



Appraising the Ecotourism Potentials of the Knuckles forest Reserve to Preserve its Sustainability

Fareena Ruzaik

Abstract

Ecotourism is nature-based visits with the anticipation of enjoying natural attractions, learning, education, environmental protection and maintaining sustainability. The Knuckles Mountain Range was acknowledged as a 'world's heritage', considering its historical value, geological and geomorphological features, ecological diversity and richness of biodiversity within the area of 160-170 km². This study was carried out with the objective of assessing its existing potentials to promote ecotourism, while preserving its sustainability. Both primary and secondary data sources have been used for this study, following the quantitative and qualitative approaches and applied a purposive sampling mechanism to identify the forest plot for this study and convenient sampling method for interviewing visitors. The computer software was used to process the coded data and accommodated traditional statistical tools to analyze the same. The results revealed that the existing potential for ecotourism development in the area was under-utilized and 90% of the identified challenges, such as deforestation, solid waste disposal (plastics and polythene) and clearing forest area for cardamom/ginger cultivation etc., have been observed at an extensive level, which are due to the human activities. According to the surveyed, 70% at Pitawalpatana, 65% at Maningala and 75% at Ilukkumbura disclosed that the said area was a very attractive and interesting place for nature lovers. The local visitor expresses that 70% of them are satisfied with nature-based attractions in the forest, 56% desire to visit to the Knuckles again, 42% has a moderate desire to visit again, 8% states that they do not like to visit again and 49% states that they have visited Knuckles more than one time. It is recommended to formulate an integrated forest management system to mitigate and manage challenges and to promote ecotourism in the Knuckles area in a sustainable manner with the collaboration of reverent stakeholders.

Keywords: Ecotourism, Sustainability, Biodiversity, Knuckles Mountain Range, Deforestation and Stakeholders

Department of
Geography,
University of Colombo

fareena@geo.cmb.ac.lk

 <https://orcid.org/0000-0002-2845-0105>



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Original Article

INTRODUCTION

The Knuckles Mountain Range is one of the major ecotourism venues of Sri Lanka and these capacities can be used for regional development towards environmental sustainability. The Knuckles Mountain range has the highest ecological, topographical and cultural value and these values and potentials can be identified with several categories such as ecological, topographical, climatologically, hydrological and cultural potentials. Knuckles is one of the most important biodiversity hotspots with a range of mountains and great water and wildlife resource. Therefore, this range has been declared as conservation forest and the area above 1500m also been declared as climatic reservoir by the central environment authority of Sri Lanka (Wickramasinghe, 2009). A remarkable feature of this area is that most of the climate conditions of Sri Lanka can be found within the extent of a mountain range. All these hanging climate conditions can be experienced within half of hour walk through this valley. The location of these hills, the particular effect of the monsoons, and the wind factor generate certain climate diversity to the area. This climatic condition has been a pulling/attractive factor for both local and foreign tourists. Also, the Knuckles Mountain range is very important due to its historical value and therefore it also can be identified as one of the valuable heritages for tourists in Sri Lanka. Therefore, relevant stakeholders

should promote ecotourism in the Knuckles area considering the valuable potential (SLTDA, 2019).

The tourism industry was badly affected by the Covid situation, economic crisis and political instability, which was occurred one after another during the period from 2020 to 2022. Hence, the economic growth rate was recorded as -3.6% in 2020 and +3.66% (CBSL, 2021). Total tourist arrivals were 195,000 in 2021 compared to 540,000 in 2020. It was 1.9 million in 2019. No tourist arrivals were reported for the period from April-November 2020 (SLTDA, 2021). The major reasons behind this were the negative situation of the COVID-19 outbreak and subsequent multifarious restrictions (lockdown, curfew, travel restriction, closure of Airport, import trade restrictions etc.) imposed by the Sri Lankan Government to ensure safety of the citizens and economy of the country. The economic crisis with fuel scarcity has induced negative impacts on the tourism industry in a large scale.

