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Potential of Horton Plains National Park as Geo Tourism Destination: Inventory & Evaluation

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Abstract

Horton Plain is the highest plateau in Sri Lanka with an elevation ranging between 1800m and 2300m. It is situated in the Central Highland of the country which covered 3162 hectares. The main objective of this study is the attempt to identify Geo – Tourism potential and in the Horton Plain National Park. Data collected for this study are from both secondary and primary sources. Secondary data collected through literature, research articles, maps, books, and magazine. The primary data collected from field observation, interview and questionnaires. The Geo tourism potential was evaluated using an assessment methodology with mathematical formulas. Scientific values, additional values and vulnerability were used for the assessment. As a result, Horton plain National Park was identified Geo tourism potential to be based on the final results of the evaluation, it can be concluded that the area of Horton plain National Park possesses high scientific value (ScV 56.48%), moderate additional values (AdV 38.25%) and a high level of vulnerability. Finally, can be concluded study area has great geo diversity which makes it attractive for various types of tourism, including geo-tourism.

Keywords: Horton plain; Plateau; Geo – tourism.

1. Introduction

During the past two decade, tourism in Sri Lanka has experienced an impressive growth. This growth has generally led to creation of additional employment an increased flow of foreign exchange and an improvement of infrastructure in Sri Lanka.

Geo - tourism is defined as tourism that sustains or enhances the distinctive geographical character of a place—its environment, heritage, aesthetics, culture, and the well-being of its residents. Geo - tourists have different profiles with respect to their motivation (Djurovic and Mijovic, 2006) for the visit of a geo-site some are interested in specific fields of the Earth sciences and possess excellent knowledge in these fields while others are motivated by a large socio-cultural or artistic interest. A broader definition has been provided by Hose (1995); Hose (2008) . It is defined as; " The provision of interpretative facilities and services to promote the value and societal benefits geological and geomorphological sites and their materials and to ensure their conservation for the use of students , tourists and other casual recreationalist ." Newsome, Dowling and Newsome (2010) define geo- tourism geo-tourism is a form of natural area tourism that specifically focuses on landscape and geology and their promotion, interpretation and conservation through appreciation and education.

Geo-tourism also represents a good opportunity for the development of sustainable tourism as it is strongly connected to sustainable management principles by balancing economic, ecological and social aspects as an integrated whole (Robinson, 2008).

Sri Lanka has vast natural resources such as monuments, valleys, rivers, natural parks, reservoirs , forest and water falls, which are important destinations for geo tourism . A Horton plain is one of the example place in Sri Lanka. Horton plains was designated a national park on 16th March 1988, having originally been established as a nature reserve on 5th December 1969.

The Horton plans National Park has very rich with numerous cliffs, valleys, fluvial formations, waterfalls etc;. These geo - sites are excellent representatives of this area's geo- diversity. Geo-heritage sites usually include all geological, geomorphological, pedological and distinct archaeological values created during the formation of the Earth's crust (Djurovic and Mijovic, 2006). All of these values are present in the area of Horton plans which makes this territory excellent for the development of geo- tourism in the future. This types of tourism is emerging as a new global phenomenon falls within the category of special interest tourism mainly focused on geology and formation of landscapes (Hose, 1995;2008).

Main objective of this study is the attempt to identify Geo – Tourism potential and in the Horton Plains National Park using the inventory & evaluation method.

1.1. Study Area

The Horton Plains National Park is situated in the central highland of the country and comes under the administrative district of Nuwara Eliya. The study area is located $6^0 47^{'}$ - $6^0 50^{'}$ North latitude and 80^0 $46^{'}$ – 80^0 $51^{'}$

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East longitudes in the Nuwara Eliya One Inch Sheet. The Horton Plains is the highest plateau in Sri Lanka with an elevation ranging between 1800m and 2300m. The geological structure of the bed rock of Horton plains was formed during the Archaean Era (5000 -2500 million years ago) and uplifted during the post - Jurassic times (Premathilaka and Epitawatta, 2001). The bead rock mainly consists of highly metamorphic rocks belonging to the Charnokite – metasedimentary series. The soil of the Horton plains is known as read yellow podzolic soil. The climate of the Horton plains ranges from extreme wet and dry. Horton Plains lies at the eastern extremity of the Wet Zone and experiences a subtropical monsoon climate, with a mean annual temperature of 15oC and mean annual rainfall of 2150 mm. The weather is dominated by persistent cloud cover and strong winds, sometimes gale-force, during the south-west monsoon. The driest months are January and February, when temperatures may reach 27oC. The vegetation is Upper Montane rain forest and Wet Patana Grassland. Upper Montane forest located at the hill slopes and upper slopes and grasslands occur on the lower slopes and in the valleys.

