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**LINKING COASTAL LAND USE CHANGE
WITH DRIVING FORCES AND ACTORS: DUE
TO THE ROLE OF BACKPACKERS IN
HIKKADUWA**

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Abstract

Tourism is an emerging industry all over the World as well as Sri Lanka. In the present situation, the tourism industry has been ranked as the 3rd largest export earning industry in Sri Lanka. The local tourism industry has been dispersed all over Sri Lanka from different modes as less and more. Travel and tourism also are emerging and developing day by day along through the different trends and modes. Backpacking is such kind of most popular concept among young travellers mostly but other age categories too. As an Island, sea and beach areas are the major strength for attraction of tourists in Sri Lanka than the other destinations. As a result of that strength, backpackers and other tourists tend to travel to the coastal areas more than the other destinations. If package tourists spend a short time period within the destinations, backpackers spend comparatively large time duration and there are significant social, economic, environmental impacts due to the backpackers. With this background, this study attempts to investigate the spatial impacts of backpackers in the context of Sri Lanka. The study predominantly goes through the four land-use change models. These models were applied to investigate the Coastal land use changing process with driving forces and Actors, due to the role of backpackers in Hikkaduwa Coastal City. This model application will help Urban Planners, policymakers when making decisions about future development projects and plans. On the other hand, this study is a missing part that can fill the gap between Tourism and decision making in planning. This application can be replicated in to other Coastal Areas. The majority of the tourists who visit the Hikkaduwa coastal City

(more than 80%) are backpackers and due to the role of them, there can be seen a significant impact on the land-use change. since the beginning of the civilization, Hikkaduwa has been represented several land-use change models out of these four models. At the very beginning of the colonization, Hikkaduwa Coastal City's land uses have been changed according DF-C Land-use change model and after colonization the land uses have been changed according DF-A-C model. From the post-independence era to present, Hikkaduwa Coastal City's land uses have changing according to the DFA-C Land-use change model. As well as according to Butler's Tourism Area Cycle model, Hikkaduwa is in between the "involvement" stage and the "development" stage.

Key Words: *Tourism, Backpackers, Land Use Change Models, Coastal city*

Introduction

Strat of travel and tourism goes to a number of decades history and at that beginning, mostly happened local tourism activities only (within the traveller's country). with the time different transportation modes were developed and people started to travel internationally (among the countries). With the improvements in smart technologies and Globalization, international tourism promoted much more. According to the different preferences of the travellers, tourism sector developed through different themes and concepts. Ecotourism, adventure tourism, medical tourism are examples of that. In the present situation, backpacking becomes one of the most emerging traveling concepts among travellers all over the world.

In the local context also tourism sector has the same importance, as the third-largest export earning industry (SLTDA, Sri Lanka Tourism Strategic Plan 2017-2020, 2017) in Sri Lankan economy, after remittances and textiles and garments. At present, the tourism industry has been generated in thousands of direct and indirect job opportunities for local people. The total number of employees in the tourism sector amounted as 156,369 in 2017 (SLTDA, SLTDA Records, 2017). With the end of terrorism, international tourism arrivals were increasing year by year and rapid growth could be seen in the Sri Lankan Tourism industry. Since 2009 to 2018 time period of tourist arrivals has been increased by 2.8 times. In 2018, the number of arrivals exceeds the level of over 2.3 million (SLTDA, Annual Statistical Reports, 2009-2018). Easter Sunday bomb explosions badly affected to rapid reduction of international arrivals when today it has been recovered. If before April 21 attack recorded 166, 975 international tourist arrivals, after the attack it decreases up to 37, 802 in May (SLTDA, Monthly Tourist Arrival Reports, 2019). When June it increases by 57% and when the end of June 115, 701 arrivals recorded (SLTDA, Monthly Tourist Arrival Reports, 2019).

In the present situation, Sri Lanka has a need for improved data and information relevant to the tourism sector. As well as a scarcity of necessary data and information such as specific demands, trends, travel behaviours etc are an obstacle to effective decision making in tourism developments (Sabraz & Mubarak, 2015). Further due to the scarcity of data cannot reach the maximum benefits of local tourism development (Wickramasinghe, 2019). In international and local both contexts very difficult to find previous studies regarding the comparison of the different tourists and how their activities influence to change the land use (Bandusena et al, 2020). International backpackers' arrivals increase in Sri Lanka day by day due to the low cost comparing to other countries and the ability to reach different climates within minimum travel

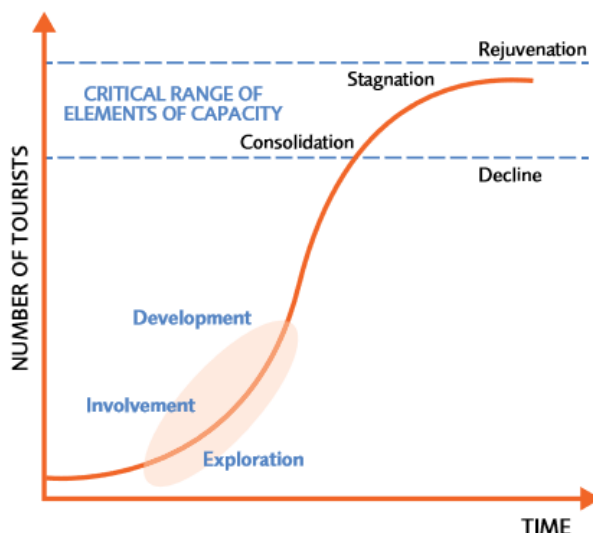
time. Comparative to the other areas, backpackers spent more time within beach areas. Due to the increasement of the coastal backpack tourism industry, it generates positive as well as negative social, cultural, environmental & economic impacts. Especially in regional level planning in tourism-related areas, facilitate for all type of tourists become major consideration factor and need of this consideration will be more important in future situation. Because to earn maximum income from the backpackers or package or any tourists, should concern about them when planning regional developments. Further, future plans should be able to get maximum benefits from tourists by using available resources and there should be reduction methods to minimize the negative impacts of travellers.

The purpose of this research is to identify the influence of backpackers when change the land uses in coastal areas. further, at the end of the study can come to conclusions about the spatial influence of the backpackers are positive or negative. Due to this kind of aspect that has not been researched relevant to the Sri Lankan context, this study will be a missing part that can fill the gap between tourism and decision making in planning.

Literature Review & Theory

Prof. Richard W. Butler introduced this tourism area life cycle model in 1980. Butler had better knowledge about the carrying capacity and sustainability. According to Butler, tourism destinations are fragile and they already consist of self-destruction seeds. if not carefully managed, destination destroys by itself. In this model, he explains the possible 06 stages of any destination. Due to the different actors and different forces in each and every stage can be seen the difference in the land-use change.

Figure 1: Butler's Tourism Area Life Cycle Model



Source: Sri Lanka Tourism Strategic Plan 2017-2020

- *Exploration Stage:* This is the commencement of destination development. As a result of adventurous tourists' favor, they visit to infamous tourism attractions as explorers.

- *Involvement Stage*: Increase the number of tourist arrivals. As a result of that increasement local people started to involve tourism industry. public investments like infrastructure start to develop.
- *Development Stage*: Due to the future tourism emerge potentials, big companies invest money to the destination area. Due to the broad advertising create a better market to tourism. Therefore, generate new job opportunities in the construction field and service sector.
- *Consolidation Stage*: Tourism becomes the main income source of the destination area. Although population of the tourists are higher than the population of the destination area, tourism growth rate becomes slow.
- *Stagnation*: Number of visitors are in the peak level. Either carrying capacity has been reached or exceed. Due to the negative impacts some local groups denounce and stand against to the tourism. The destination area no longer more attractive and fashionable. New tourists' arrivals are very low and mostly depend on repeat visits.
- *Decline or Rejuvenation*: After the stagnation, destination have to face either decline or rejuvenation. These are two different scenarios and in decline scenario, tourists attract in to other destinations and day visitors and weekend visitors become main income source. Most of hotels transform in to flats or retirements homes to local people. Finally, destination area can be totally removing from tourism and possible to become a tourism slum.
Rejuvenation scenario means when government or private sector enter to overcome the stagnation situation. in here can be use untapped tourism potential which has never used. through the modifications and quality enhancements try to again popular the destination among the tourists (Cravo & Bailoa, 2012).

Land-use change models can use as supportive tools to analyse the causes and consequences of land-use changes. Land-use change model support to get a better understanding of how is land-use change happens according to different influences. Anna M. Hersperger, Maria-Pia Gennaio, Peter H. Verburg, and Matthias Bürgi, by the combination of these four scholars, introduced four land change models and by developing these models they expected to increase the land change studies' potential contribution to theory developments (Hersperger, Gennaio, H. Verburg, & Bürgi, 2010). They have been explained four conceptual models to link land-use change with Actors and driving forces.

□ Driving Force -Land Change Model (DF-C):

In driving force-land change model driving forces are directly affects the land-use change. Actually, the model assumes observed land-use change occurred due to the driving factors. Except for DF-C model, other all three models explain land change due to the ultimate cause of the actor.

