# SITE SUITABILITY MODEL FOR ECOTOURISM AT THE KIRALA KELE PARTIAL-NATURE-BASED WETLAND OF SOUTHERN SRI LANKA

**By**


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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AOI | Area of Interest |
| IUCN | International Union for Conservation of Nature |
| TIES | the International Ecotourism Society |
| UNWTO | United Nations World Tourism Organization |
| UNDP | United National Development Project |
| AHP | Analytic Hierarchy Process GIS Geographic Information System |
| SLTB | Sri Lanka Tourist Board |
| SLTDA | Sri Lanka Tourism Development Authority |
| GDP | Gross Domestic Production |
| USD | United State Dollars |
| IPS | Institute of Policy Studies |
| NGFPS | Nilwala Ganga Flood Protection Scheme |
| RS | Remote Sensing |
| TES | The Ecotourism Society |
| 3 S | Sea, Sun, Sand |
| UNDP | United Nations Development Programme |
| MCE | Multi Criteria Evaluation |
| IKONOS | is Greek for “image”, a commercial earth observation satellite |
| MCDM | Multi Criteria Decision Making |
| ILWIS | Integrated Land and Water Information System (GIS software) |
| REP | Regional ecotourism planning |
| ET | Evepotranspiration |
| DEM | Digital Elevation Model |

| | |
|---|---|
| ASTER | Advanced Space born Thermal Emission and Reflection Radiometer |
| QUICKBIRD | the World Highest Resolution Commercial Satellite |
| WTO | The World Tourism Organization |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| CZMP | Coastal Zone Management Plan |
| GND | Grama Niladari Divisions |
| RH | Relative Humidity |
| TGD | Target Group Survey |
| FGD | Focused Group Discussions |
| NGO | Non Governmental Organizations |
| SDA | Southern Development Authority |
| RMSE | Root Meal Square Error |
| CR | Consistency Ratio |
| FEPKK | First Ecotourism Project in Kirala Kele |
| QD | Survey Quadrat survey |
| CNI | Closed Neighborhood Index |
| LULC | Land use/Land cover |
| HWW | High Water Wetland |
| MWW | Moderate Water Wetland |
| LWW | Low Water Wetland |
| TAA | Total Actual Acidity |
| TPA | Total Potential Acidity |
| MSL | Mean Sea Level |
| SWI | Surface Water Inflow |

| | |
|---|---|
| GWI | Ground Water Inflow |
| SWO | Surface Water Outflow |
| GWO | Ground WaterOutflow |
| AS | Changing Storage |
| RH | Relative Humidity |
| RF | Rainfall |
| DRI | Drainage Index |
| BP | Before Present |
| DH1 | Denudated Hills 1 |
| DH2 | Denudated Hills 2 |
| SOAS | Soil Sampling Plots |
| YR | Yellowish red |
| Y | Yellow |
| Site ID | Site Identification No |
| AGR | Annual Growth Rate |
| Negh No- | Neighboring Settlement No |
| KMO | Kaiser-Meyer-Olkin |
| BI | Biodiversity |
| WI | Water resources |
| TI | Terrain factor |
| LI | Land use/land cover |
| RI | Road network |
| SI | Settlements |
| PCA | Principle Components Analysis |
| RI | Average Random Consistency Ratio |

## LIST OF SYMBOLS

| | |
|---|---|
| $C^o$ | Celsius |
| μm | Microwave |
| N | North |
| E | East |
| $C_a$ | The amount of the particular land covers at the beginning of year |
| $C_b$ | The amount at the end of year |
| $T$ | Represent the length of time |
| E | Nodes of roads |
| V | Indicated the points (junctions) |
| $\alpha$ | AlphaBeta and Gama Alpha |
| $\beta$ | Beta |
| Γ | Gama |
| Λ | Lamda |
| $p^H$ | Potential of Hydrogen |
| P | Significant value |
| ± | Plus or minus |
| $\lambda^{1/2}$ | Square root of Lamda |
| $Km^2$ | Square Kilometer |
| λ max | Highest eigenvalue |

**MODEL KESESUAIAN TAPAK UNTUK EKO-PELANCONGAN DI TANAHBENCAH BERASASKAN SEPARA SEMULAJADI DI KIRALA KELE SELATAN SRI LANKA**

## ABSTRAK

Sumber-sumber tanah bencah membentuk sebahagian penting daripada persekitaran dan pengurusannya perlu dikaji, dalam konteks satu interaksi antara strategi-strategi pemuliharaan dan pembangunan negara.Sri Lanka mempunyai sumber tanah bencah berasaskan separa alam semulajadi yang mempunyai potensi yang besar untuk tujuan pembangunan di Asia Selatan.Dalam kajian ini, satu model ruangan berasaskan literatur telah dibangunkan, untuk menerangkan potensi tanah bencah separa alam semulajadi untuk dibangunkan sebagai kawasan eko-pelancongan.Proses Hierarki Analitik (AHP) model telah digunakan untuk menganalisis kesesuaian kawasan untuk pembangunan eko-pelancongan di tanah bencah separa alam semulajadi.Enam kriteria telah digabungkan; biokepelbagaian, sumber air, rupabumi, penggunaan tanah dan litupan tanah, jaringan jalanraya dan petempatan telah dikenalpasti.Beberapa petunjuk yang berasaskan tinjauan literatur, pendapat pakar, soal-selidik isirumah, dan lawatan lapangan telah digunakan untuk persediaan peta kebolehsuaian untuk pembangunan eko-pelancongan. Klasifikasi kriteria dan analisis petunjuk telah dijalankan menggunakan penderiaan jauh satelit dan GIS. Interpretasi visual telah dilakukan melalui dua imej IKONOS (2003 and 2011) dan satu pasangan stereo foto udara (1983) melitupi kawasan tanah bencahKiralaKeledi Matara, selatan Sri Lanka.Tambahan lagi, data lokasi GPS dan data lapangan bagi tanih dan tumbuh-tumbuhan digunakan untuk analisis klasifikasi kriteria. Keputusan daripada klasifikasi dan interpretasi imej dimantapkan menggunakan

