	0.0044	0.0088	0.0072	0.0144	0.0087	0.0174	0.0012	0.0023	0.0027	0.0055	0.0033	0.0066	0.0028	0.0057	0.0109	0.0217
	Cloth Pattern	Type of textile	Available textile shops relative to size of population	Area less than 100 sqm.	1	0.0019	0.0019	0.0035	0.0035	0.0054	0.0054	0.0068	0.0068	0.0009	0.0009	0.0055	0.0055	0.0022	0.0022	0.0021	0.0021	0.0085	0.0085
				Area more than 100 sqm.	3	0.0006	0.0019	0.0009	0.0026	0.0023	0.0068	0.0010	0.0029	0.0003	0.0009	0.0009	0.0027	0.0011	0.0033	0.0014	0.0043	0.0031	0.0093
	Shelter	Type of tenure	Tenant house holders relative to size of population		3	0.0325	0.0974	0.0656	0.1967	0.0686	0.2058	0.0763	0.2288	0.0153	0.0459	0.0494	0.1482	0.0416	0.1247	0.0369	0.1108	0.0682	0.2047
		Type of storey's	Houses with two or more stories relative to size of population		4	0.0251	0.1005	0.0229	0.0915	0.0262	0.1047	0.0343	0.1371	0.0014	0.0058	0.0128	0.0512	0.0235	0.0940	0.0227	0.0909	0.0457	0.1829
		Type of Toilet Facilities	House hold unitS having inside toilets facilities relative to size of population		3	0.1050	0.3150	0.1645	0.4936	0.0514	0.1543	0.1810	0.5430	0.0620	0.1861	0.2306	0.6917	0.1154	0.3461	0.2464	0.7393	0.1899	0.5698
		Type of toilet	House hold units having water sealed toilets connecting sewerage pit relative to size of		2	0.1454	0.2908	0.0823	0.1645	0.1909	0.3818	0.0545	0.1091	0.1781	0.3561	0.0339	0.0677	0.1323	0.2646	0.0213	0.0426	0.0209	0.0419
	Means of Communication	Type of communication equipment use	Houses having fix line telephone relative to size of population		2	0.1117	0.2234	0.0788	0.1575	0.0681	0.1363	0.0642	0.1284	0.0260	0.0519	0.0961	0.1921	0.1011	0.2023	0.0810	0.1619	0.0760	0.1519
			Houses having Mobile telephone relative to size of population		2	0.2405	0.4811	0.2011	0.4021	0.2247	0.4495	0.2259	0.4517	0.2323	0.4646	0.2452	0.4904	0.2324	0.4647	0.2571	0.5142	0.1822	0.3643
			Houses having desktop computer relative to size of population		3	0.0296	0.0888	0.0211	0.0634	0.0212	0.0636	0.0169	0.0507	0.0061	0.0182	0.0128	0.0384	0.0131	0.0394	0.0199	0.0597	0.0481	0.1442
			Houses having lap top computer relative to size of population		3	0.0200	0.0601	0.0148	0.0444	0.0145	0.0436	0.0141	0.0424	0.0144	0.0432	0.0158	0.0473	0.0145	0.0435	0.0159	0.0477	0.0123	0.0368
		Language proficiency	Population with English language proficiency relative to size of population		3	0.1199	0.3598	0.1185	0.3554	0.1163	0.3490	0.1131	0.3392	0.0696	0.2089	0.1260	0.3781	0.0532	0.1595	0.1272	0.3815	0.0982	0.2947
		Access to internet	Population having access to internet facility at house hold units relative to size of population		3	0.0557	0.1670	0.0494	0.1481	0.0679	0.2036	0.0565	0.1696	0.0360	0.1081	0.0499	0.1497	0.0532	0.1595	0.0636	0.1907	0.0491	0.1473
Access to Facility	Water	Drinking water source	Household unit having pipe born water relative to size of population		2	0.1788	0.3576	0.2257	0.4514	0.1602	0.3204	0.2283	0.4566	0.0750	0.1501	0.2443	0.4886	0.2460	0.4921	0.2599	0.5199	0.2023	0.4047
	Energy Consumption	Type of lighting	House hold units having national electricity grid power connection relative to size of population		2	0.2294	0.4588	0.2508	0.5015	0.2392	0.4783	0.2326	0.4653	0.2081	0.4162	0.2534	0.5069	0.2389	0.4779	0.2585	0.5170	0.2031	0.4062
		Type of Cooking Fuel	House hold units using LP gas or electricity as a main source of cooking fuel relative to size of		2	0.1320	0.2641	0.1474	0.2948	0.1255	0.2509	0.1520	0.3041	0.0237	0.0473	0.1537	0.3074	0.1668	0.3335	0.1641	0.3281	0.1496	0.2992
	Health	Type of service	No of beds available in government hospital relative to size of population		2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3137	0.6274	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
			Available privet hospitals relative to size of population.		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0023
			Available dispensaries relative to size of population.		3	0.0010	0.0029	0.0026	0.0079	0.0018	0.0054	0.0058	0.0174	0.0003	0.0009	0.0000	0.0000	0.0000	0.0000	0.0007	0.0021	0.0023	0.0070
	Solid waste	Solid waste disposal	Household units where solid waste being collected by local authority relative to size of		3	0.2017	0.6052	0.2389	0.7167	0.2365	0.7094	0.2297	0.6892	0.0095	0.0286	0.1921	0.5764	0.2335	0.7004	0.2138	0.6413	0.1822	0.5465
Aspiration	Education	Education attainment	Population with a degree or above qualification relative to size of population.		3	0.0204	0.0611	0.0268	0.0805	0.0311	0.0934	0.0343	0.1028	0.0046	0.0139	0.0119	0.0357	0.0235	0.0705	0.0241	0.0724	0.0264	0.0791
			Government school children's relative to size of population.		2	0.0159	0.0318	0.2640	0.5279	1.6697	3.3394	0.4826	0.9653	0.0000	0.0000	0.0457	0.0915	0.6561	1.3122	0.5682	1.1364	1.9380	3.8760
Physical Setting	Physical Development	Density	Population Density per hectares relative to size of population		5	0.0067	0.0334	0.0198	0.0990	0.0257	0.1286	0.0140	0.0700	0.0012	0.0058	0.0220	0.1098	0.0279	0.1394	0.0206	0.1030	0.0116	0.0581
			Area covered by building relatively house hold units.		5	0.0004	0.0020	0.0008	0.0039	0.0008	0.0038	0.0008	0.0041	0.0003	0.0015	0.0003	0.0015	0.0002	0.0009	0.0002	0.0011	0.0003	0.0015
			Area covered by Road relative to size of population.		5	0.0000	0.0002	0.0001	0.0004	0.0001	0.0005	0.0001	0.0004	0.0000	0.0001	0.0001	0.0005	0.0001	0.0003	0.0001	0.0005	0.0002	0.0010
		Growth Rate	Population growth rate in last ten years.(%)		1	-0.0004	-0.0004	0.0003	0.0003	-0.0009	-0.0009	0.0005	0.0005	0.0002	0.0002	-0.0003	-0.0003	-0.0002	-0.0002	-0.0005	-0.0005	-0.0029	-0.0029
		Available Commercial Banks	Available Commercial Banks relative to size of population		4	0.0000	0.0000	0.0000	0.0000	0.0005	0.0018	0.0005	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0124
Total						1.687	4.022	2.030	4.849	3.384	7.483	2.576	5.965	0.971	2.162	1.816	4.398	2.389	5.448	2.427	5.702	3.576	7.927