2. Literature Review

There is a death of research and studies on the geo tourism destination of the Horton plains National park. But, various research studies have been done by various researchers. Most of such research discusses biodiversity, geology, climate and landscape in the Horton plains. Premathilaka and Epitawatta (2001) studied the geological history of the Horton Plains. It is this study revealed that the Horton Plains was formed during the Archaen Era (5000 -2500 million years) and uplifted during the post Jurassic times (150 -136 million years ago.

The eco tourism habitats were studied in the Horton plains. ecotourism potential was evaluated in the Horton plains and Kawdulla National park in Sri Lanka. This methodology has been used rating method and finally statistically found ecotourism potential is totally different at Horton plans and Kawduula National Park. This study concludes that there is a significant potential for nature tourism in Sri Lanka.This study provides ecological information , endemic species , water bodies , observation points and micro climatic variation in the Horton plain National Park. The methodology used mapping and field investigation methods.

Karunarathna (2008) studied about eco – tourism and bio diversity conservation in the Horton plain National Park. This study used the interview and exploration method for the collecting of data. Accordingly, 432 visitors were interviewed and it showed that 55% of the total visitors visited the park as nature tourist. In addition this paper also discusses the different eco tourism and its importance in the development of eco tourism in the Horton Plain.

(Wijeyratne, 2000) studied about the endemic birds in Horton Plains National Park . They used field investigation methods including photograph. Pollen and flora were analyzed from sedimentary sequences which revealed the use of slash and burn techniques . It was found that prehistoric man lived in the Horton Plans around C.17.500calyrs BP.

The influence of the Sambhur on grassland and forest vegetation in the HPNP was studied. Two areas such as dominant grassland areas were chosen. This study found that trees with an average height 7m were prone to damage by the Sambhur with 5% of 921 trees dead due to bark damage by the Sambhur.

Manfred (2003) dwelled on the design of a visitors ‘eco-trail’ for nature conservation in the HPNP which was based on components such as climate, endemic species and botanical spices.

3. Methodology

The evaluation geo tourismof assessment methods developed by researchers focused mainly on geomorphosites and their scientific quality, and later additional values Bruschi and Cedrero (2005); Coratza and Giusti (2005); Reynard (2005); (Pereira *et al.* (2007)). This paper focuses on Hadzic model which is introduced by Hadizic *et al.* (2010). This model is based on mainly three indicators such as scientific value (table 1), additional value (table 2) and vulnerability. Scientific value (ScV)areas were included sub indicated such as rareness in relation to integrity, integrity, representativeness of geomorpological processes, diversity of geomorphologcal features, other geomorpological features with heritage values, scientific knowledge, educational interest and rareness at the national level. Additional Values (AdV) areas were included Experience component of a geo- tourism product , connection with the some artistic work, Connection with the some social development of the local community, the possibility to organize some special cultural events, Interpretative value , existence of complementary natural and cultural heritage etc.

Table-1. Sub indicators for Scientific Values (ScV)

Value	Areas	Indicators
Scientific Value (ScV)	Rareness in relation to integrity	Ra
	Integrity	In
	Representativeness of geomorpological processes	Rp
	Diversity of geomorphologcal features	Dv
	Other geomorpological features with heritage values	Ge
	Scientific knowledge	Kn
	Educational Interest	Ed
	Rareness at the national level	Rn

Table-2. Sub indicators for Additional Values

Value	Areas	Indicators
Additional Values (AdV)	Scientific values. Experience component of a geo- tourism product. Connection with the some artistic work. Connection with the some social development of the local community. The possibility to organize some special cultural events. Interpretative value (connected with a "good story") Existence of complementary natural and cultural heritage The quality of management of the geo site Equipment and support services Accessibility Visibility Representativeness for the destination	Scv Ec Ex Dlc In Oce In Com Qu Ess Acc Vi Red

Scientific Value (ScV) and additional values (AdV) calculated using of following formular.