data sokongan. Keputusan daripada analisis kriteria utama kemudiannya digabungkan ke dalam proses AHP. Kajian ini telah mengenalpasti empat kawasan yang paling sesuai- tinggi, sederhana, terpinggir dan rendah untuk pembangunan eko-pelancongan tanah bencah berasaskan separa alamsemulajadi.Kajian ini mendapati bahawa, di bahagian tengah kajian adalah sangat sesuai untuk eko-pelancongan dengan kepelbagaian-bio dan sumber air yang tinggi.Bahagian timur dan selatan juga didapati ketara sebagai kawasan untuk aktiviti-aktiviti eko-pelancongan.Sebaliknya,kawasan-kawasan tanah bencah dengan petempatan dan jaringan jalanraya mempunyai kebolehsesuaian yang terpinggir dan rendah untuk kegiatan-kegiatan eko-pelancongan. Tambahanlagi, didapati bahawa pembentukan dan perkembangan secara ruangan tanah bencah berasaskan separa alam semulajadi dalam kawasan kajian adalah disebabkan oleh penggunaan tanah dan perubahan litupan tanah selepas Skim Perlindungan Banjir Nilwala Ganga. Dengan jarak Kirala Kele yang dekat dengan destinasi-destinasi pelancongan seperti Hikkaduwa dengan terumbu karang dan pantai berpasir dan Unawatuna dengan pantai berpasir di utara dan Galle dan Koggala dengan lagun yang cantik di selatan, ia mempunyai potensi yang besar untuk dibangunkan sebagai kawasan eko-pelancongan. Tambahan pula, Kirala Kele boleh menjadi jaringan perjalanan pelancongan seiringdengan destinasi-destinasi ini.

**SITE SUITABILITY MODEL FOR ECOTOURISM AT THE KIRALA KELE PARTIAL-NATURE-BASED WETLAND OF SOUTHERN SRI LANKA**

## ABSTRACT

Wetland resources form an integral part of the environment and their management must be pursued in the context of an interaction between conservation and the national development strategies**.**Sri Lanka has a tremendous partial nature based wetland resources that have a great potential for further development in Southern Asia. In this study a literature based spatial model is developed to explain the potential of a partial-nature-based wetland to be developed as an ecotourism site. Analytic Hierarchy Process (AHP)model is used to analyze the site suitability for ecotourism development of the partial-nature-based wetland. Six integrated criteria; biodiversity, water resources, terrain, land use and land cover, road network and settlements are identified. Several evaluating indicators which are based on literature survey, experts' opinions, questionnaire survey from households, and field excursions are used for the preparation of site suitability map for ecotourism development. Classification of criteria and analysis of indicators are employed using satellite remote sensing and GIS. Visual interpretation is applied to two IKONOS images (2003 and 2011) and a stereo pair of Aerial Photographs (1983) covering Kirala Kele wetland area in Matara, Southern Sri Lanka. Interpretation and classificationresultsof the images are refined using ancillary data. Moreover, the GPS location data and the field data of soil and vegetation are used for analysis of classification of criteria. The results from the analysis of the main criteria are then integrated into AHP process. This study had identified four suitable sites of

high, moderate, marginal and low for the ecotourism development of partial-nature-based wetland. The study found that, the central part of the study area is more sensitive and highly suitable for ecotourism with high biodiversity and water resources. Eastern and southern parts of the wetlands are also found as prominent for ecotourism activities. On the other hand, the wetland areas associated with settlement and road network are marginally and low suitability for the ecotourism activities. Furthermore, it was found that, the formation and spatial expansion of the partial-nature-based wetland in this study area is due to the land use and land cover changes after the Nilwala Ganga Flood Protection Scheme. With the proximity of Kirala Kele to the well known tourism destinations such as Hikkaduwa with coral reef and sandy beach and Unawatuna with golden beach on the north and Galle and Koggala with beautiful lagoon on the south, it has great potential to be developed as an ecotourism site. Moreover, Kirala Kele can be part of one tourism travel network together with these destinations.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Introduction to the chapter

This chapter consists of the background of the study and the reasons for selecting this study as the area of interest. The understanding gained through background helped to define the problem of the study and contemporary research questions of this study. Moreover, this chapter is confined to discuss research objectives, significance and importance of the study area, scope and outcomes of the research with limitations of the study. Finally, the structure of the thesis is included in this chapter.

## 1.2 Background of the study

Wetland ecotourism is a multi-disciplinary field which comprises of natural and cultural environment.Ecotourism may involves visiting natural areas with the objectives of learning, studying or participating in activities that do not harm the environment; whilst protecting and empowering local communities socially and economically(Allcock & Smith, 1994; Blamy, 1995; Butler, 1999; Cristina, 2004; Fennell, 2003; Mara, 2006; Walpola & Goodwin, 2000; Weaver, 2001). The International Union for Conservation of Nature (IUCN) and The International Ecotourism Society (TIES) both had made statement that ecotourism activities can be implemented in the natural environment. Nevertheless, Nelson (2004)added that man-

made areas can also be created for the purpose of ecotourism after resilience of the naturalenvironment.Proper management and a conservation plan of the ecotourism can enhance the socioeconomic and eco-friendly environment of the local community. This provides local economic benefits to the host country such as, employment opportunities, infrastructural improvement, rural and urban productions and natural resource for tourism activities. Ecotourism brings closer to rural local market due to low cost mechanisms (Healy, 1994) and can provide foreign exchange and economic rewards for the preservation of natural systems and socioeconomic development of coastal wetlands.