□ Driving Force-Actor-Land Change Model (DF-A-C):

According to the DF-A-C model driving forces affect to the actor and then the actor becomes the cause behind the land-use change. In here actors and driving forces are important in the same way. Driving forces pre-determined the motivations and autonomy of the actor. Due to the action of the actor, the result is changed.

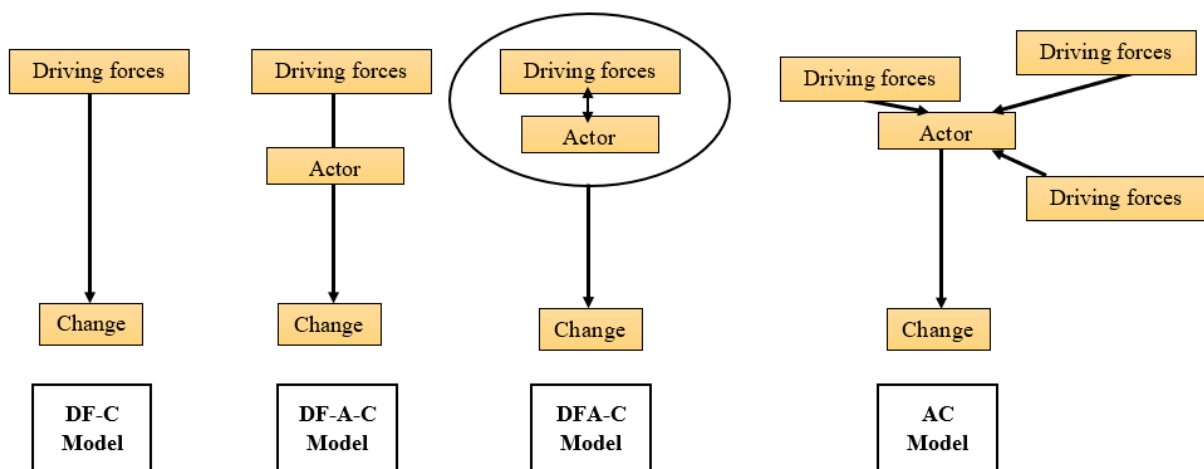
□ Driving Force/Actor-Land Change Model (DFA-C):

Here can be seen an interaction in between driving forces and the actor. Land-use change happens as a result of the interaction of these two. the model not focus the driving forces, actors or incident series of driving forces to actors. it focusses interplay of actors and driving forces with the feedbacks.

□ Actor-Land Change Model (A-C):

In the A-C model, actors play a central role in land change. If driving forces identify under this model, its only limited to one of element in the environment of actors' decision making. According to the model, land-use change can understand by cumulating decisions of every individual actor.

Figure 2: Diagrams of Four Land Use Change Models



Source: Compiled by Author

Research Methodology

In the literature review part identified four (04) land-use change models as the most applicable models. All three models base three crucial elements such as Actor, driving forces, and land-use change. Mainly analysis based on these four models. The study tried to identify when backpackers get the actor's role, what will be the driving forces and how land-use change due to the influence of backpackers as well as driving forces. According to that findings hope to identify the appropriate model which fix the current situation of Hikkaduwa.

There could be identified another model named as Butler's tourism area life cycle model. That model describes different stages of the transformation since the destination hidden, unknown area until it becomes popular, well function destination. By applying the Tourism area life cycle model in to Hikkaduwa tourism destination able to identify the current position of the Hikkaduwa according to the model. By understanding that able go some future tourism forecasts also. Mainly analysis stage consists with two (02) different parts as follows.

1. Descriptive Statistical Analysis Part
 2. Spatial Transformation Analysis Part
- 2.1 Spatial transformation of the Hikkaduwa Coastal Area**

2.2 Identification and selection of the Driving Forces

2.3 Interaction between the Backpackers and selected driving forces explains the land-use change in Hikkaduwa Coastal Area

2.3.1.1 – Entropy Value Calculation for Exploring Land Use Change

2.3.1.2 – Application of the Land Use change Models

2.3.1.3 – Application of the Butler’s Tourism Area Life Cycle Model

2.3.1.4 – Model Validation in brief

The first part is the descriptive statistical analysis part. Outcomes of the questionnaire surveys analyse under this part. Graphically shows the summarized answers which provide by tourists as well as service providers.

The second part is the spatial analysis part and it has two sub analytical parts. The first subpart shows the spatial transformation of the Hikkaduwa within different time periods and its going through the GIS map series. Total evolution process since the colonial period to the present cover-up by under this stage. After the evolution map series derive another map which shows the highly spatially changed area.

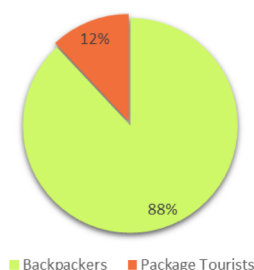
As the first step of the second subpart derives the driving forces based on the characteristics of the backpackers. To derive and select the most prominent driving forces, the literature review part and outcomes of the questionnaire survey used as supportive tools. Then create another map series that shows the evolution of the selected driving forces. Finally, findings apply to 04 different land-use change models and complete the model validation.

Findings

Descriptive Statistical Analysis Part

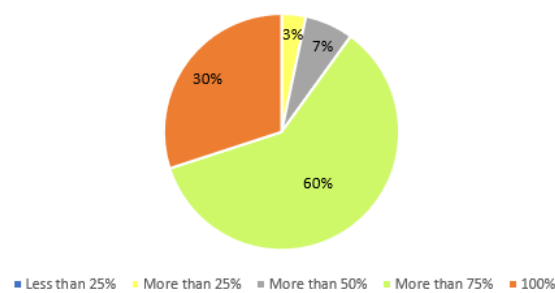
Responsible Authorities like SLTDA, Southern Tourism Promotion Bureau has not any record which mentioned exact total tourism arrivals or backpackers’ arrivals of Hikkaduwa. By conducting questionnaire surveys realized that the majority of the tourists are backpackers.

Figure 3: Backpackers as a percentage (%) (out of all respondent tourists)



Source: Prepared by Author

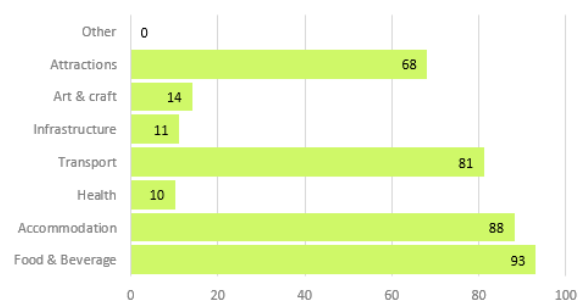
Figure 4: Annual Backpackers as a Percentage- Out of All Visitors Came to the Service Providing Places



Source: Prepared by Author

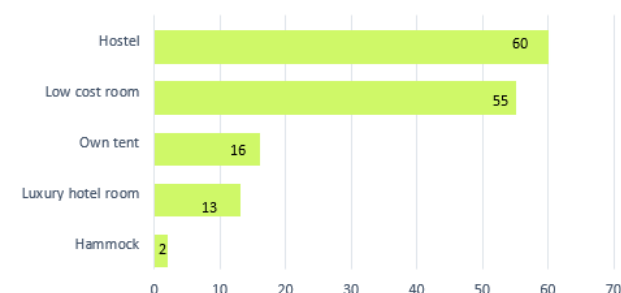
As a mostly expected, service category, most of the tourist has been marked the “food and beverages”. After that in orderly “Accommodation”, “Transport facilities” and “Attractions” has been got the 2nd, 3rd and 4th places. According to the type of tourist, there can be seen a variation of the accommodation facility selections. Most of the backpackers are tend to stay at the low-cost rooms or hostels due to its cost-effectiveness.

Figure 5: Expected Service Categories of Tourists in Hikkaduwa



Source: Prepared by Author

Figure 6: Staying Places of the Tourists at the Night-Time in Hikkaduwa

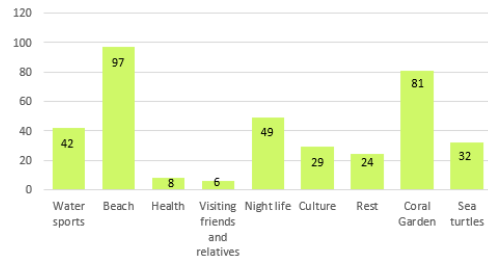


Source: Prepared by Author

When Tourists select Hikkaduwa, there can identify the main attractions they mostly preferred. According to the provided answers, the most preferred attraction is the beach strip. Coral garden, the night life of the Hikkaduwa & sea turtles are the other three crucial attractions. Due

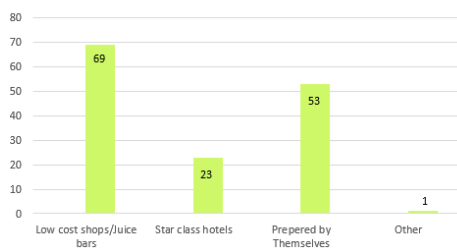
to the majority of tourists are backpackers there can be seen a trend of selecting low cost service providing places.