ScV= Im (Ra)x Ra + Im (In) x In + Im (Rp) x Rp + Im (Dv) x Dv + Im (Ge) x Ge + Im (Kn)xKn + Im (Ed) xEd + Im(Rn)x Rn

AdV= Im (Scv)xScv + Im (Ec) xEc + Im (Ex) x Ex + Im (Aw) xAw + Im (Dlc)x Dlc + Im (Oce) xOce +Im (In) xIn +Im (Com) x Com + Im(Qu) x Qu +Im (Ess) xEss + Im (Acc) x Acc + Im(Vi) x Vi.

The importance of every sub indicators (Im) is evaluated by tourists (weight value given by tourist from 0 to 1). That number is multiplied with the value that is given by experts (from 0 to 5) for same indicator. This is done for each sub indicator and afterwards the values are added up and final result is scientific value of geo site. The final result of the tourist evaluation (TE) is obtained by adding up scientific value, additional values, and the vulnerability of geo site.

TE = (ScV+ AdV+ Vu)

Questionnaire was used for evaluation of the geo site of the Horton plan National Park. Questionnaire consisted of 21 questions / sub indicated and each visitor was asked to evaluate the importance of every sub indicator by rating it from zero to one. Total visitors filled out 100 questionnaires on the spot.

4. Result and Findings

4.1. Geo Tourist Evaluation of Horton Plains National Park

According to the Hadizic *et al.* (2010) model, geo -tourism potential was evaluated under the three criteria such as scientific value, additional values and vulnerability of Horton Plain National Park. Evaluation values are presented in following text.

ScV = 1.0 (Ra) x5 + 0.50(In) x3 +1.0 (Rp) x5 + 1.0 (Dv) x 5 + 0.63(Ge) x 4 + 1.0 (Kn) x 5 + 1.0 (Ed) x 5 + 1.0 (Rn) x5 = 32.33

AdV = 1.0(Sw) x 5+1.0(Ec) x 5+0.82(Ex) x 3 +0.31(Aw) x 2 + 0.25(Dlc) x 3 + 0.12 (Oce) x1+ 0.32(In) x 2 + 0.68 (Com) x3 + 0.75 (Qu) x5 +0.03 (Ess) x2 + 0.72 (Acc) x5 + 0.62 (Vi) x 3 +0.70 (Red) x3 = 22.03

Vu = 2

The final result of the evaluation (TE) after adding up scientific value , additional value and vulnerability value.

TE = 32.33 + 22.03 + 2 = 56.36.

Based on the final result of evaluation it can be concluded Horton plan National Park is given High scientific value (57.36%) , moderate additional value (39.62%) and low vulnerability value (3.54%).

Horton Plans National Park is unique in the Sri Lanka and that are the reasons it's received such a high rareness (Ra), diversity of geomorphologcal features (Dv), scientific knowledge (Sn), educational interest (ed) and rareness at the national level (Rn) from expert and visitors. The scenic value is highly rated because of beautiful landscape that are unique to this part of the country and that can be experienced from a number of viewpoints in the study area (section 4.2). Ecological value is highly rated and the reason for this is the rich bio – diversity of the Horton Plains with a large number of endemic flora and fauna species (Section 4.3). This value is helping develop of high scientific knowledge and educational value for the visitors of the study area (Section 4.3). The lowest rated sub indicators are the representatives of the National Park for the Connection with the some social development of the local community, Equipment and support services and connection with the some artistic work etc; Among this the local community is still not very interested in tourism activities and unaware of the great potential of this area hold as a potential geo – tourism destination. Better education and promotion is required among the local community in the order to raise awareness about the potential of this area. This can be done with the help of the local and regional tourism destination.

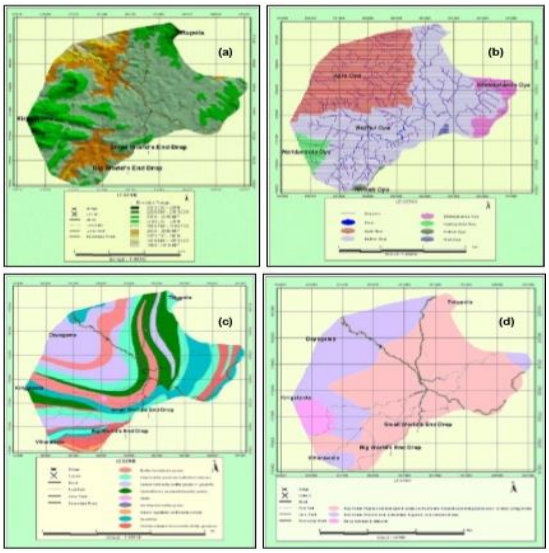
4.2. Geo – Diversity Features of the Horton Plans National Park

Horton plain is a gently undulating plateau at 2,100m lying at the south end of the Central Highlands. It is dominated by Kirigalpota (2,389 m) to the west and Totupolakanda (2,389 m) to the north , respectively second and third highest peaks in Sri Lanka. Tributaries of three major rivers drain the plateau, flowing into the Mahaweli Ganga to the north, the Kaleni Ganga to the west and the Walawe to the south (Figure 1.1b). Horton Plains serves as an important catchment area for these three rivers which have been harnessed for major irrigation and hydropower projects.