Natural and partially natural environment can be considered for the development of ecotourism, if the particular areas have sufficient requirement for that development(Dong, & Liu, 2008; Twining& Butler, 2002). In southern Sri Lanka, there are some potential resources of coastal wetlands that can be useful for the ecotourism development (See Figure 1.1).

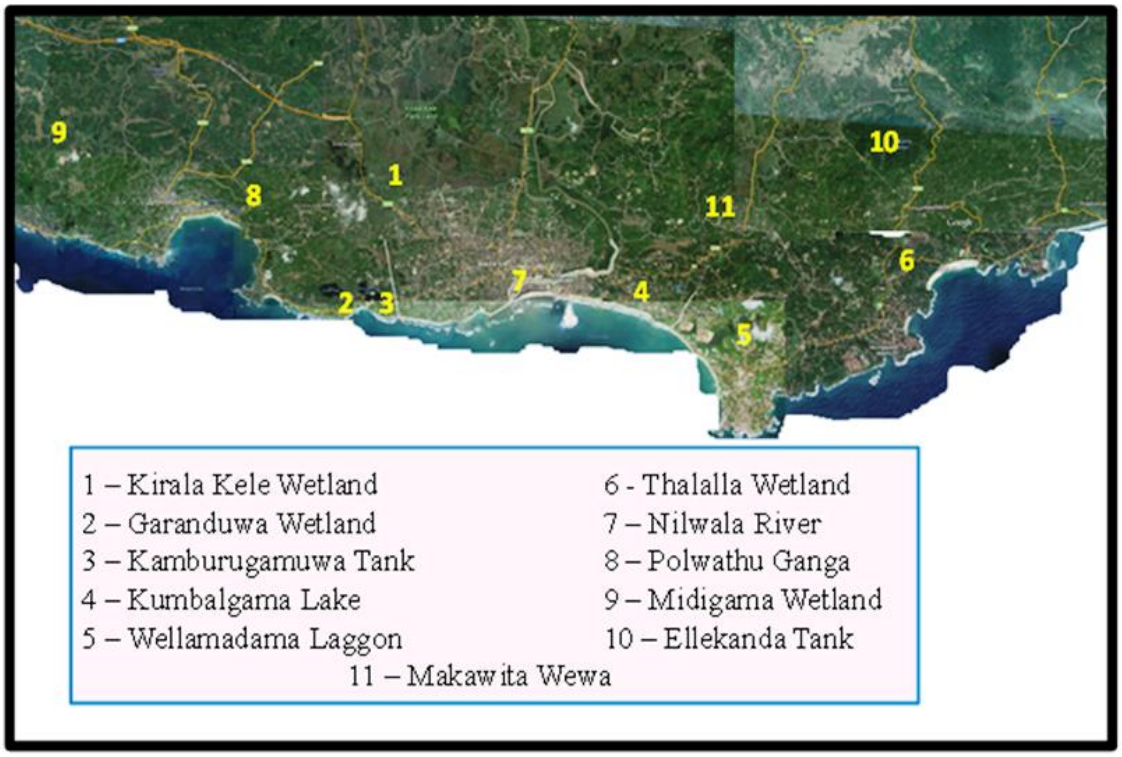


Figure 1.1 – Coastal wetlands along the southwest coast of Sri Lanka

Source: Google map of Sri Lanka, 2015

Partial-nature-based wetlands are areas characterized by a high percentage of artificial environment, which are saturated with water, either permanently or seasonally, that determines the nature of soil development and the types of animals and plant communities in the soil (Charman, 2002). Concentration of partial-nature-based wetland has the ability to produce a large amount of resources for the development of ecotourism. Humans are part of the natural world, just like all other living things and therefore, human behaviourcontributes to the natural evolution of all kinds of living things. So, humans are parts of the natural processes. As a result, they are literally unable to behave unnaturally. So these natural and unnatural types of ecotourism include nature based environment and culture based environment.

Kirala Kele wetland enables a rich tourism potential with attractiveness, with various activities, boating, fishing, camping, bird watching, nature photography, and picnicking, visiting traditional villages, visiting traditional farming, as a solitude and a research canter (Bukley, 2003; Weaver, 2001).

Ecotourism has a strong interrelationship with sustainable tourism, which considers the environmental friendly economic activities (Bunruamkaew& Murayama, 2011; Gray, 2003). Evaluation of ecotourism is a proper way to develop the field of tourism in a given region with conservation of the environment and concern of economic factors (Ryngnga, 2008). The development of the tourism has a strong correlation with development of ecotourism as ecotourism is a subset of mass tourism.

In recent years tourism has seen a dramatic growth throughout the world, and many countries which had experienceda little tourism previously have been developed as international destinations. Tourists are demanding the experience of new cultures and physical environments which has led to indigenous cultures and special physical environments has becoming the focus of tourism industry (Poon, 1993). As the peripheries of tourism continue to be stretched the social, economic, and environmental impacts of tourism continue to become more dramatic.