Figure 7: Main Interests of the Tourists when selecting in Hikkaduwa



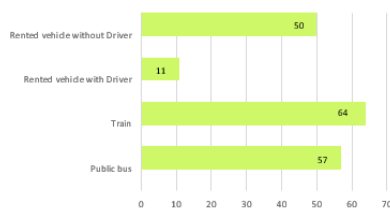
Source: Prepared by Author

Figure 8: Food & Beverage Getting places



Source: Prepared by Author

Figure 9: Used Transportation Modes of Tourists



Source: Prepared by Author

Spatial Transformation Analysis Part

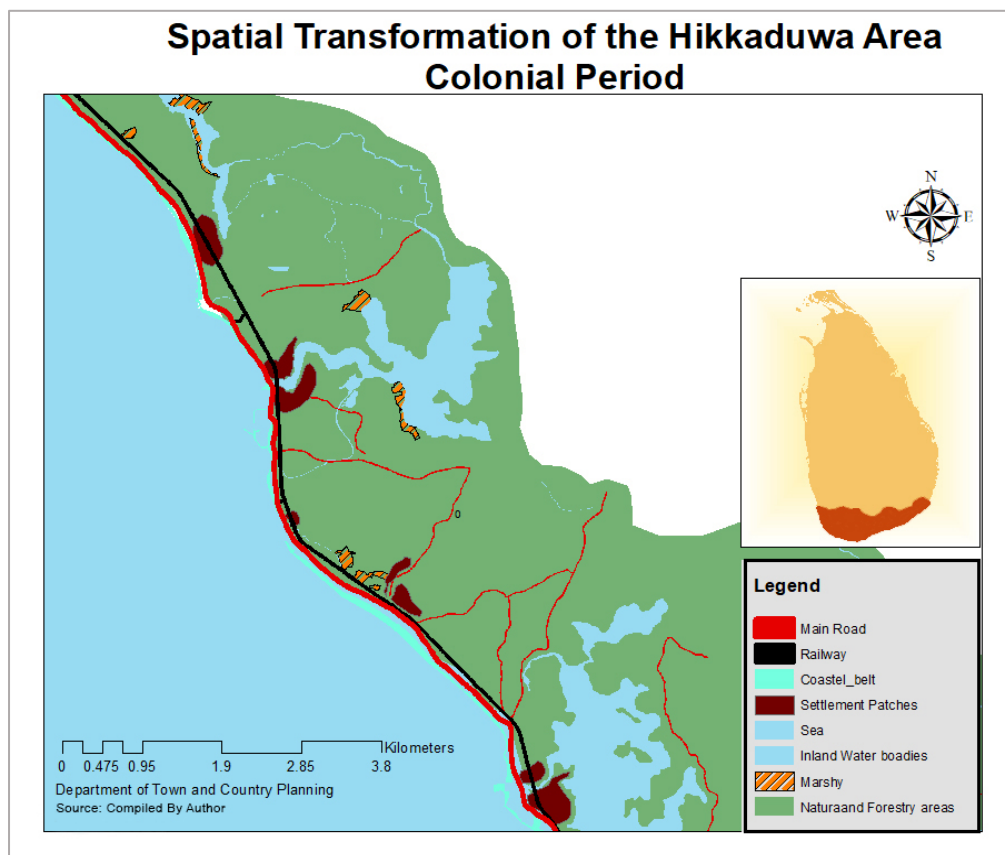
1. Spatial Transformation of the Hikkaduwa Coastal City

1.1 Spatial transformation of the Colonial period

In colonial period settlements were only limited into Hikkaduwa lake, Rathgama lake and several small clusters along the beach strip. Fishery based communities are the first residents of these small settlements. When marine fishery activities happen in coastal settlement clusters, same time freshwater fishery-based activities happened around the two lakes. Agricultural activities happened by using the freshwater of two lakes. Paddy and coconut were the major cultivations. Except fishing and farming, coral mining was one of the main industries of that era because Portuguese, Dutch & English administrators use coral as a major material for their constructions. If fishery, agriculture-based activities and coral mining happening, huge portion of the Hikkaduwa remains as a natural vegetation patch. Most of settlements, fishery industrial settlements have been constructed by using temporary materials such as clay and coconut branches.

As a land-use change here can identify natural vegetation patches transform in to human settlements. Some locations of natural beach strip transform into coral mining locations and fishery-based Areas. The natural vegetation patch has been reduced by less than 5% from the total area of Hikkaduwa.

Figure 10: Spatial Transformation of the Hikkaduwa Area-Colonial Period



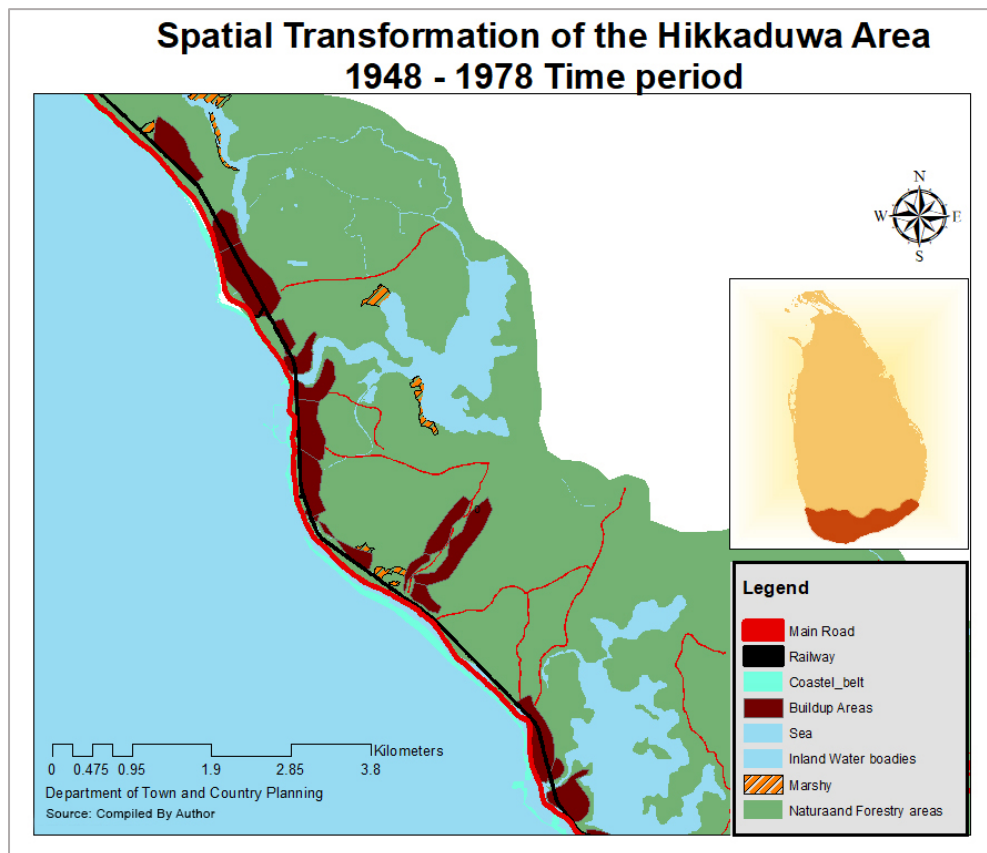
Source: Prepared by Author

1.2 Spatial transformation of the 1948 to 1978 time period

Within this 1948 – 1978 time period can be seen a huge difference comparing to the colonial era. At the beginning of the after-independence era (In 1948 to 1950 time period) build up area expanded when comparing to colonial period but slowly. This time also city form appeared scattered clusters along through the beach strip and major road and railway line. Fishery community has been expanded little bit in the beach strip. Narigama to wellaboda area started to function well as a lime stone industrial area. when 1950, due to the natural shape, upper part of the Hikkaduwa beach started to function as a fishery harbour. In this time Hikkaduwa has one main shop which consist with day to day good and its located in Hikkaduwa town centre. One Rest-House also located in Hikkaduwa within this time period and its famous among the local people and foreign tourists both. In most of time that use while travel in to Galle city. Road system, railway and transportation also developed. This era can be identified as the beginning stage of the tourism industry.

When 1970-1978, there was a considerable level visible change of the build-up area. around the Baddegama road and Galle road connecting point this change mostly happen with newly build small shops, settlements etc. and this area started to develop as the Hikkaduwa Town Centre. There could be seen the clear expansion of tourism-based land uses from the town centre to Coral Reef area.

