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TOURISM CARRYING CAPACITY, A COMPLEMENT FOR THE MANAGEMENT IN THE CUYABENO WILDLIFE RESERVE, ECUADOR

Carlos Mestanza Ramón[*1], Hilter Figueroa Saavedra [1], Angel Cunalata García[1], Jorge Rentería Regalado[1], Marco Vizuete Montero[2] & Aurora Ariza Velasco[1]

[1]Escuela Superior Politécnica de Chimborazo, Extensión Norte Amazónica, Facultad de Recursos Naturales, Puerto Francisco de Orellana, Orellana 51002, Ecuador;

[2]Universidad de Antioquia, Facultad de Ciencias Agrarias, Doctorado en Agroecología, Apartado Aéreo 1226, Medellin, Colombia

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ABSTRACT

Carrying capacity has emerged as an important parameter to consider when developing a series of effective management tools for natural protected areas such that the experience of the average tourist remains satisfactory when exerting an "acceptable" or minimum impact to the protected area. The Cuyabeno Fauna Production Reserve (CFPR), one of the 56 protected areas of Ecuador. This is considered a good strategic place for hosting unique and representative ecosystems of the Amazon region. It is located in the provinces of Orellana and Sucumbios. This current research study determined the Tourist Carrying Capacity in the reserve´s publicly used paths, which will provide a management tool for managers to avoid environmental actions that could threaten conservation and sustainability. The Physical, Real and Effective Carrying Capacity was determined. In the determination of the Real Carrying Capacity (RCC), six factors of correction were considered: social, accessibility, erodibility, water logging, vegetation and wildlife. In the process of determining the Effective Carrying Capacity (ECC), the managers´ Capacity Management (CM) were considered. It was also determined that the saturation of the carrying capacity exists on the trails in the high season. The implementation of the local carrying capacity had lead not only to maintain the balanced use of resources at reserve but furthermore, combined with a other programs, to promote projects such as trail restoration, enhancing the relevance of the application of carrying capacity for the sustainable use of the areas of public use of the reserve.

KEYWORDS: Petroleum services, work performance, company MKP, psychosocial risk factors.

1. INTRODUCTION

The excessive number of tourists to natural sites has been reported to cause physical damage, pollution, loss and degradation of landscape, open space and agricultural lands to tourism development, destruction of flora and fauna, degradation of landscape, water shortages, introduction of exotic species, and disruption of wildlife cycles and behaviors. In most of the natural sites, their physical and environmental characteristics possess limits to the number of visitors using the site simultaneously without inducing impacts, or in other words alter the carrying capacity [1,2].

In 1981, the World Tourism Organization (WTO) proposed a definition of tourist carrying capacity as: “The maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic, socio-cultural environment and an unacceptable decrease in the quality of visitors' satisfaction” [3]. Consequently, the concept of carrying capacity that covers all these aspects is often used to develop sustainable tourism in order to protect the destination physically, socially, culturally and ecologically. In addition, tourism carrying capacity studies are used to design and implement strategies and actions for conservation, mitigation and adaptation of tourism in a Protected Natural Area (SegradoPavón et al., 2015), even if the definition of “limits” is a controversial subject and requires the integration of natural, social, and economic aspects to obtain a systemic understanding of the locations. Furthermore, the long-term objectives for the conservation of Protected Areas can be complex and must assume that the preservation of a site should not be in conflict with the right of access by users (tourists, residents, environmentalists and researchers) and with

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the quality of visitors' experiences. Therefore, models creating short- and medium-term simulations are important tool in the decision-making process regarding land and resources management [4].