According to international tourism maintained momentum in 2011, international tourist arrivals grew by 4.6% to reach 983 million worldwide, up from 940 million in 2010. International tourism receipts for 2011 were estimated at US$1,030 billion worldwide, up from US$ 928 billion in 2010 (+3.9% in real term), setting new records in most destinations despite economic challenges in many source markets. According to monthly and quarterly data included in the UNWTO World (2013), international tourist arrivals

worldwide grew at a rate of 5% in the first four months of 2012, consolidating the growth trend started in 2010. Forecast prepared by UNWTO in January 2012 pointed that a growth of 3% to 4% international tourist arrivals are expected to reach one billion in 2012 for the first time. International tourist arrivals (overnight visitors) grew by 5% in 2013. In 2012, arrivals were increased from 1035 million to 1087 million. It means with an additional 52 million international tourists travelling internationally in 2013 (UNWTO, 2014). Asia and the pacific region recorded the fastest growth rate of a 6% increase in international arrivals in 2012 among other regions. Even though, the growth rate was expected to be continued in 2014 as 4.0 % to 4.5 % worldwide, Asia and pacific regions showed the strongest rates (+5% to +6%) among other regions in 2014. As the World Tourism Organization (2012) highlighted 217 million international tourist arrivals to the Asia and the Pacific region were reported in 2012.The largest tourism industries in terms of 2012 arrivals were concentrated in North East Asia (115.8 million) and South east Asia (77.2million). Comparing these two regions, South Asian countries had low international tourist arrivals in 2012 about 12.4 million in a total amount of 217 million in Asia Pacific regions. The annual growth rate of tourist arrivals in south Asia was observed higher than in other regions in Asia Pacific.

However, the largest tourism industries in terms of arrivals in 2012 were highly promoted to the Eastern Asia such as China (57.58 million), Malaysia (24.71 million), Hongkong (22.32 million) and Thailand (19.10 million) (UNWTO, 2012). At the opposite end of the spectrum, certain south Asian destinations have a very little enhancement compared to east Asian countries. These are some minor ecotourism activities outside of the Himalayas in South Asia (Weaver, 2008).Almost 10% of the

world's number one employers contribute to the respect of tourism industry sector. Therefore, international tourist arrivals would be expected to be double from 625 million in 1999 to1.6 billion in 2020. According to Tourism Towards 2030, UNWTO recently updated a long term outlook and an assessment of future tourism trends. The number of international tourist arrivals worldwide is expected to increase by 3.3% per year on average from 2010 to 2030. These represent some 43 million more international tourist arrivals every year, reaching a total of 1.8 billion arrivals by 2030.

Sri Lanka is situated in the South Asian region and South Asia comprises the countries of India, Pakistan, Bangladesh, Bhutan, Nepal, Maldives, Afghanistan, Iran and Sri Lanka. The economic growth of Sri Lanka achieved 6.8% in the second quarter of year 2013. Even industrial and service sectors were grown 10.15% and 10.6%, respectively. The growth of tourism sector was higher (21.1%) compared to both industrial and service sectors in the same quarter of the year.

Indeed, Sri Lanka is currently experiencing an unprecedented boom in tourism. The number of tourist arrivals was increased from 447,890 in 2009 to 855,975 in 2011. Sri Lanka is now promoting tourism under the tourism branding slogan "Sri Lanka: the wonder of Asia". The end of war in May 2009 helped to begin a new chapter of development in Sri Lanka in general and tourism in particular. The economy of the country managed to achieve an impressive rate of its growth of 8% in 2010. According to the Sri Lanka Economist Intelligence Unit noted in the government treasury report "Sri Lanka has been ranked as eighth among the top ten fastest economically developing countries in the world (Treasury, 2011).

Employment opportunities in sectors of the tourism have increased during the last fifty - years.

In this context, ecotourism development has become a main research stream as a strategy for sustainable development in the tourism field. Researches demonstrate that the development of tourism requires a paradigm shift in the development of ecotourism based on environmental friendly activities (Bukley, 2003; Mobaraki et al., 2014; Kumari et al., 2010; Bunruamkaew& Murayama, 2011; Weaver, 2001). Therefore, a study on the best potential locationfor any new wetland ecotourism seems demanding. Geographic Information System with multy criteria and multi objective techniques such as analytic hirarchy process choosing the best decision alternatives on site suitability criteria (Saaty& Vargas, 2012).AHP is a multi criteria decision making method to determine the preference of the decision makers for the hierarchy level. This method basically structured with a pair wise comparison of criteria, judgements, an eigenvector method for making weights and the consistency ratio of the selected criteria (Yang & Lee, 1997; Saaty, 1990). This involves six essential steps as: define unstructured problem, develop AHP hierarchy, establish pair wise comparison, estimate relative weights, check consistence and determine overall ratings (Ghamgosar et al., 2011). Mobaraki et al., (2014) has identified six criteria in selecting suitable sites for ecotourism using AHP and GIS at the Isfahan Township in Iran. The study indicated that they could have selected the suitable area by this method. Kumari et al., (2010) employed a research for identification of potential tourism sites in West District, in India by integrating five indicators using AHP and GIS. It has been used for identification and assessed the ecotourism sustainability of the destination point (Kumari et al., 2010).

Bunruamkaew & Yuji (2011) also used GIS and AHP to evaluate site suitability by five main factors and nine criteria at the Surat Thani Province, Thailand. AHP was effectively used to calculate the preference weights and identify the potential ecotourism sites of the destination. Thus, this study was focused on key theoretical and empirical findings with potential sites of development of ecotourism and focal problem addressed a partial nature based wetland in Sri Lanka.