This situation would have been managed in middle level, if Sri Lanka had a contingency plan or policy for tourism and tourism development. Hence, it is a wise strategy to promote eco-tourism as a tool to attract both domestic and international tourists for the tourism sector development in Sri Lanka during the 2020/2022 period, while achieving multiple benefits; such as financial, the protection of nature, benefiting local communities, providing training and learning



Original Article

opportunities on nature/environment, enhancing job creation, saving non-renewable resources and the protection of the environment and cultural heritage etc., where Knuckle has all these potentials. Accordingly, the objectives of this study are to identify the existing challenges and potentials to develop ecotourism in the Knuckles forest area and to provide applicable recommendations to promote ecotourism to maintain its sustainability.

RESEARCH PROBLEM

Tourism is directly interconnected with tourists' perceptions and mindset. Any internal or external factors could influence the fate of this industry. Hence, it is more essential to extend more research to identify potentials of multiple ecotourism destinations available in Sri Lanka and recommend applicable strategies as a tool for the fast recovery and contingency, which will minimize the negative economic impact in any disaster situation such as COVID or recent financial crisis. The ecotourism is mostly demanded sector by both domestic and international tourists, which has a minimum impact to the natural environment. Hence, the research problem of this study is to assess the ecotourism potentials of Knuckles forest reserve and the result of which can also be applied for other identified biodiversity hotspots in Sri Lanka.

METHODOLOGY

The field study was designed to collect data by way of questionnaire survey, observations and direct interview with tourists. Both qualitative and quantitative approaches have been followed for collecting data. The three prominent entry points (3/9), viz., Pitawalapatana, Maningala and Illukkumbura-Kosgawala were incorporated for this study, following the purposive sampling method; considering the size of this research, easy accesses (more than 60% tourists used these entrances) and convenience of meeting tourists for gathering data. Out of 430 visitors, who have visited to the Knuckles forest *via*, above three entry points according to forest officials records of the particular day of field study; 10% of questionnaires, amounting to 43 were filled, following the convenient sampling methods in the year 2018. The sample size-10% was decided considering the time factor, size of this research and tourist's willingness to spend time with Research Assistants. The observations were carried out to collect primary data, using the structured record sheets. The secondary data from the respective Grama Niladhari, the Divisional Secretariat Division and the public domain have also been used for this study. All collected data were coded and tabulated, according to the objective of the study and MS-Office computer software was used to process and analyze the collected data.



Original Article

Ecotourism

The concept of ecotourism was very first exhibited by Hector Ceballos-Lascurain in 1983, who is an architect, environmentalist and ecotourism consultant from Mexico (Planeta). Accordingly, "Ecotourism is, environmentally responsible visit to relatively undisturbed natural areas to enjoy and appreciate nature (and any accompanying cultural features-both past and present) that promotes conservation, has low negative visitor impact and provides for beneficially active socio-economic involvement of local populations" (Ceballos, 2005). Further, Ecotourism is usually defined as "responsible visit to natural areas that conserve the environmental states and improve the welfare of the local people" (Lindberg et.al, 1997).

Above original concept of Hector Ceballos has been brought to the world's attention in 1987 with the introduction of the Brundtland Report on "our common future". The United Nations World Tourist Organization UNWTO (2002) was involved in the field of ecotourism in the early 1990s, provided with required guidelines and subsequently organized a conference in the name of "world summit on ecotourism" in 2002, declaring-said year as "international year of ecotourism". Further, UNWTO (2002) has defined eco-tourism as all-nature-based forms of tourism, in which the main motivation and appreciation of nature, as well as the traditional

culture, prevailing in the natural forest areas. Thereafter, the term ecotourism is known with multiple terms, such as green tourism, nature tourism, environmental tourism, scientific tourism, rural tourism, cultural tourism, wildlife-related tourism and sustainable tourism *etc.* Filion, et al, (1994) said, "Ecotourism is travel to enjoy and appreciate nature". All these terms have emphasized that the management of all resources of the forest should be carried out, safeguarding socio-economic, aesthetic and cultural values without compromising the ecological processes or biological diversity of the area. Ecotourism is a different experience that can be achieved with a high level of tourist satisfaction and to ensure discipline, among the tourists towards nature, providing multifarious benefits to the community and environment in a sustainable manner.