The geological structure of Horton Plains is made up of highly crystalline, non-fossiliferous rocks of Precambrian age, belonging to the Highland Series. They are composed of inter-banded metamorphosed sediments and Charnockite gneisses. The meta-sedimentary rocks are metamorphosed equivalents of sedimentary rocks such as shales, sandstones, limestone, sandy clays and calcareous sands (Cooray., 1984) Soils are predominantly Red Yellow Podsols, derived from the feldspar-rich rocks of the Highland Series. A layer of ironstone gravel, 20-30 cm thick, is found below the black organic-rich surface soil.

Big (884m) and Small (274m) world Ends are two of the deepest escarpment of the Horton plains, where left side of the escarpment has the beautiful valley. The escarpment bottom narrows in some places and there is number of rock boulders. Two water falls located at the Horton plains National Park. Namely, Bakers fall and Slab rock fall which are generated from Horton Plains tributaries. Bakers fall is attractive geo sites from local and foreign tourist. The Bakers fall plunges over a wide black rock about 20 m down into a gorge amid Rhododendron and huge fern trees.

Figurer-1. Geo diversity of the Horton Plains National Park showing (a) topography (b) river sub - basins (c) geology (d) soils



Source: DWC, 2006

4.3. Ecological Diversity of the Horton Plans National Park

A Horton plain is home to a wonderful array of plant and animal species, many of which are endemic to Sri Lanka and a few of which are known only from this locality. Thirteen (13) amphibians, five (05) reptiles, thirteen (13) birds and two (02) mammals are endemic to Horton Plains National park of Sri Lanka. Amphibians and reptiles occur at variety of wet land and freshwater bodies. The *Aspiduratrachiprocta*and rat snake (*Pytasmucosus*) common in the Park. But the genus Aspidura is endemic to Sri Lanka which specious are often seen along the OhiyaPattipola road. A high diversity of specious of birds can be seen in the cloud forest and tussock grasslands areas of the Horton Plans. Some of the endemic species that can be seen are namely, Sri Lankan White – eye (*Zosteropsceylonensis)* , Sri Lankan Yellow –eared Bulbul (*phynonotus*) Sri Lanka Wood Pigeon (*Columba torringtoni*), Sri Lanka Dull Blue Flycatcher (*Eumyiassordida*) and Sri Lanka Bush Warbier (*Bradypteruspalliseri*). The Sri Lanka Bush Warbur is commonly seen along the way to Thotupolakanda and in the forest around Bakers fall.

These species are found in Cloud forest, Grass land and other micro environment. Cloud forest is very important on account of its many unique plant species. Although fewer species occur at these higher altitudes due to the colder conditions. Nearly 60% of plant species are endemic, which is comparatively high the overall of endemism of 30% for all indigenous flowering plants in the country. Some endemic flowering plants namely Davul kurudu(*Nelolitseafuscata*) , Ginihota (*Cyathea*) , Buttercup (*Renunculus*) , *Hedyotisneolessertiana*, Ratumihiriya (*Adinandralasiopetala*) ,and Binara (*Exacumtrinervium*).

5. Conclusions

The Horton Plans National Park is attractive for geo –tourism. Geoturistic values are represented by features of the topography, escarpments, valleys and waterfalls. They prove also the high scientific significance of the Horton Plains for geology, geomorphology and other domains. Although , Geo – tourism activities can be developed in this area according to the sustainability through various museum centers, interpretive and educational centers, trails,

guided tours, popular literature, maps and modern media etc. Web-based dynamic maps can be a great educational tool and also an excellent way of promoting a geo - tourism destination. The use of these maps can very effectively contribute to the marketing of Horton Plans National Park in the future. Finally, can be concluded study area has great geo diversity which makes it attractive for sightseeing, ecotourism and geo-tourism.

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