### 1.3 Problem statement

Tourism industry in Sri Lanka dates back to the 1960's and has grown steadily over the years. The Ceylon Tourist Board was established as a government administrative body under the Ceylon Tourist Board act No 10 of 1966. After 41 years, in October 2007 the Tourism Act No 38 of 2005 came into effect and act provided for the establishment of the Sri Lanka Tourist Board (SLTB) (SLTDA, 2009). In present tourism industry is one of the major foreign exchange generating industries in Sri Lanka and 237,000 people directly or indirectly depends on the industry for their livelihood under the present administration. The GDP of travel and tourism in Sri Lanka had increased an absolute value of 2099.7million USD in 2012. The percentage of total compared bit high (3.4 %) to previous years, 3.1%, 2.9% and 2.5% in 2011, 2010 and 2009 respectively. Furthermore, GDP growth forecast would be increased by 5.7% in between 2013 to 2022 (Dickinson & Lumsdon, 2010).

The tourism industry in Sri Lanka has consolidated its development position in a good rank among the other countries in the world. Sri Lanka has reached to 74$^{th}$ place out of

141 countries and 4 scores out of 7 in Travel and Competitiveness Index in 2013. Moreover, creating an environment conductive for tourism is a major component of '5 Year Master Plan' (2011-2016) in Sri Lanka. Seven strategies should be followed to be the above target; increasing tourist arrivals, increasing the tourism related employments, distributing the economic benefits to society, increasing foreign exchange earnings, improving the global trade and position of Sri Lanka as the world's most treasured island for tourism (SLTDA, 2014).

Many governments have viewed ecotourism as less problematic than the other economic sources (Such as mining, logging and ranching) it can earn more profits by the ecotourism processes. By the early 1990s, nearly every developing country was promoting ecotourism as a part of its development strategy. Several countries identified the nature based tourism as the most appropriate way to earn the largest foreign exchange in the tourism environment.

The approach of ecotourism was introduced to Sri Lanka in the year of 1980 in order to sustain tourism with the conservation of nature. As the conservation of nature and the development of the economy, this approach was a preliminary requirement of the development of tourism destinations in Sri Lanka. A national ecotourism policy plan is being formulated to promote Sri Lanka as a unique ecotourism destination. In addition, the Institute of Policy Studies (IPS) of Sri Lanka, the research agency had presented a comprehensive plan to promote and manage nature tourism in Sri Lanka (Mathews, 2000). To lift the profile of ecotourism, the ministry of tourism in Sri Lanka declared year 2000 as the 'Year of Ecotourism'. Even tourism in Sri Lanka initially focused on

beach tourism, there is a significant potential to develop ecotourism by using other profiles in Sri Lanka (Bandara Ranjith, 2009).

Therefore, the tourism sector in Sri Lanka was diversified with a special emphasis on ecotourism since 2010 for tapping the tourism potential of the natural topography and ecological values of the country (SLTDA, 2014).

Most of the scholars as well as the government policy in Sri Lanka have identified that ecotourism is a nature based tourism and its process occurs under the natural environment (Wight, 1993; Hawkes and Williams 1993; Orams, 1995; Brandon, 1996; Honey, 1999; Fennell, 1999; Buckley, 2003; Cater and Lowman, 1994) So, wetlands can be identified as a natural environmental ecosystem.

Those studies have been focused on the socioeconomic issues and environmental problems arising from the ecotourism activities. But few studies have tended to focus on the identification of possibilities to develop the ecotourism and difficulties on distinguished pertain studies about ecotourism potentiality in the nature based wetlands without using the remote sensing and GIS techniques (Bandara, 2009; Herath, 2002). Some scholars, Kumari, S. et al., (2010); Bukenya, (2012); Abidin, (1995); Choi & Sirakaya, (2006) and Twining-ward& Butler, (2002) have identified the potential of ecotourism development sites using Rs and GIS techniques related to natural (Ramsar Centre, 1995)ecosystems.

So, wetland as a category of natural environmental systemhas multi variant sub-systems (Marsh, fen, peat lands, fresh, brackish or salty lands, and artificial water static or flowing areas) with physical and chemical properties which can be developedin a

sustainablemanner (Ramsar Center, 1995). However, it is important to point out that even though, more sustainable resources are comprised the studies on the potential of ecotourism in partial nature based wetlands are still limited. Therefore, this study has analyzed basic principles of site suitability, selection of the ecotourism development and proposed important sites for the ecotourism development in the Kirala Kele partial nature based wetland in southern Sri Lanka based on GIS and AHP.

Ultimately, Tourism Authority in Sri Lanka (SLTDA) has emphasized that Sri Lanka is in need of alternative development options to foster a sustainable tourism industry (SLTDA, 2009). So, Ecotourism field would be the Sustainable tourism industry in Sri Lanka and so far, there is no efficient system to manage the existing wetland area in the Kirala Kele. But, there are six (06) hot Spots in Sri Lanka related to ecotourism destinations namely; Habarana- Sigiriya – Archaeological site, Kithulgala – Hilly site, Nakals – Natural forest, Belihul Oya – River site, Chillow - Beach site and Thanamalwila – Wildlife destination (Bandara, 2009). It is very clear that, there is no any ecotourism site in above list corresponding with the wetlands of the southern part of Sri Lanka. However, there was a community based ecotourism project planned to be implemented in the Kirala Kele area before a decade. Even it was the first model of the ecotourism development in this area; it was failed due to many reasons. Since the issues and challenges of the previous studies with regards to the national objectives are already identified.This study attempted to address the target and gaps in the ecotourism industry in Southern Sri Lanka. Furthermore, this would be the first study of the ecotourism development based on a partial-nature-based wetland in Sri Lanka.