There are seven principles in identifying ecotourism services and facilities as per UNEP-2002 (Wood, 2002). Accordingly, Conservation of biological diversity and cultural diversity, through ecosystems protection; sustain the health and well-being of local people; includes an interpretation/learning experience – environmental and cultural knowledge; involves responsible action on the part of tourists and the tourism industry; it served primarily by small-scale businesses; minimizes to the lowest possible level the consumption of non-renewable resources; stresses



Original Article

local participation, ownership and business opportunities, particularly to rural people.

Ecotourism is widely recognized as a means to derive economic benefits from natural forest resources without compromising nature. Hence, it lies in the sustainable development framework, since it aims to achieve social and environmental goals in addition to economic goals. In practice, the success of ecotourism depends on the extent to which the ecotourism principles are translated from concept to reality in its concept formulation, planning, design, development, operation and marketing of the ecotourism products and to receive real benefits (Muller, 2000).

The location of Sri Lanka naturally carries above ecotourism criteria and potentials, which were still not utilized fully for tourism development. Knuckles is one of the identified biodiversity hotspots with less modern facilities in terms of ecotourism services. This study shall provide a background to fill the gap of providing and improving ecotourism services in the Knuckles forest area, taking into consideration entrainments and safety of the tourists.

Existing Potentials for Ecotourism in Sri Lanka

Sri Lanka's geographical location, climates richness, rich forest cover, fauna and flora diversity, endemic cultural values provide huge potential

and prospects for the development of ecotourism (WTO, 2013). In the world, there are 36 biodiversity hotspots were recognized with more than 1,500 endemic species and remarkable nature-based advantages for the development of ecotourism and out of which approximately 2 billion people were, directly and indirectly, connected to forest-centered activities (Wickramasinghe, 2009). Sri Lanka is considered as one of them. However, ecotourism in Sri Lanka is still not being popularized among both domestic and international tourists due to the lack of promotional campaign and availability of proper information in virtual domains. Mostly, the tourists in the current scenario prefer to feel the difference between mass tourism and ecotourism. Understanding the pattern of the global mass-tourism and ecotourism market, there are possibilities of promoting this concept to achieve multiple benefits simultaneously. According to the Annual Statistical Report of SLTDA (2019); out of total tourist arrivals (1.9 million tourists), 348,883 tourists visited to island-wide eco-based tourist destinations, including Knuckles forest reserve. The Knuckles generated LKR 130.50 million (20.1%) out of the total income of LKR 646.36 million in 2019. Accordingly, Sri Lanka holds an enormous diversity in its forest resources with rich in species diversity, high degree of endemism and genetic diversity (WTO, 2013). Hence the resources point of view, Sri Lanka carries a unique natural benefit for



Original Article

with series of folds and range of mountain (majorly 5 peaks) at higher elevations and spread of cloud forests cover *etc.* The morphological, biological and hydrological values of the Knuckles Range have been recognized since 1873 even prior to that, during colonial periods and it was declared a section of the Knuckles region above 1,500 m height as a "climatic reserve" (Suraj, et al, 2006).

In 1985, the Knuckles Range was considered as a large natural forest area with a unique ecosystem, which to be conserved as per the cabinet paper approved by the government of Sri Lanka at that time. In 1994, as a follow-up of the said initiative, the government developed a more comprehensive management plan for the Knuckles Range in consultation with various stakeholders, including state agencies, local communities, Non-Government Organizations and community-based organizations *etc.* (Silva, 2004). The forest department declared Knuckles as a "conservation zone" in the year 2000 with the aim of assuring the sustainability of the forest. In 2002, as envisaged in the management plan, the Knuckles Range was surveyed, demarcated and declared as a "Conservation Forest" under the Forest Ordinance (Badenoch, 2008). In 2010, this forest reserve was declared as a conservation area, naming as 'Knuckles National Heritage and Wilderness (KNHW) area' by UNESCO and titled this forest as 'World Heritage Site' in 2010. Many