Figure 11: Spatial Transformation of the Hikkaduwa Area 1948-1978 Time Period



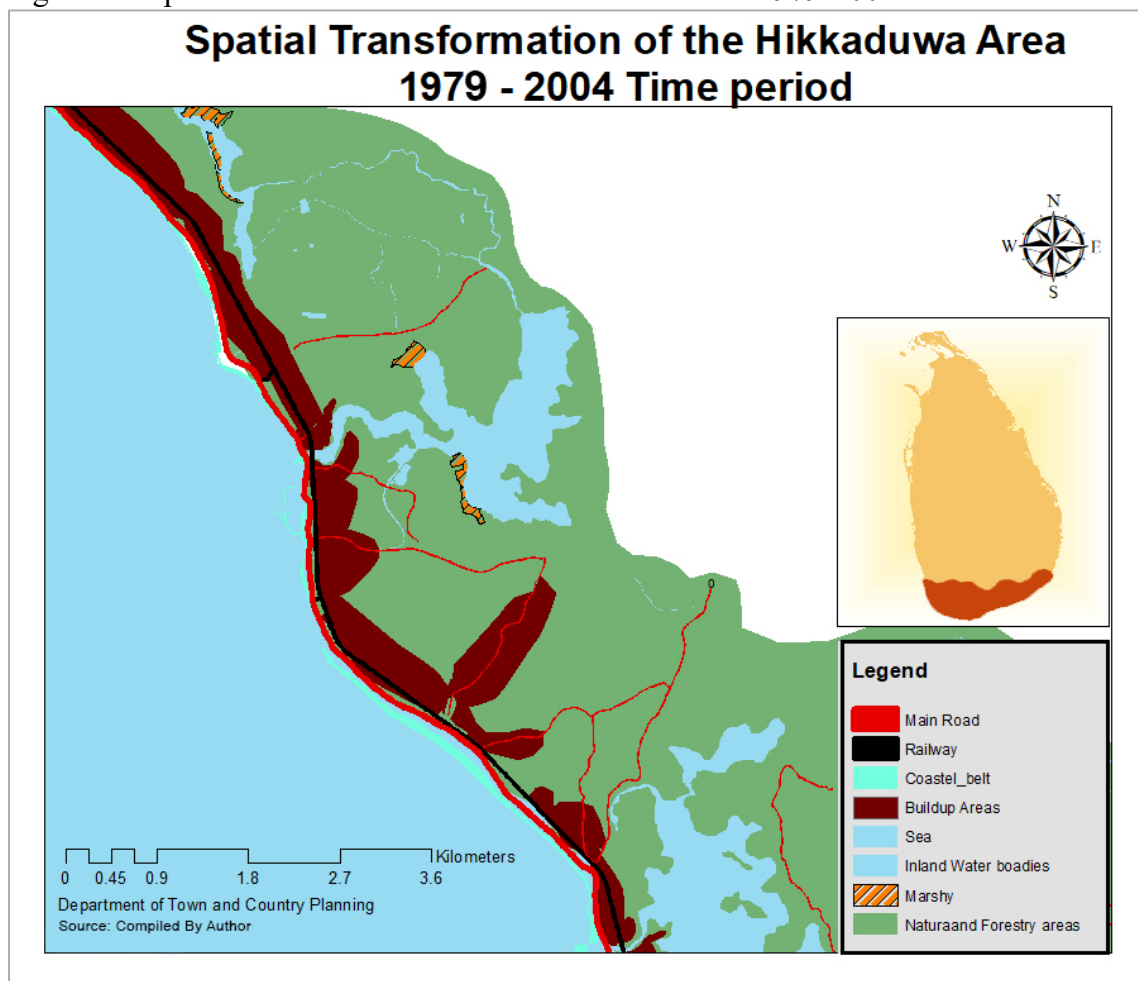
Source: Prepared by Author

1.3 Spatial transformation of the 1979 to 2004 time period

In this time Hikkaduwa town centre more developed with better infrastructure facility. As a result of the development of the road system, clustered settlements started to expand through mainly Galle main road and Hikkaduwa-Baddegama road. That means built form development got linear shape. Arrivals of the tourists were increasing in this period and local people got understood the benefits of tourism industry. As a result of that understanding, more and more local people engaged with the tourism industry by providing different types of services to foreign as well as local tourists. Some Houses started to convert in to provide tourism-based services. Development expanded out of the city centre. That means country sides of the Hikkaduwa also started to developed. When after the year of 2000, still tourism industry and build up area was increasing in to the same trend. This time also Coral mining industry also there. but tourism industry has been won the monopoly of the Hikkaduwa economy. As an invisible hand growth of the tourism industry automatically affected to many of industries and fields.

When the end of 2004, large number of industries, residential units which has been located within the Hikkaduwa beach strip. These clusters terribly affected by the tsunami disaster in 2004 and loss of the buildings and lives were very high.

Figure 12: Spatial Transformation of the Hikkaduwa Area 1979-2004 Time Period



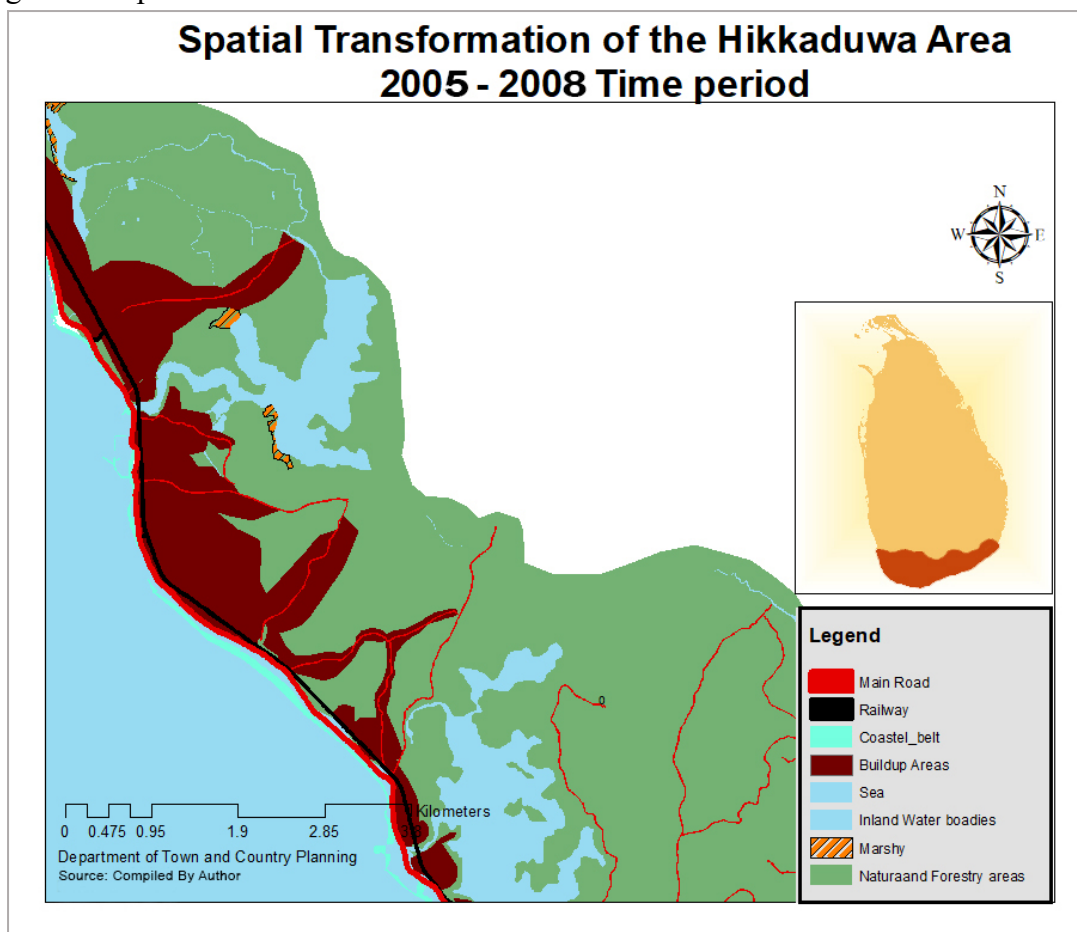
Source: Prepared by Author

1.4 Spatial transformation of the 2005 to 2008 time period

Just after the tsunami disaster 2004, Tourist Hotels, Restaurants and housing units removed from the coastal area. With the time people rebuilt destroyed buildings for resettle and adopted again to their normal lives. But there was a huge change of the coastal area. because many people shifted their houses in to country sides after the tsunami disaster. Most of the constructions which newly happen were shops, hotels, restaurants, institutions and other services providing places.

Build up areas still expanding in parallel to Galle road and railway track. Not only that, through the internal road networks also this build-up area expansion could be seen clearly. Tourism based services providing places were growing and emerging. Cloth shops, art and crafts selling places, restaurants opened and developed mostly in parallel to the Galle road. Internal roads and lanes also have accommodation providing places but very few. Most of buildings in sub roads were housing units. Fishery based activities limited in to the northern side of the Hikkaduwa. Coconut states which located in near areas to the Town Centre, subdivided and converted in to build up areas. Before 2004, limestone industry was one of major industry, in Hikkaduwa. But after the tsunami disaster, this is totally changed. The limestone industry stopped and tourism was the most prominent industry.