## 1.4 Research questions

This study attempted to address above mentioned researchgap using the conceptual model in the processes of identifying criteria and indicators of the suitability to develop ecotourism in the Kirala Kele. The research questions are;

1. What are the potentialindicators and criteriaof site suitability for the ecotourism development of the partial-nature-based wetland?
2. What is the site suitability model for the ecotourism development of the partial-nature-based wetland?
3. Is there a relationship between the spatial expansion of the partial-nature-based wetland and land use/land cover change after NGFPS?

## 1.5 Objectives of the study

This study initially developed a literature based conceptual model and tested the model that explain the suitable sites for ecotourism development of the partial nature based wetland using Analytic Hierarchy Process (AHP) and Geographic Information System (GIS)

### 1.5.1 Overall Objective

The main objective of this study was to identify and examine the suitability to develop an ecotourism site in the partial-nature-based wetlands along the southern coastal belt in Sri Lanka.

To achieve the above broad objective, this study attempted to test the following specific objectives;

### 1.5.2 Specific objectives

1. To identifyscale of indicators and criteria of a suitable site for the ecotourism developmentof partial-nature-based wetland;
2. To develop suitability model of partial-nature-based wetland for ecotourismsite;
3. To identify the relationship between spatialexpansions of the partial- nature-based wetland and land use/land cover change after NGFPS.

## 1.6 Significance of the study

At present ecotourism of Sri Lanka is still at the stage of preliminary level. Sri Lanka has failed to capitalize on this, despite the expansion of the ecotourism industry, which has been dramatically grown in the recent years. It is thoroughly identified the present status of ecotourism in Sri Lanka and also it is needed to obtain the applicable experience from the developed countries which are successful practitioners of ecotourism (Bandara, 2009). It has been observed recently in Sri Lanka that more changes are needed in terms of the increase in environmental concern and eco-friendly conservation tools for the development of ecotourism field. In Sri Lanka, negligible research has been conducted in the area of partial nature based wetlands and their potentialities for the development of ecotourism. Thus, this study concerned this

neglected aspect and expected to contribute to identify and develop the partial nature based wetland in Sri Lanka.

The second aspect is empirically observing what has not been previously tested in Sri Lankan context in the profile of ecotourism development. Although, biological theories explain the process of a wetland and behaviour depend on the natural environmental factors (Samarasekara et al., 2013, Chandana, 2012; Jayatissa & Coedam, 2002), this phenomenon of ecotourism development of a partial nature based wetlands still lacks empirical investigation.

This approach is evident in the study of James Butler (2009), which asserted that the environment should be considered with natural and artificial characteristics. Chirgwin and Hughes (2007) suggested that the modified areas like human made wetlands can serve as ecotourism venues if they are well presented and managed aesthetically pleasingly and provide the opportunity to observe more natural things (Chirgwin and Hughes, 1997). In addition to this, related studies have already been done by some researchers, namely; Shutes (2002), On the environmental assessment of man-made wetlands in southern England, Mwaura, (2006) on some aspects of water quality characteristics in small shallow tropical man-made reservoirs in Kenya, Ryan et al.,(2012) on ecotourism in constructed wetlands: post modernity in the modernity of Dubai landscape and Shutes (2001), Hunge et al., (2003) on integrated catchment management of urban man-made lakes and wetlands- in Putrajaya of Malaysia. Therefore, this research examined the partial nature based wetlands and tried to bring out the facts that are more important to develop the ecotourism plan.

### 1.6.1 The importance of study area

Ecotourism can provide foreign exchange and economic rewards for the preservation of natural systems and development of socioeconomic background of coastal wetlands. Wetlands are the ecotourism and recreation sites because of their aesthetic appeal based on the high biodiversity ecosystems in the world. In reality, the developing countries such as Sri Lanka can earn more benefits with a special emphasis on rural areas in the Southern region. It can broadly use resources in a sustainable manner by providing direct financial benefits for conservation and management of wetlands and empowerment of local people.

Kirala Kele wetland area is one of the most appropriate areas which have a concentration on the regional development of the Southern region in Sri Lanka.The total land area is about 4880 hectares (12390 acres) consisted with natural and man-made wetland with a small size of agricultural land and home gardens. Around 40% (5000 acres) of the total land area (12390 acres) was covered with the paddy cultivation before Nilwala Ganga Flood Protection Scheme (NGFPS) in 1983. After implementation of the scheme this land did not have suitable soil and water for agriculture. The cultivated land area was abandoned due to the changes of physical and chemical properties of soil and water. Now, it is becoming a marsh area and converted as a partial-nature-based wetland.

However, this area provides more potential resources for the development of ecotourism. Thus, the area comprises a number of interrelated components, all of which could be managed in sustainable manner. Some areas are becoming an encroachment of the

vegetation for the diversification of biological process; it also receives high levels of rainfall and other water resources when compared to surroundings of the wetland area. Travel network system and traditional cultural activities such as traditional farming, water supply system and cultural events (Dancing, herbal medicine system) also are available in the area. Furthermore, present government provides the valuable feedings for infrastructural development in the area, because the government has a positive vision on the protection of the environment and distribution of economic benefits to a larger cross section of the society. Therefore, Kirala Kele area would be a great socioeconomic and environmental boost for the development of ecotourism in the Southern part of Sri Lanka.