The intensive use of ecosystems can generate a reduction in the provision of benefits that ecosystems provide, a higher probability of non-linear risks,and an increase in poverty and inequality. One of the conservation strategies applied throughout the world is the establishment of Natural Protected Areas. The use of natural resources is planned and managed to achieve specific objectives for conservation, such as populations of wild species, habitat, natural landscape or various aspects of the biocultural heritage. Worldwide, a total of 217,155 protected areas have been established, covering 14.7% of the land surface and 4.12% of the total marine area on the planet [5,6]. Tourism can be a threat or an ally for the conservation of Protected Areas, depending on their compatibility with conservation objectives, and can be determined through management planning. Tourism is one of the most important economic and social phenomena of the 21st century, characterized by a rapid expansion of the industry and by the growing tendency of tourists to visit new destinations [7,8]. According to the World Tourism Organization (WTO), 25 million tourists traveled internationally in 1950, compared to 674 million tourists in 2000 and 1186 million in 2015. The economic resources generated by tourism also increased, from 2000 million in 1950 to 495,000 million in 2000 and 1,260,000 million in 2015. In countries that emit large numbers of tourists, such as European and North American countries, there is a tendency to look for adventure tourism and visit "authentic sites" [8,9].

For this reason, Asia, Africa and Latin America, continents with great natural heritage, have become tourist centers of the world. Protected areas around the world receive almost eight million visitors a year, which generates revenues of up to 600 million dollars per year in recipient countries. Tourism in protected areas must be framed within the principles of sustainability and must contribute to achieving conservation objectives. Given that biodiversity is one of the main attractions of ecotourism, there is an urgent need for tools to prevent the negative environmental impacts of activities related to tourism. In addition, to ensure that ecotourism can contribute to the long-term conservation objectives of protected areas, tourism activities should be monitored, evaluated and properly managed [10,11].

The objective of the study that led to this document was to provide a management tool by applying the tourism carrying capacity in the Cuyabeno Wildlife Reserve, Ecuador.

2. MATERIALS AND METHODS

Study area

The Cuyabeno Wildlife Reserve (Spanish: Reserva de ProducciónFaunística Cuyabeno), is one of the most important protected areas in Ecuador. It is located in the northeast of the country, in the Putumayo Canton in the Sucumbíos Province and in the Aguarico Canton in the Orellana Province. It has a 603,380 ha lowland tropical rainforest in the Amazon region of Ecuador with some of the highest biodiversity on earth. The altitudinal that goes from 200 to 280 above sea level. The average rainfall is 3000 mm / year. The average annual temperature is 24ºC. In the RPFC inhabit the indigenous nationalities Siona, Secoya, Cofán, Kichwa and Shuar. The Cuyabeno Wildlife Reserve is an important nature reserve in Amazonia with rather unusual ecological characteristics. Located at the foothills of the Andes, it is different from any other Amazon protected area in the world [12,13].

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Fig. 1. Wildlife Reserve the Cuyabeno location map [9].

The Cuyabeno Wildlife Reserve is one of the most important protected areas in Ecuador, with almost 600 000 ha comprising about 12% of Ecuador's protected land. Located in the northeastern portion of the Ecuadorian Amazon, the Reserve embodies an extraordinary degree of biological richness. The Reserve is also home to several indigenous communities: Siona, Secoya, Cofán, Quichua, and Shuar that all have different histories of migration to the area and different degrees of acculturation and market. These indigenous communities have strong links to the resources and ecosystem services of the Reserve [9,10,14].

Methodology

To determine the annual increase in visitors in the last 10 years, the records granted by the Ministry of the Environment were used. With regard to Tourist Load Capacity, the Cifuentes methodology was used (1992), which establishes the maximum number of visits that a protected natural area can receive according to its physical, biological, environmental and management conditions. The process consists of three levels: a) Physical Carrying Capacity maximum limit of visits in a day, given by the relationship between visiting factors, available space and the need for space per visitor. b) Real Carrying Capacity is associated the capacity of Physical Carrying Capacity with a series of elements that affect or limit the use of the path, called correction factors, were obtained considering physical, environmental, ecological, social and management variables, which modify or They could change their condition and their supply of resources. c) Effective Load Capacity is the maximum limit of visitors that can be allowed given the ability to order and manage them. The Effective Carrying Capacity is obtained by comparing the Real Carrying Capacity with the Management Capacity. It is necessary to know the minimum essential management capacity and determine what percentage of it corresponds to the existing Management Capacity.