significant activities prescribed in the management plan focus on providing alternative income-generating activities to the communities and restoring degraded forests. Key pillars in the development strategy focus on strengthening community groups. Activities include training and support in procuring materials for new livelihoods (Silva, 2004). The management plan outlines a programme for assisting local people in obtaining credit, training in micro-credit management and establishing mechanisms to coordinate production and marketing (Forest Department, 2017). As a result of this in 2019, the domestic tourist 78,263 and international tourists 1,964, total amounting to 80,227 (23% of total forest-based tourists) tourists visited Knuckles and the total income generation was LKR 2.665 million (2% of total forest-based income) (SLTDA, 2019).

Existing Eco-Tourism Potentials of the Knuckles Area

The Knuckles forest reserve has multiple potentials, in terms of its biological richness, location, geographical features, economic activities of surrounding dwellers and their cultural values; which provides more opportunities for visitors to experience and to learn about the importance of nature, while generating benefits to both the community and environment simultaneously. Ecotourism, as an ancillary product of



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Tourism, the existing nature of the Knuckles forest reserve could be used as a tool to transform its potential into eco-friendly economic activities. This idea was first emphasized as a product development strategy in the Tourism Sector Master Plan-1995 of Sri Lanka. Although the knuckles have multiple potentials, the ecotourism in the Knuckles forest Range is still not well developed in an organized manner. Hence, it is suggested to understand and apply ecotourism principles and translate from concept to practice in planning, design, development, operations and marketing of ecotourism as a product. The prevalent local Ayurvedic health treatment mechanism, together with the highest ecological, topographical, climatologically, hydrological and cultural potentials could be utilized to promote ecotourism among the local and international visitors. Below are the identified ecotourism potentials and amenities that are available with the Knuckles forest reserve.

Richness of biodiversity: Sri Lanka has an enormous diversity in its forest resources. Knuckles is most important biodiversity hotspot among them with rich biodiversity, mountain peaks, crystal clear and perennial waterways, cloud forests, exquisite fauna and flora, inspiring aesthetics beauty, attractive scenery with great history and scientific values, natural bridges within the land area of 170 km² to promote ecotourism in Sri Lanka. Gunatilleke and Gunatilleke, (1990) recognized 15

floristic regions in Sri Lanka and each of these has dominant plant communities. The Knuckles forest belongs to the 12th floristic region with unique vegetation types. According to Rosayro (1958), the vegetation types of the Knuckles region were categorized as lowland tropical wet semi-evergreen forests, Sub-Montana tropical wet semi-evergreen forests, and Montana tropical wet evergreen forests.

Flora diversity: The Knuckle Forest Reserve has recorded approximately 1041 plant species, belonging to 141 families; of which 15% (160 species) are endemic, 290 woody plant species and 10-15% species nationally under threats. The range of landscape and climatic features present in the Knuckles supports a variety of natural vegetation types: montane forests, sub-montane forests, lowland semi-evergreen forests, riverine forests, rock-outcrop forests, savannah, patana grasslands, and scrublands (De Rosyro, 1958). All these potentials can be observed and experienced by a tourist within a shorter distance of time and the different climatic conditions can be felt in a 3 to 4 hours walk through the forest, due to the presence of many vegetation types. Frequent change of climate within a very short period of time is also a very interesting experience one can entertain in this area. Further, the existing vegetation types have become an attractive source of nectar and pollen particularly for bees that may play an important role in



Original Article

the maintenance of the flora through pollination.

Faunal diversity: Knuckles-the faunal diversity can be categorized as 200 bird's species (15-20 endemic), 31 mammal species, 60 butterflies' varieties, 17 mollusks, 20 amphibians (12-endemic), 53 different reptile species (23-endemic), 262 species of vertebrates (69-endemic) and 25 fish species (8- endemics). Further, an average of around 50% of species in each are nationally endangered. In addition, sambhur, barking deer, mouse deer, wild boar, giant squirrel and the slender loris, monkey can be seen. Knuckles range is home for not less than 200 birds' species and approximately 15-20 species are endemic to Sri Lanka, such as spot wing thrush, Sri Lankan blue magpie, jungle fowl, yellow-fronted barbet, small barbet, Sri Lankan warbler, white-faced starling, Sri Lanka white-eye etc. (Badenoch, 2008). The International Union for Conservation of Nature (IUCN-2007) states that the Knuckles Range should be saved to prevent the extinction of the species.