Figure 13: Spatial Transformation of the Hikkaduwa Area 2005-2008 Time Period



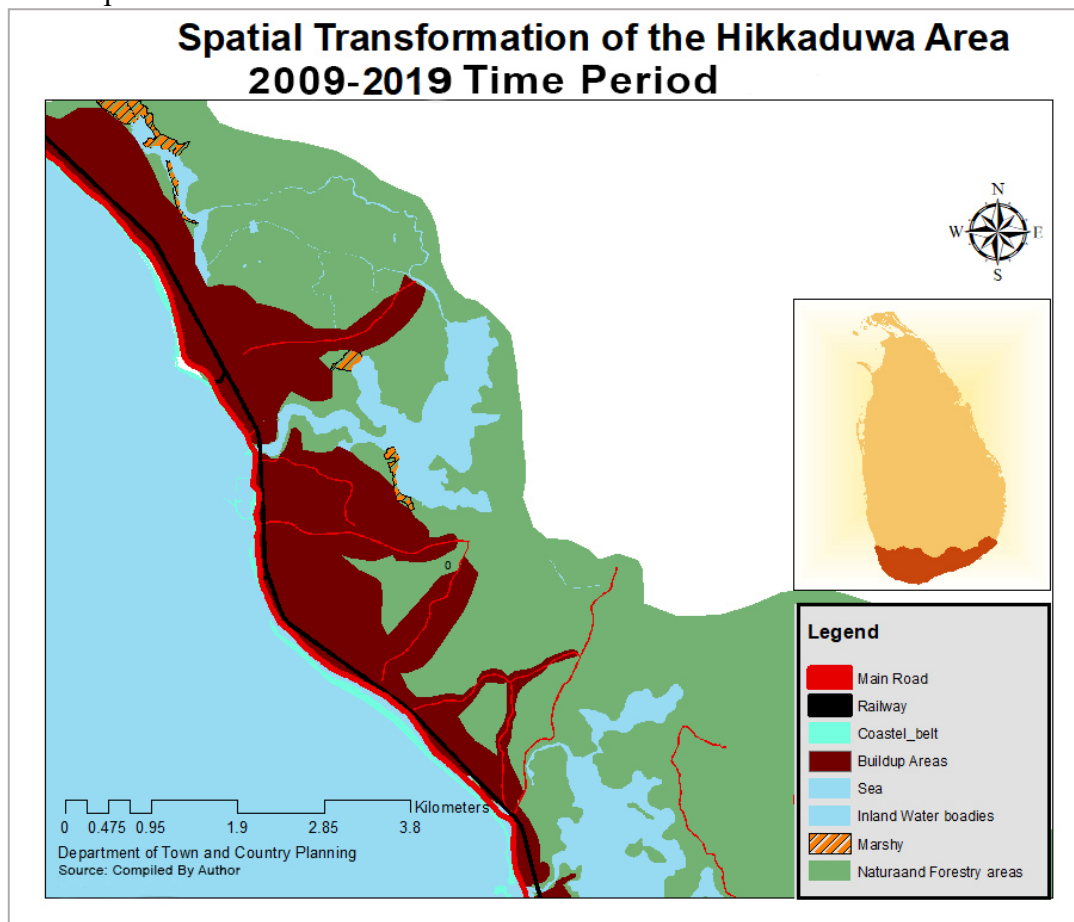
Source: Prepared by Author

1.5 Spatial transformation of the 2009 to 2019 time period

This is the time period that can see the revolutionized change of the spatial structure. 30 decades civil war finished at the year of 2008. As a result of that all security issues solved and lots of development projects started all over the country. The southern expressway is great example for such kind of projects and first stage of its' opened in 2011. Due to this secure situation of the country and infrastructure developments, rapid increscent of international tourism arrivals could be seen in the Hikkaduwa area.

The benefits of the tourism sector understood by the local people and new hotels, restaurants were constructed. Luxury hotels, Small hotels and restaurants maximize the sizes of the buildings by adding new parts to the buildings. Most of the normal residents who didn't have additional lands started to provide tourism-based services within their houses. Some residents allocated total housing units for backpackers and some residents allocated a part of the house only. This adaptation could be seen along through the main roads as well as sub roads. The tourism industry became the most prominent industry than other industries. Most of the land uses converted in to vehicle renting places, accommodation places, tea, and juice bars and so many other kinds of stuff of service providing places.

Figure 14: Spatial Transformation of the Hikkaduwa Area 2009-2019 Time Period

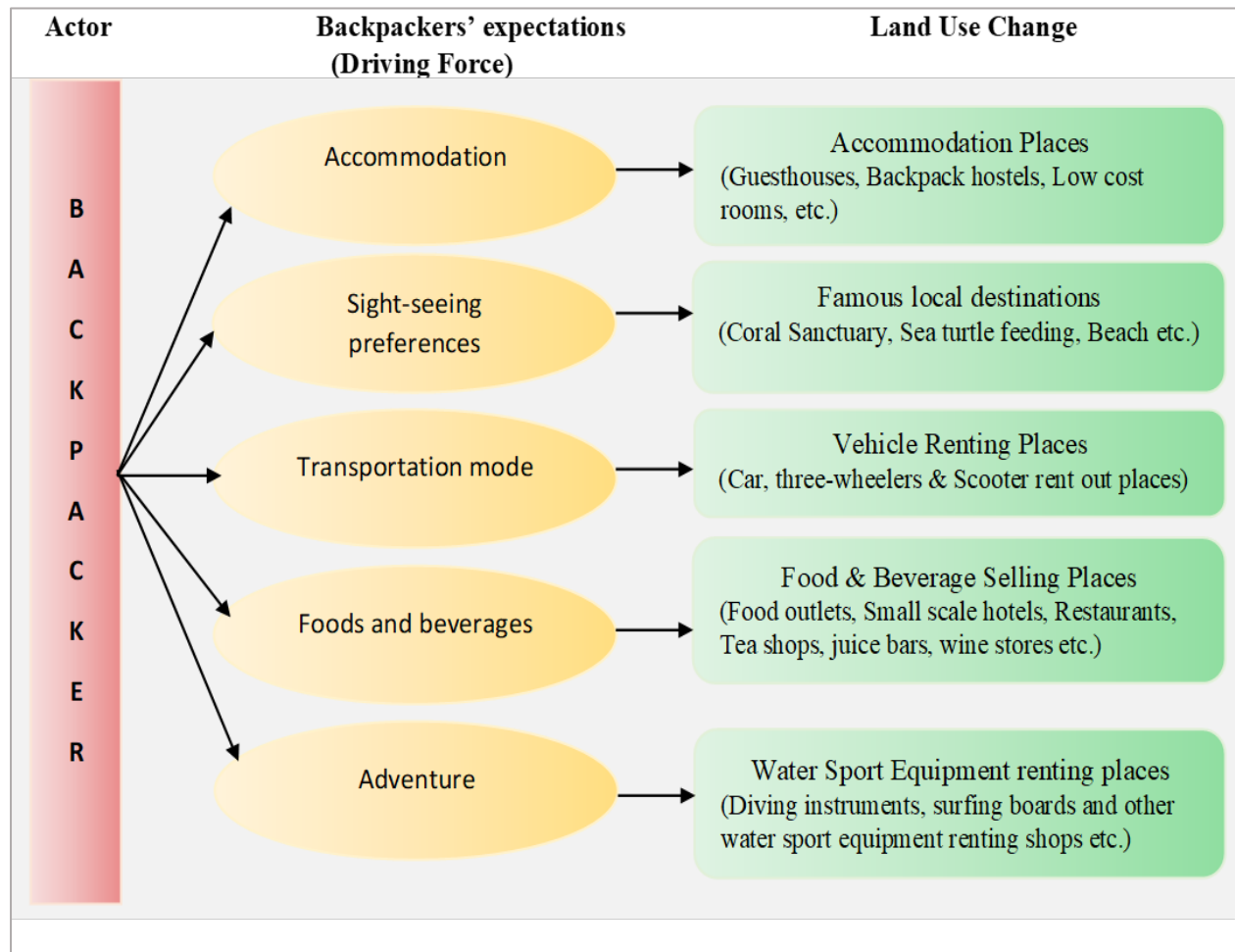


Source: Prepared by Author

2. Identification and selection of the driving forces in Land Use Change

In here backpackers' expectations have been considered as driving forces, to derive the most prominent driving forces has been used characteristics of backpackers which identified under the literature review and survey data which collected for descriptive statistical analysis, part.

Figure 15: Identification and Selection of the Driving Forces



Source: Compiled by Author

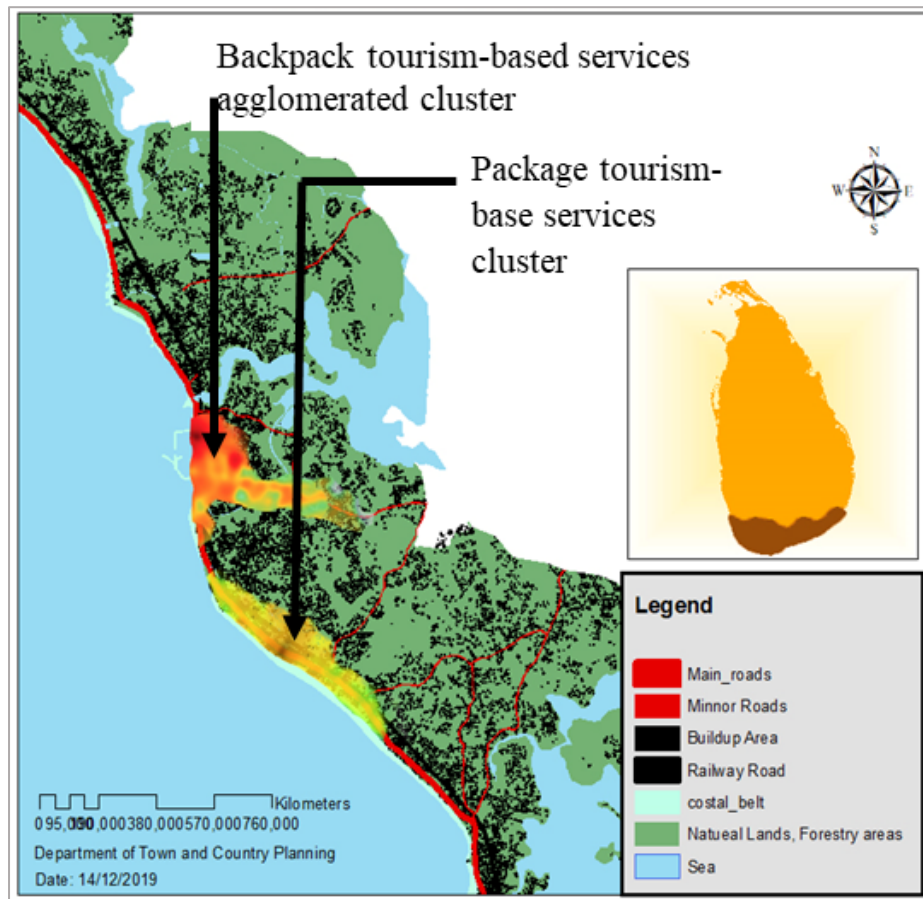
3. Interaction between Backpackers & driving forces explain the land use change in Hikkaduwa area