## 1.7 Scope of study

The study aimed to demarcate a suitable site for the ecotourism development in the partial-nature-based wetland using AHP with GIS. Therefore, the study developed the conceptual model with regards to AHP process. The study mainly used qualitative and quantitative mode approach based on survey research and pre-studies. The study also assessed the relationship between factors (Criteria) and indicators that contribute to the suitable site selection in the study area. The research applied remote sensing (RS) and Geographic Information System (GIS) techniques to derive the input layers of Analytic Hierarchy Process. Moreover, the study coverspatial and temporal data of land use, land cover, biodiversity, geomorphology, geology, water resources, transport, network, climatic data, population and settlement data for the analysis of AHP model. Based on the findings of the study, following outcomes are expected.

Due to lack of studies regarding the partial nature-based-wetlands, this study would be a new approach to develop the ecotourism in the man-made wetlands in Sri Lanka. After doing this research following outcomes could be achieved.

- This study can be used to make a proper ecotourism development plan in Kirala Kele wetland under Tourism Development Schemes in Sri Lanka.
- The awareness among the people to provide the contribution for the sustainable wetland management could be increased.
- After implementing a flood controlling scheme in 1983, around 5000 acres of paddy lands surrounding the wetland area had become arable lands and now they host communities and improve their welfare, the people who have lost their agricultural lands can earn more economic benefits as well as the infrastructural facilities by the ecotourism processes of this area.
-

## 1.8 Structure of the thesis

The presentation of the findings and report are organized in the following manner.

The chapter one explains the background of the study, information with problem context, the objectives, significance and importance of the study, the scope of study, the structure of the thesis and limitation of the study. Hence chapter one establishes an overall study background with an emphasis on the existing literature gaps for the proposed study.

The second chapter covers theoretical and applied literature related to this study with four main disciplines. Also this chapter highlights previous research work regarding to

ecotourism and sustainable ecotourism with various profiles in the world. Due to the studies related to ecotourism development in the natural and partially natural wetlands are essential for the feedback of this study, it covers some portions of the literature survey. Furthermore, this chapter explains the analytical process through the Remote Sensing and GIS based data with the Analytic Hierarchy Process (AHP). Finally, literature concerning all the study variables incorporated in the conceptual study framework is included.

The chapter three provides details of the methodology and construct employed. It covers the methodology of the empirical investigation, field work, research design procedure of data collection method, development of instruments and measures and data analysis methods. Moreover, it includes the Analytic Hierarchy Process for the selectionof the most suitable site for the ecotourism development in this area.

Chapter four discusses the details of criteria classification and analysis of factors for the identification of suitable site selection of ecotourism development. Main six criteria were analysed by separate analytical methods. Finally, the data from criteria results were used to analyse the AHP process for the preparation of suitable site map of ecotourism development in the study area.

Chapter five interprets the results from the analysis of the data both descriptive and inferential. Analytic Hierarchy Process used for the main analytical method of the field data and descriptive statistics include analysis of the socioeconomic data. The results of the AHP for the land suitability in the ecotourism development of the study area, analysis and descriptions of criteria and indicators of the main factors, and classification of land use land cover are also discussed in this chapter.

The chapter six summarizes the results together with the discussion of the research findings. It presents the answers to the research objectives and research questions of the study along with the contribution of the study to the practice and theory. The final section of the chapter highlights the conclusion with a summary of the research findings.

## 1.9 Conclusion

This study employs to develop and test a conceptual model that explain the suitable sites for ecotourism development of the partial-nature-based wetland using Analytic Hierarchy Process (AHP) and Geographic Information System (GIS) with main three objectives. The Kirala Kele partial-nature-based wetland is one of the most appropriate destinations with high potentiality for the ecotourism development of the Southern region in Sri Lanka. The studies respect to ecotourism in the partial-nature-based wetland would be a new approach for the regional development in Sri Lanka due to the neglected research area of the Sri Lankan studies.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter discusses the theoretical and empirical literature of the wetland ecotourism. The concept of the ecotourism, definitions and practices in the world and Sri Lanka are explained in the first part since the wetland ecotourism is based on. Secondly, empirical research findings highlighting the analysis of the suitability of ecotourism practices in various parts of the world are described.

## 2.2 Definitions and concepts of ecotourism

Ecotourism is a subset of a broader nature based tourism that includes a community benefit component, an educational component, a sustainability component, and an ethical component (Brondo & Woods, 2007; Buckley, 2003; Cater & Lowman, 1994; Er et al., 2012; D. A. Fennell, 1999; Hawkes & Williams, 1993; Honey, 1999; Kutay, 1989; LU & LI, 2008; Omar, et al., 2014; Orams, 2001; Wight, 1993)The above mentioned idea has been narrowed down by some scholars as, Ecotourism is a subset of natural area tourism and may combine elements of both nature based and adventure travel tourism. Ecotourism involves visiting natural areas with the objectives of learning, studying or participating in activities that do not bring negative effects to the environment; whilst protecting and empowering the local community socially and economically (Cristina, 2004). Ceballos-Lascurain (1987) cited by Clarke (2002) had narrowed down the definition of ecotourism to read as follows; Ecotourism is an environmentally responsible enlightening travel and visitation

to relatively undisturbed natural areas in order to enjoy and appreciate nature (and accompanying cultural features both past and present). Furthermore, that promotes conservation from low visitor impact and provides for beneficially active socio-economic involvement of local populations.