Nature trails: Approximately 09 nature trails are available to access the Knuckles forest reserve, in addition to the access road. Some of them are damaged and unable to use for vehicles, which should be rehabilitated for better use (Suraj, et al, 2006).

Climatic conditions: Diversified climatic conditions of Sri Lanka can be

found within the extent of this mountain range since it is located within the range of monsoons rainfalls (both southwest and northeast) areas and wind direction and existence of more characteristics of all the key ecological zones in Sri Lanka. All these changing climate conditions can be experienced throughout this forest. Average annual rainfall lies between 4000-5000mm, and the temperature of the region range between 5.5 degrees and 35 degrees Celsius. The average wind speed has been measured at approximately 7.2km/hour and humidity in the range lies between 57-90%. In fact, in these hills, one can find characteristics of all the key ecological zones found in the country (Silva, D.C. (2004).

Water Resources: Knuckles Mountain range, as a richer of the upper watersheds in the country, originates more than 500 streams; many of which are drained into the Mahaweli River system from multiple directions. A few major such streams are Maha Oya, Hulu Ganga, Heen Ganga and Kalu Ganga (Silva, 2004). The Knuckles catchments area contributes about 30% of water to the three reservoirs, namely Victoria, Randenigala and Rantambe (Bambaradeniya & Ekanayake, 2003). Further, there are a number of breathtaking waterfalls (Mini Sera Ella, Kandi Ella, Naththinda Ella, Pathana Ella, Vedda Peni Ella, Wambatuheena Ella and Banbarakiri Ella) and small rivers, which can be found in this area. There



Original Article

is no other valley of this nature to be seen in the island.

Physical background: Knuckles Mountain Range geologically part of the central highlands, which has series of recumbent folds and peaks in the west of the massif, which resembles the knuckles of clenched (De Rosayro 1958). There are nine peaks over 1200 meters (4000 Ft) in Knuckles Range. The highest peak, "Gombaniya" is 1906 meters (6248 Ft) and Lunumadalla with 1060m (3,475 Ft) is the lowest peak. The topographic variation highly influences to climatic variation in the Knuckles region. Knuckles massif is separated from the Central Highlands by a deeply incised valley referred to as the Dumbara Valley. It bears the pride of 35 peaks above 900m from mean sea level and 2 peaks over 1900m. Pitawala Pathana and Mini World's End Pitawala Pathana/Plain is the unique grassland found in the Knuckles conservation forest. This "Pathana" has a great ecological value and really eye-catching.

Agriculture: The communities living around the Knuckles Range are dependent on the forest areas for obtaining multiple agricultural yields. Approximately 1,880 ha. of the land area was dedicated for shifting cultivation (Chena), cardamom, tea (40-50 plantations) and paddy in the lowest area is available around the forest. Accordingly, an area of 2,700 ha. of cardamom are planted within and around the Knuckles forest. This 35% of

total cardamom production in the country; obtaining timber, fuelwood collection and harvesting of non-timber forest products from an area of 1,880 ha; dwellers produce the "Toddy" (a local alcoholic beverage) from flowers of the Kitul palm and Jaggery (De Rosayro, 1958).