3.1 Selection of the Specific Area

Under the 4.3.2, already identified driving forces in related with land use change in Hikkaduwa. in here, check the interaction between backpackers and driving forces through the land use change map series. Due to the time limit it difficult to apply the whole Hikkaduwa area. Therefore, have to select one small area.

When studying about the existing built up pattern and land use pattern, Package tourism-based services spread out along the beach strip to the Galle direction. closer areas to the Hikkaduwa town centre have been concentrated as backpack tourism-based services

Figure 16: Package and Backpack Tourism Based Services Agglomerated Areas



Source: Prepared by Author

From the direct field observations identified the “Amarasena Mawatha” as mostly backpack tourism-based services integrated lane than the other areas of backpack tourism-based services agglomerated cluster. Therefore, “Amarasena Mawatha” and part of the Galle road has been selected to explore the land-use change due to the backpackers.

Figure 17: Selected Area to Explore the Land Use Change Due to the Backpackers

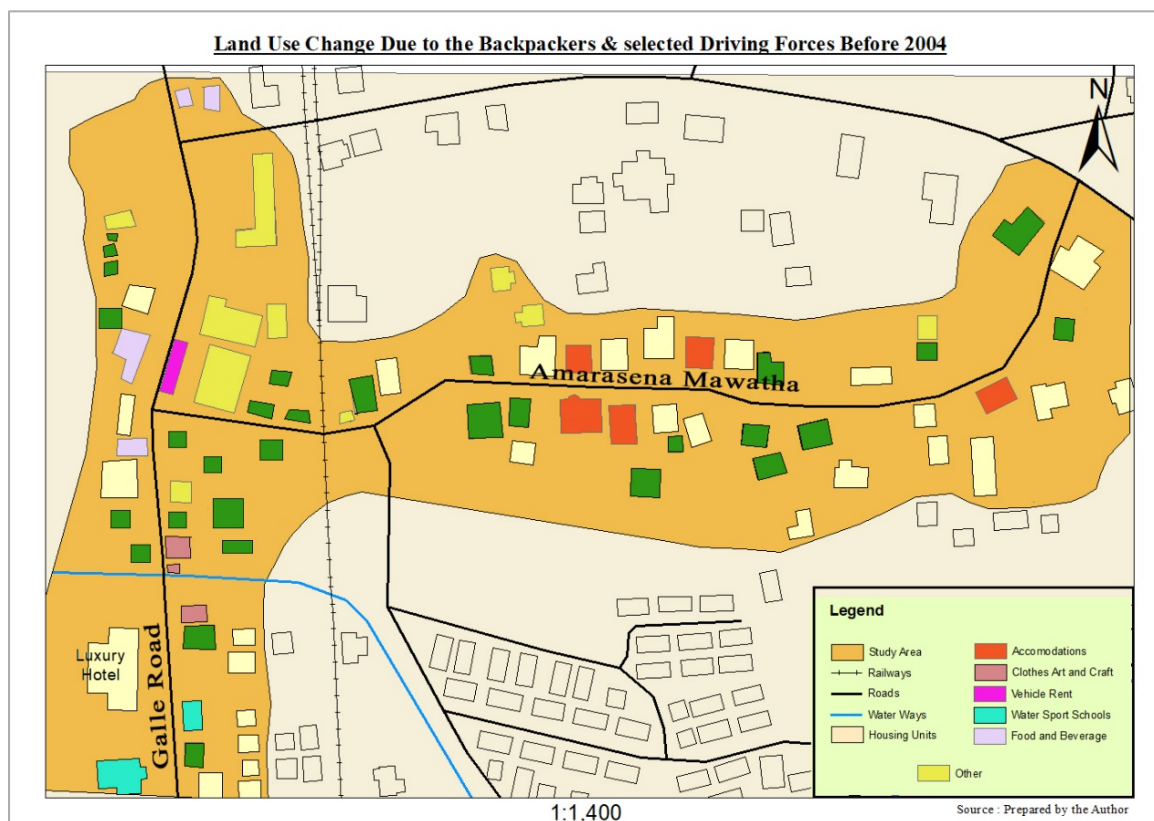


Source: Prepared by Author

3.2 Land Use Change Due to the Backpackers and Selected Driving Forces

This land-use change process has been analysed through the map series which has been created according to three different time periods as “before 2004” , “2005-2008” and “2009-2019”.

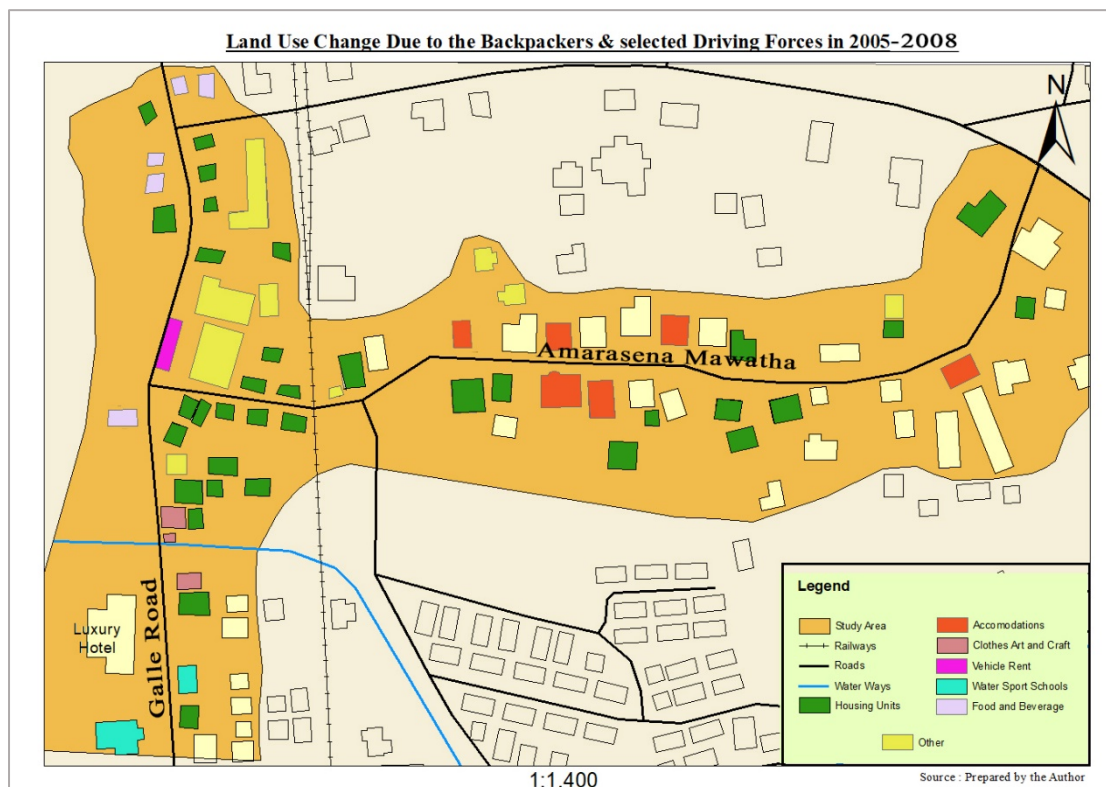
Figure 18: Land Use Change Due to the Backpackers and Selected Driving Forces-Before 2004



Source: Prepared by Author

Before 2004 situation there could be seen most of the residential units and dispersed vacant lands. Hikkaduwa Beach Hotel, Commercial Bank, Bank of Ceylon and old Bus Stand already were there. Inside the lane, there were only 04 accommodation providing places. Those places also have a very low number of beds and rooms than in the future. The “Kind and love” guest house was the oldest one there. In this time backpack, tourism-based service was very befitted due to the low amount of service providers. Along the Galle road could be seen a low number of food and beverage providing places. Some housing units also were near the beach