3. RESULTS AND DISCUSSION

For the Saladero, Copal, Red Palm and Catholic trails, the Physical Load Capacity, real and effective were determined; as well as, the values of the different correction factors and the management capacity of the administrative body. The months of February, July and August are those that attract the greatest number of

visitors, while the months of September to January and March to June are the months with the least presence of tourists.

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There is a consensus in all areas that the role of tourism is very important in generating income. This is often manifested in phrases commonly used by locals and lodge owners during conversations: "tourism brings money"; "Tourism produces considerable foreign exchange earnings"; "Tourism is our life". At the same time, tourism is responsible for changes in social customs and practices and increases in the cost of living.

The tourism tourist capacity on the trails is being marked by tourism operators based on the number of people authorized to receive 348 visitors / day patents, 42,456 visitors / year. The average growth rate of tourists of the last 10 years is 12.79% and contrasted with the Effective Load Capacity (CCE) 182 visitors / day, 22.143 visitors / year, determines that in the months of September - January and March - June not there is saturation, a77% of the maximum capacity is used. In the months of February, July and August the reception capacity reaches 106%, exceeding its maximum limit by 6%.

The highest Physical Load Capacity CCF is given by the "Palma Roja" trail with 5,464 visitors / day, without being the longest trail. It was expected that the path with the greatest physical load capacity would be the "Saladero" trail, since it is the longest one, but the accessibility factor is a determining factor, influencing the travel time. It is contrasted with other investigations (Butler, 1997) in the trails of the International Park "La Amistad" where not always the longest trails have the highest CCF Physical Load Capacity. The "Saladero" trail is 29% longer and occupies 50% more time than the other three trails. The "Saladero" trail has the lowest CCF Physical Load Capacity 3,813 visitors / day, due to the time it takes to travel and to have a high accessibility and waterlogging factor.

The results of the present study also show the need to understand the load capacity as a management tool. The method does not present a fixed limitation of the number of visitors, but instead proposes a dynamic interval, according to the answers of the field tests. These answers may be different due to the tourist seasons, which results in different levels of carrying capacity for each month of the year, as already mentioned in the study of (Whitelaw, 2014). Taking into account the aforementioned conditions, each year of the year will present different levels of load capacity.

Therefore, carrying capacity is not a scientific concept or a formula to obtain a fictitious number, beyond which development should cease. The load capacity is not fixed. It develops over time and the growth of tourism and can be manipulated by management techniques and controls. Therefore, cargo capacity is useful as a management process to ensure that tourism development takes place within the context and thresholds of the optimum level of overall capacity, thus ensuring the long-term sustainability of tourism development.

4. CONCLUSION

CCT Tourist Cargo Capacity in the low season months has not reached its maximum threshold. While in the months of high season this exceeds the limit causing potential environmental impacts which compromises the sustainability of the area. Administrators and managers should seek and apply effective management strategies to ensure the conservation and sustainability of the reserve in high season. Aspects such as maintenance of trails, application of regulations for use, reduction of accommodation to lodge and increase of personnel for management and control should be managed immediately to avoid future effects. The results provided a basis for another conclusion: linear and mathematical responses from the environment that can solve the problem of tourism management should not be expected, exempting managers and researchers from their responsibilities. The fact that there is a wider range of possibilities for tourism activities in the reserve reinforces the need to adopt scientific practices and long-term measures. The management plans must have the responses of the measurable environmental parameters as strategic reference points for responsible actions related to the management of other show caves. Several caves show around the world are kept up to date with environmental and atmospheric monitoring protocols for long periods. It is important to continue with new studies of Tourist Load Capacity in the areas of public use of the reserve, with special emphasis on the Laguna Grande where there is a large concentration of tourists from 5:00 p.m. to 6:30 p.m. to perform swimming activities and observe the sunset, allowing to contrast new results with the Load Capacity of the trails.

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