Challenges for Ecotourism in the Knuckles forest Area

The Knuckles Mountain Range could be transformed into internationally recognized ecotourism destination by maximum use of its each and every potential viz. historical value, rich biodiversity and other amenities for ecotourism-quality mountain peaks, crystal clear and perennial waterways, cloud forests, exquisite fauna and flora and a veritable treasure house of cultural heritage *etc.* However, it was observed that such resources were still under-utilized to yield maximum economic benefits, due to many constraints in the context of transportation, easy access/nature trails, infrastructures, financials, proper management *etc.* Further, there are more areas with forest patches, which have not been properly managed in order to get tourism attraction and provide maximum satisfaction to the tourists and also to minimize environmental threats to the nature/ecosystem of the forest. In addition, both general public and tourists failed to understand their bonafide responsibilities towards this historic heritage. Some of the private



Original Article

ecotourism operators use the “Ecotourism” label, without complying with laid down processes and true ecotourism principles in practice (Wickramasinghe, 2009). At present, there are lack of guidelines, standards, or certification mechanisms developed and community involvement for ecotourism products and related services. In addition, attracting genuine eco-tourists both domestic and international is a challenging exercise to maintain least disruption to the natural and socio-cultural environment.

The summary of challenges, related to the ecotourism development in the Knuckles area are appended below.

- **Loss of biodiversity:** 90% of the biodiversity loss have been taken place, due to human interventions, especially deforestation and extensive cardamom, pepper and ginger cultivation.
- **Forest fire:** Two acres of the Gal Oya reserve and 5 acres of Kalawalaragama have been destroyed in the past, due to the forest fire.
- **Environmental pollution:** Deforestation, cutting trees for fuel wood, encroachments, solid waste disposal (majorly plastics and polythene) *etc.* were observed.
- **Dwellers around the forest:** Population increase around the forest boundary has become a threat to the forest habitats. Dwellers (55%) around it invest and utilize the forest products in an inappropriate manner, creating multifarious threats to the biodiversity of the forest area.
- **Insufficient infrastructures:** Accommodations, transportations, nature trails, lodging, safety measures of tourist with proper guidance *etc.*, should be rehabilitated and further developed.
- **Improper maintenance of nature trails:** The existing trails are not in a good condition. Out of 09 nature trails, 03 trails *viz.* Pitawalapatana, Ellukkumbura and Kahagala are having slightly easy access to the forest.
- **Forest management:** The requirements of a regularized forest management process are required to manage the Knuckles and for its administrative and operational works; Natural impacts: Forest fire, climate change, biological disasters *etc.*.
- **Financials:** Financial constraints to develop its infrastructures; Participation: Lack of community participation, due to insufficient training, awareness, and language barriers.

The study revealed that nature-oriented tourism has a substantial demand, especially among the youth in Sri Lanka. Team-wise, group-wise and institutional visitors have been observed during the survey. They dispose of plastic and shopping bags to the forest environment haphazardly, which will have a negative impact to



Original Article

the fauna and flora, must be disciplined in terms of environmental conservation, through education and awareness. Approximately, 90% of the identified challenges have been taken place due to human interventions. 55% of the Surrounding dwellers utilize forest products and land area for personnel benefits and to cultivate majorly cardamom and ginger. According to the SLTDA (2019), the total number of tourists, who visited the Knuckles forest was approximately 80,227, out of which 78,263 were domestic visitors and 1,964-international and total income generation was LKR 2.665 million (2% of total forest-based income). This shows a requirement of promoting forest-based tourism in the international market to generate more income and maintain the suitability of the forest reserve. According to the study, it was observed 09 nature trails to access the forest, which should be facilitated with infrastructures to ensure the safety and convenience of visitors. According to Vidanage et.al (1995) revealed that 52% of the nature-based tourists are not willing to re-enjoy ecotourism due to the lack of facilities, including eco-based tourism guidance and information. Hence, this study suggested to identify the visitors' perceptions (watching fauna varieties, nature-based activities, research & education, adventures *etc.*) and provide facilities accordingly.

Below result extracted by interweaving Visitors with regard to the sample study areas.

Patawalapatana is situated in between 37 and 38 km posts of posts of Matale-Laggala road. This is a plain area and elevation is in-between 800 and 900m. This is an excellent viewpoint in Knuckles. In the Northeastern side there is a cliff of around 100m. From this side many areas of northern and Eastern Sri Lanka, including tanks in Polonnaruwa area can be observed. Out of the 43 visitors surveyed, 93% have visited this place to enjoy nature and 70% of revealed that said area is very interesting place.