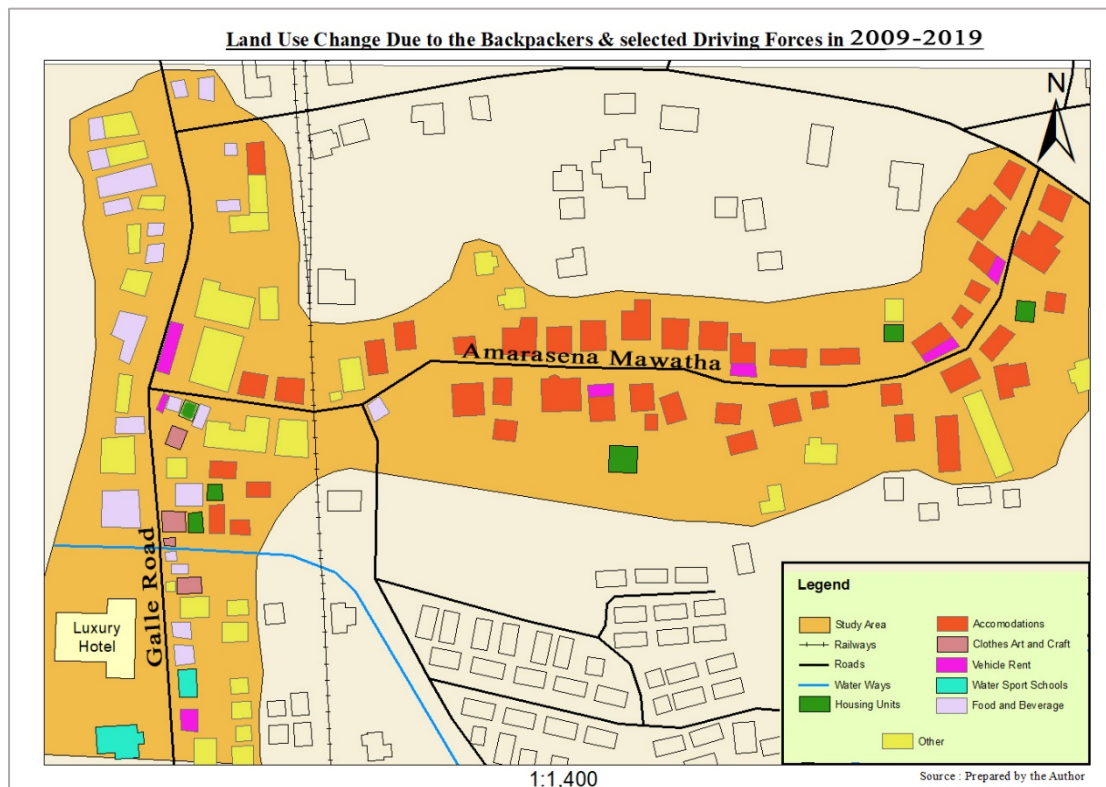
Figure 19: Land Use Change Due to the Backpackers and Selected Driving Forces in 2005-2008



Source: Prepared by Author

In the 2005-2008 time period due to the tsunami disaster, buildings which located next to the beach were destroyed. With the time those houses shifted into other areas. Tourism arrivals increased somewhat but not very high. Because the Civil war has not been finished at this time. Some places of the lane have been changed according to the demand of backpack tourists. Along the Galle road could be seen little shops, Restaurants that provide foods and beverages to backpackers.

Figure 20: Land Use Change Due to the Backpackers and Selected Driving Forces in 2009-2019

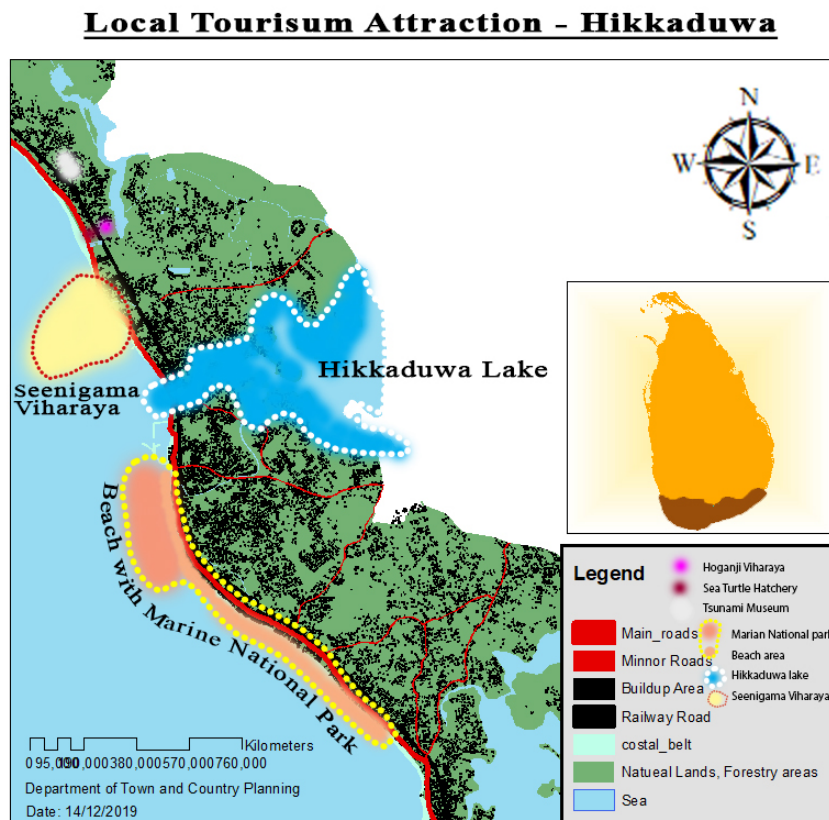


Source: Prepared by Author

After 2008 there could be seen a huge transformation. With the end of the civil war, backpackers' arrivals were increased. Usual land uses rapidly changed into service providing places according to the need of backpackers. Houses converted into guest houses, small hotels and usual service providing places maximize by increasing their elements. In the present situation, "Amarasena Mawatha" has 04 housing units only. Other all houses already have been converted into the accommodations, vehicle renting and such kind of other service providing places. (Under the figure 25, has been mentioned this land-use size and change of every service categories)

From the above map series has been showed accommodations, Driving forces "food and beverages", "Transportation", "adventure" 04 driving forces how lead to land-use change with interacting to backpackers. But "Site-seeing preferences" were not there. Because attraction cannot limit to one small area. Backpackers' mostly preferred sites are as follows.

Figure 21: Local Tourism Attractions Which Backpackers Mostly Prefer



Source: Prepared by Author

3.3 Entropy Value Calculation for Exploring Land Use Change

This “Entropy” value formula developed by Cervero and Kockelman in 1997 to assess the land-use change.

The formula is as follows,

$$H = -1 \left[\frac{\sum (P_j) * \ln(P_j)}{\ln(K)} \right]$$

H = Entropy Value

K= Number of Land use categories

P_j= Proportion of the total area in jth land use type

ln= Natural Logarithm (approximately 2.718)

The entropy value range has been dispersed in between 0 and 1. If Entropy Value near to the 0, that means single dominant land-use change is there. If Entropy Value closer to 1, it

represents the equal proportion of every land use category. The “Entropy” value formula has been applied in here to understand the level of land-use change in the selected area and calculation is as follows.

The “Entropy” value formula has been applied in here to understand the level of land-use change in the selected area and calculation is as follows.

Figure 22: Entropy Value Calculation

Type of the Land Use	BEFORE 2004				2005-2018				2009-2019			
	Extent in Sq.m	P	ln(P)	P*ln(P)	Extent in Sq.m	P	ln(P)	P*ln(P)	Extent in Sq.m	P	ln(P)	P*ln(P)
Accommodation	948	0.014256068	-4.25057	-0.060596452	2043	0.030722729	-3.48275	-0.106999661	6733	0.101251165	-2.29015	-0.231880464
Cloth shops/ Art & Craft	193	0.002902343	-5.84224	-0.016956175	274	0.004120425	-5.4918	-0.022628544	533	0.008015279	-4.82641	-0.038684987
Vehicle Rent	49	0.000736864	-7.21311	-0.005315081	102	0.001533881	-6.47995	-0.009939477	407	0.006120485	-5.09611	-0.031190688
Food & beverage	348	0.00523324	-5.25272	-0.027488769	593	0.008917561	-4.71973	-0.042088507	1692	0.025444374	-3.67126	-0.093412929
Water Sport	233	0.003503865	-5.65389	-0.019810461	388	0.005834762	-5.14392	-0.030013559	426	0.006406208	-5.05049	-0.032354474
Housing Units	2358	0.035459713	-3.33936	-0.118412679	2502	0.037625192	-3.28008	-0.123413694	2890	0.043459954	-3.13592	-0.136286737
Other	62369	0.937907907	-0.0641	-0.060123194	60596	0.911245451	-0.09294	-0.084693875	53817	0.809302535	-0.21158	-0.171234229
	66498	1		0.158641863	66498	1		0.215722867	66498	1		0.377738154

Source: Compiled by Author

Here when before 2004 situation “other” land use category was the dominant category (“Other” land use category includes land uses excluding backpacking base service places and houses). With time that dominance has been changed and other land use categories have been converted into backpack tourism-based service providing places. Housing units also have been converted into backpack tourism-based service providing places. There can be seen a significant land-use change due to the backpacking and backpackers

3.4 Application of the Land Use Change Models

From this study try to find the most appropriate model which fits with the Hikkaduwa Coastal City. According to the descriptive and spatial analysis parts, interpretation of the land-use change models can summarize as follows. A most important outcome of the study is since the beginning of the civilization era, Hikkaduwa has been represented several land-use change models out of 04 models.