According to Stone & Wall (2004), ecologically sound tourism is the proper definition of ecotourism. They also criticize Ceballos-Lascurain (1987) definition of ecotourism for not addressing the issues of environmental impacts and explains that according to his definition ‘ the traveller could admire and enjoy natural and cultural elements too much that the traveller is moved to collect protected artefacts or disturb nesting birds or simply destroy them through careless disregard’.

In accordance to above definitions, ecotourism is an enlightening, interactive participatory travelling experience of both natural and cultural environments that ensures the sustainable use of an appropriate level of environmental resources, while producing viable economic opportunities for the ecotourism industry and host/local communities, which makes the sound environmental management of the resources beneficial to all tourism role players. Therefore, it is a multi-disciplinary field which comprises a number of interrelated components integrated with the process of natural and cultural environments.

Stone and Wall (2004) defined tourism as a service, which demands a high level of human responsibility involving active contribution towards conservation and/or the improvement of host community welfare (Stone & Wall, 2004). It means the real management and conservation plan of the ecotourism can develop the socioeconomic and infrastructure of the host country. The challenge is in integrating economic gains

with environmental protection, social wellbeing, and cultural sustainable development of the partial nature-based wetland. This means, ecotourism is an environmentally responsible travel and visitation to relatively undisturbed natural area in order to enjoy and appreciate nature that promotes conservation practices from low negative visitor impact and provide for beneficially active socio economic involvement of local populations. This identification was officially adopted by the IUCN during its first World Conservation Congress held in Montreal (Ceballos Lascurain, 1996). Ecotourism as a form of tourism is inspired primarily by the natural history of an area, including its indigenous cultures (Ziffer, 1989). Even, his definition has a special emphasis on nature tourism, partial nature based environment too can be improved by ecotourism activities as well as infrastructural development in any destination (Chaman, 2002; Chris, 2003).It can be implemented in the man-made areas such as anthropogenic wetlands, even the above mentioned society highlighted the ecotourism approach should be implemented in natural areas.International Ecotourism Society approaches ecotourism as a responsible travel to natural areas which conserves the environment and improves the welfare of local people.

Australian Department of Tourism has also asserted their definition emphasizing the naturally based environment. They defined ecotourism as a nature based tourism that involves education and interpretation of the natural environment which is managed to be ecologically sustainable (Sun & Walsh, 1998; Azizan, et al., 2011). The Ecotourism Society (TES) defines ecotourism as a purposeful travel to natural areas to understand the cultural and natural history of the environment, taking care not to alter the integrity of the ecosystem while producingeconomic opportunities that make the conservation of

natural resources financially beneficial to local citizens (TES, 1999). Both IUCN and TES have mentioned that the ecotourism activities can be implemented regarding the natural environment and the man-made areas after excavating some natural resources from the above mentioned sites. On account of the definitions of ecotourism, are based on the nature based environment, to understand the partially natural based environment as a new research gap in literature. Therefore, the focus addressed by this research is the development of a partially nature-based wetland based on the concept of the nature based ecotourism combined with a new research gap.

### 2.3 Trends of Tourism

The World Tourism Organization (WTO) analyzed the definitions of tourism and calculated that three elements are common to all definitions: residing of tourists, geographical setting of tourism and duration of travel. In recent years tourism has seen a dramatic growth, and many countries which had experienced a little tourism previously have been developed as international destinations. Tourists are demanding the experience of new cultures and physical environments,hence indigenous cultures and special physical environments have become the focus of tourism (Poon, 1993). As the peripheries of tourism continue to stretch the social, economic, and environmental impacts of tourism,it has become more dramatic. The World Tourism Organization (2012) highlighted that 217 million international tourist arrivals were reported in Asia and the Pacific region by 2012. The largest tourism industries in terms of 2012 arrivals were concentrated in North East Asia (115.8 million) and South East Asia (77.2million). When compared to these two regions, South Asian countries had low international tourist arrivals in 2012 respectively 12.4 million in total amount of 217 million in Asia

Pacific regions. The annual growth rate of tourist arrivals in south Asia is higher thanobserved in other regions in Asia Pacific. In the event of a total annual growth rate in the Asia Pacific is 5.9%, south Asia led to have a growth rate of 7.2% in 2012.

However, the largest tourism industries in terms of 2012 arrivals were highly promoted to the Eastern Asia such as China (57.58 million), Malaysia (24.71 million), Hongkong (22.32 million) and Thailand (19.10 million) (UNWTO, 2012). At the opposite end of the spectrum, certain south Asian destinations have a very little enhancement compared to east Asian countries. These are some minor ecotourism activities outside of the Himalayas in South Asia (Weaver, 2001). Almost 10% of the world's number one employers contribute to the tourism industry sector. Therefore, international tourist arrivals would be expected to be double in 2020 (1.6 billion) (Theuns, 2002). International tourist arrivals grew by 4.6% to reach 983 million worldwide, from 940 million in 2010. International tourism receipts for 2011 are estimated at US$ 1,030 billion worldwide, up from US$ 928 billion in 2010 (+3.9% in real term), setting new records in most destinations despite economic challenges in many source markets.

Over the past six decades, tourism has experienceda continued expansion and diversification, becoming one of the largest and fastest growing economic sectors in the world. Many new destinations have emerged, challenging the traditional ones in Europe and North America. Despite occasional shocks, international tourist arrivals have shown a virtually uninterrupted growth from 277 million in 1980 to 528 million in 1995, and 983 million in 2011. According to Tourism Towards 2030, UNWTO's recently updated a long term outlook and assessment of future tourism trends. The number of international tourist arrivals worldwide is expected to increase by 3.3% a year on