Maningala is also a good viewpoint and many place of the Knuckles area, such as Lakegala, Baambaragala, Ginikeliyawa patana, and Pituwalapatana, Kalupahana and villages such as Ranninda, Elanwela, Illukkumbura can be seen from Maningala. The view of the Polonnaruwa and Giritale areas is very beautiful seen. Out of the 43 visitors surveyed, 59% have visited to Manigala and out of which, 65% mentioned that the Manigala is very interesting place.

Ilukkumbura-Kosgawela trial area consists of thick humid semi-evergreen forests. Many huge trees, big caves, many birds, abandoned water bodies, small mammals, reptiles, and signs of big mammals can be seen in this area. There is a trail of around 3 km to see this area starting from Illukkumbura conservation center and ends at



Original Article

Matale- Laggala road. This trail does not need much trekking. Out of the 43 visitors surveyed, 65% have visited to Illukkumbura and enjoyed its nature; out of which, 75% mentioned that this area is a very interesting place.

The overall perspective of the local visitor surveyed during the study shows that 70% of visitors are satisfied with nature-based attractions in the forest and 56% of the sample has a strong desire to visit to the Knuckles again, 42% has a moderate desire to visit again and 8% states that they do not like to visit again. In the same, about 49% visitors have visited Knuckles more than one time, which clearly indicates the high value of the attractions available in the area. The visitors are visiting to the Knuckles without any proper plan, due to the lack of information, available in the public system, hence, it is required to make available more information about the Knuckles in the public domain to the public to access. Out of 43 visitors surveyed, 72% has got information from friends and 39% has from Brochures and Leaflets of Forest Department as depicted in the below table-1.

Table-1: Sources of information to know about the Knuckles

Sources	Number	%
Friends	31	72
Mass Media	9	20
Forest Dept.- Leaflets	17	39
Teachers	3	6
Others	4	9

Source: Field survey, 2018

The above facts and study observations clearly show the necessity of improving the infrastructures in the Knuckles area to develop ecotourism such as; Develop new nature trails and improve existing trails for walking with sign boards, Develop Road facilities and other access, Develop and improve trails for mountain trekking, Facilities for bird watching; Facilities for camping, Facilities for accommodation, Good interpretation service, Expand the access public to retrieve the information on Knuckles from public domain etc.

CONCLUSION AND IMPLICATIONS

Eco-tourism is a worldwide fast-growing sector at present, since the international tourists and more percentage of youth show immense interest on this. It is an ideal tool for transforming the existing potentials of the Knuckle forest Reserve into economic yield and environmental conservation with the participation of the local community. This will assist the national tourism industry being a byproduct. Knuckles consisted with an enormous potential and prospects for the development of ecotourism, which can be converted into forest-based ecotourism to attract visitors' foremost attention. Meantime, this concept with adequate details should be promoted, ensuring safety and available facilities at an affordable price as appropriate manner. Transformation of participating local community into



Original Article

ecological-based tourism could be benefited to the community, environment and visitors as well, towards its sustainability. The majority of the visitors are local tourists, who come in small groups. These visitors expect an improvement of infrastructure and strengthening of the institutional capacity to enable the environment of local people to interpret the ecological and social heritage. The most important issues that should be taken into consideration in promoting tourism in Knuckles are strengthening the institutional capacities of relevant stakeholders, developments of infrastructure in the area, publicize Knuckles range in the media and encourage villagers to participate in eco-tourism activities. These alternative benefits will help the peripheral community to sustain their livelihoods, forest resource management and help social, economic and environmental sustainability in the Knuckles area. Further, this study found that the actual meaning of this concept is not being maintained by the related stakeholders (especially by local visitors) and their main motive is to generate economic benefits in the context of ecotourism development in the Knuckles forest range. The author has observed that all laid down criteria, principles and standards as stated above are not actually followed in the process of eco-tourism planning, implementation, development and operations by the respective stakeholders. Hence, it is required to regulate a proper mechanism to

maintain discipline, among visitors and other stakeholders to achieve the actual meaning/objective of this concept and to establish a monitoring authority to audit such requirements and to protect its environment together with all existing potentials with it.

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Original Article

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