- **Application of the DF-C Model:** At the beginning of the human civilization, Natural Driving forces were only in the Hikkaduwa area. there was not anyone to play the actors’ role. Based on the natural driving forces like long Beach strip, Rathgama, and Hikkaduwa lakes, coral reef natural vegetation patches transform into fishery-based settlements. Driving forces directly affect to change land use. “DF-C Model” is the mostly fitted land-use change model with this time period.
- **Application of the DF-A-C Model:** After the people settled down around two lakes and the beach strip, they wanted to fulfill more needs and wants. As a result of that different industries, service places, institutions were built in Hikkaduwa. Due to the natural driving forces, people attacked Hikkaduwa and, local people played the role of Actor. Then the actor change started to change the land use. Here can be seen as a “DF-A-C Model”.

- **Application of the DFA-C Model:** With the time tourism industry was promoted within the Hikkaduwa Coastal Area and it became the most prominent industry than others. When the Package tourism industry limited into luxury star class hotels, backpack tourism started to spread out among the local community of Hikkaduwa. Local people understood the benefits and advantages which can gain through providing a different kind of services to backpackers. Then they started to sell goods and services which mostly expect by backpackers. According to the land-use change models, backpackers' expectations became in to driving forces. As an example, can get the "Backpack hostels". This backpack hostel concept started in the World, due to the backpackers' expectation of "low cost". Backpackers who visit in to the Hikkaduwa also need these kinds of cost-effective accommodation services. As a result of that huge number of vacant lands, homes have been converted in to Hostels and low-cost rooms. According to the surveys carried out under this study gave results food and beverages, accommodation, tourist attractions, transportation and adventure are the most expected services. According to the expectation of tourists, local service providers in these fields doing some kind of changes. As an example, backpackers tend to cook by themselves and accommodation providers has been allocated a cooking area for them. Like wise, there can be seen an interaction among the Driving forces and Backpackers. Land-use change happens due that interaction. this land use changes due to the interaction of the Backpackers and Driving forces can be seen since the post-independence era to present situation. this is the "DFA-C model" and in existing situation also Hikkaduwa coastal city functioning according to this model.
- **Application of the A-C Model:** In the existing situation, Hikkaduwa coastal city shows the "DFA-C model". Because at the present situation Tourism is the mostly prominent industry. If any other industry will not prominent as tourism in future situation, Hikkaduwa Area will be function according to the "DFA-C model" as the same way. But with the time if more industries will prominent as Tourism, the existing land change model transform in to "A-C Model". There will be lots of driving forces from different fields which can affect to the actors and land-use change due to that. If more industry/industries will add rather than the tourism, then Hikkaduwa land use changing process will happen According to the "AC Model".

Figure 23: Summary Table of Applied Land Use Change Models

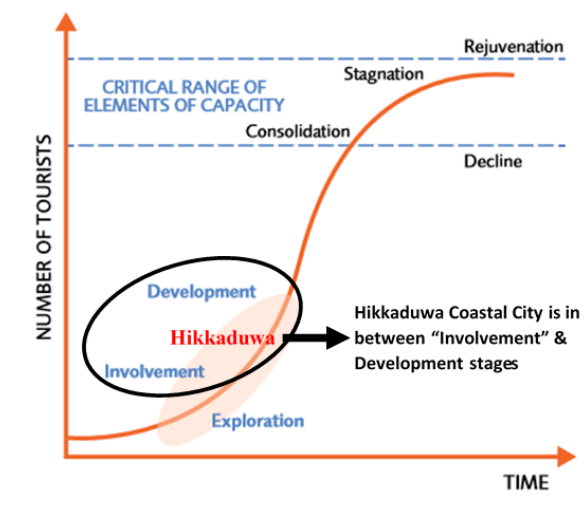
Application of the Land Use Change Models						
01 DF-C Model	Coral reef			Natural Driving forces	Settlements	
	Sandy long beach strip					
	Rathgama & Hikkaduwa lakes					
	Driving force				Land use change	
02 DF-A-C Model	Coral reef		Natural Driving forces	Local people	service places, institutions, industries	
	Sandy long beach strip					
	Rathgama & Hikkaduwa lakes					
	Driving force			Actor	Land use change	
03 DFA-C Model	Accommodation		Tourism is the main industry	Backpackers (majority of the tourists are backpackers)	Guesthouses, backpack hostel Famous local destinations Car, three-wheelers & Food outlets, small scale	
	Sight-seeing preferences					
	Transportation mode					
	Food and beverages					
	Driving force			Interaction	Actor	Land use change
04 A-C Model	Tourism + Other industries which can be prominent in future			Tourists + Other Actors	services which can full fill the Actors Needs	
	Driving force	Driving force	Driving force	Driving force	Actor	Land use change

Source: Compiled by Author

3.5 Application of the Butlers' Tourism Area Life Cycle Model

According to the evolutionary process of the Hikkaduwa Coastal City, it's still at in between of the "Involvement" and "Development" stages. Because in one hand, there is no reduction of tourism arrivals and as an industry, it's still emerging within the Hikkaduwa. In the other hand tourism-based developments like Hotel Projects, still happening in Hikkaduwa. Maximization of the backpack tourism arrival has already proven under the descriptive statistical analysis part by using service providers' answers to the questionnaire survey. The local community has been aware of the benefits of the tourism industry and by adopting and through land-use changing they are hurry to arrange their own spaces into tourism service providing place.

Figure 24: Application of the Butler's Tourism Area Life Cycle Model



Source: Compiled by Author

By seeing few rooms/beds remain without tourist or by looking at restaurant with a small number of tourists, most of the people come to conclusions like “there is no more maximization of the tourist arrivals in Hikkaduwa”, “Hikkaduwa tourism industry is declining” etc. but the actual reason is there is no reduction of the tourism arrivals. But there is a clear maximization of the service providers. If the tourism service providing places grow rapidly, tourists are not growing in parallel to that. As a result of that tourists divide in to a huge number of services providing places. Then there can be seen some service places with few of tourists.

Figure 25: Before and Current Situation of the Tourists Distribution among the Service Providing Places



Source: Compiled by Author

3.6 Model Validation in brief

According to the analysis of the spatial transformation analysis part and to the evolution of Backpack tourism service providing places (in Amarasena Mawatha and the part of the Galle road), there can be seen a significant land-use change. through theorize this land-use change models verify that significant land-use change has been generated due to an Actor and in here

Actor is the Backpacker. According to their aspirations, Expectations, previous land uses have been converted into the service providing places. Backpackers (actor) and (driving forces) have interaction and due to that interaction, huge land-use change has been generated there.

Discussion & Conclusion

The main objective of the study was to investigate the land-use change of the Hikkaduwa area, in relation to the interaction between Backpackers and the selected driving forces. This Investigation based on four land-use change models which consist with three crucial elements such as “Actor”, “Driving Forces” and “Land Use Change”. According to this specific case, “backpacker” was the Actor and driving forces has been created according to the characteristics and expectation of the backpackers.

As the main outcome of the research could be identified there was a significant impact in land use changing process with the influence of the Backpackers. According to the results of the surveys which carried out, informal discussions with locals as well as tourists and the Author’s direct field observations verified more than 80% of tourists are backpackers. It’s an average percentage and some service providing places totally based on backpackers. That means their every customer are backpackers. Most of local people have been adopted and change their usual land uses, usual spaces in to service providing places for the backpackers. When in the land use changing process, Actor’s (Backpackers’) expectations and aspirations are act as “Driving forces”. When local people hurry to provide the service, which need to tourists and the same time they are flexible to do changes as backpackers want. The highlighted thing in here is there can be seen the interaction in between Backpackers and driving forces. Land-use change happen as a result of this interaction. DFA-C model is the most suitable model which fit with this situation. This DFA-C model can be seen Hikkaduwa area since after independence time until today. But at the somewhere in the beginning of the civilization period, Hikkaduwa has been functioned according to the other first two models orderly “DF-C Model” and “DF-A-C Model”. In addition to that land-use change models, here has been applied to the tourism area life cycle model also. According to the life cycle model Hikkaduwa is in between the Involvement and development stages.

Recommendation

As a planning Strategy if want to make a change by interfering an actor and driving forces, this will be a very good mechanism in order to achieve that target. Huge spatial transformation can achieve through adding or removing very small factor. This study will be a guidance for that.

When in future tourism as well as spatial planning processes, this study can use as a supportive tool to identify different driving forces, actors which relate with land use changing process. Not only that, this study and methodology can use when decision making and policymaking processes in spatial planning, tourism planning and land use planning fields. Especially in coastal areas planning these same models, methods can use to understand the area, by only changing the case study area.

Under this study identified four Land Use Change Models apply for specifically selected Area only because of time limitation. The same models can apply to the entire Hikkaduwa area the same way to study the land-use change. Further, by calculating “entropy value” can check the level of the land-use change. A better understanding of the land use changing process in any area will make a path to achieve better future plans and sustainable future developments.

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