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NATURAL PROTECTED AREAS IN ECUADOR, A POTENTIAL OF BIODIVERSITY FOR THE TOURISM

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ABSTRACT
The vision of the Ministry of the Environment of Ecuador is to ensure that the country sustainably uses its strategic natural resources to achieve good living. Its mission is to effectively and efficiently exercise the stewardship of environmental management, guaranteeing a harmonious relationship between the economic, social and environmental axes that ensures the sustainable management of strategic natural resources. The objective of this study is to determine the biodiversity potential of protected areas in Ecuador. Three protected areas were analyzed as the main result is its high degree of pristinity and biological diversity.

KEYWORDS: Natural Protected Areas, biodiversity, tourism, Ecuador.

INTRODUCTION

Nature or Pacha Mama, where life is reproduced and carried out, has the right to have its existence and maintenance fully respected and regeneration of their life cycles, structure, functions and evolutionary processes. The National System of Protected Areas will guarantee the conservation of biodiversity and the maintenance of ecological functions [1]. The State will allocate the necessary economic resources for the financial sustainability of the system, and will encourage the participation of the communities, peoples and nationalities that have ancestrally inhabited the protected areas in their administration and management. The Ecuadorian State recognizes biodiversity as a competitive advantage and as the spearhead for the scientific development of the chemical, pharmaceutical and food industries, in order to make viable its sovereign, strategic and sustainable use[2]. Among the sectors prioritized in national and sectoral planning instances, are those that depend directly on nature and their biological resources, such as fresh and processed foods, bioenergies, pharmaceutical products, biotechnology, biochemistry and biomedicine, among others [3].
From a geographical point of view, Ecuador is a small country. However, it is characterized by its unique topography, its diversity of climatic zones, and a prolific population of plant and animal species. The traveler does not need to leave their borders to move, in a matter of hours, from the rainforest to the foothills and heights of the Andes, and then down to the Pacific Coast, while contemplating an endless succession of natural landscapes [4]. By traveling through the wonderful natural world of Ecuador, we can follow the course of

wide and narrow currents rivers, rest on the shore of pristine lakes, explore mysterious caves and admire unique plant and animal species in their type that have evolved without the intervention of Man on solitary islands of the Pacific. From the Sierra to the Coast, the proverbial diversity of Ecuador is also reproduced in its people, whose origins and traditions have been formed from its immediate geographical contour [5].

Ecuador probably has the greatest vegetable and animal diversity in the world. Its biological richness is reflected in a whole range of organisms, namely: 10% of the vascular plant species of the world are in an area that barely represents 2% of the total surface of the Earth. Its diverse ecosystems have interacted in multiple ways throughout geological history [6].

According to the Center of Conservation of the Environment, Ecuador is in the sixth position of the group of 17 mega-diverse countries of the planet that, together, hold more than two thirds of all the biodiversity of the world. Within this group, Ecuador, despite having the smallest area, has the highest biodiversity per square kilometer, which is explained by the coincidence of some geographic and climatic phenomena within its borders, which have stimulated the presence of numerous species. Protected areas are the most effective natural solution at the global level, to counteract the processes of deforestation and changes in land use that produce the emissions of greenhouse gases that cause climate change. The Amazon protected areas of Ecuador are a clear example since they store 708 million tons of carbon, contribute to the mitigation of climate change and, in this way, support the resilience of the largest continuous forest in the world [7].

Another reason, why Ecuador enjoys a high biodiversity, and specifically high rates of endemism, is its geological history (formation of the Andes, volcanic eruptions, formation of the Galapagos Islands, among others) and climatic (glaciations, marine currents, among others), which produced isolation effects. Ecuador presents two of the 34 hot spot 1 of biodiversity worldwide recognized by Conservation International. This term was born in 1988 when Norman Myers identified the first 10 hot spot of biodiversity in tropical forests [8]. To qualify as a hot spot for a region, two criteria are considered: contain at least 1 500 species of endemic vascular plants (> 0.5% of the world total), and have lost at least 70% of their habitat original . Which means that belonging to an internationally recognized hot spot is not just an award, but an alert because of the high risk of losing unique areas that harbor unique species. On the other hand, BirdLife International (2005), under criteria applied worldwide, has determined, in Ecuador, the presence of 107 Important Bird Areas (IBAs for its acronym in English, Important Bird Areas), that is, , critically important sites worldwide for birds and biodiversity. The protected areas described in this book belong to the Patrimonio de Áreas Naturales del Estado (PANE) [7,8]. This Heritage is anchored in the Forestry Law, which identifies the categories of National Park, Ecological Reserve, Biological Reserve, Wildlife Refuge, Wildlife Reserve, National Recreation Area, Geobotanical Reserve, and Hunting and Fishing Area. Additionally, with the Special Organic Law of Galápagos (1998), the Marine Reserve category was incorporated, which until now has its sole representative in the Galapagos Marine Reserve. Protected Areas are an essential and irreplaceable way to protect ecosystems, biodiversity and environmental services. The World Commission on Protected Areas (WCPA) of the World Conservation Union (IUCN) defines a protected area (1992) as: "an area of land and / or sea specially dedicated to the protection and maintenance of biological diversity , as well as natural resources and associated cultural resources, and managed through legal means or other effective means " [9].

In Ecuador, the main legal backing for private protected areas continues to be the recognition as "Protective Forest or Vegetation" established by the Forestry Law. Other models to achieve the extension of protected areas are the "Ecological Easements", in which civil law contracts are signed between owners of a private protected area and owners of neighboring areas. It is important to note that one of the most important incentives for private protection is the possibility of its use for the development of different forms of nature tourism (ecotourism, adventure tourism) [10].

An alternative example of management, in favor of the conservation of biological diversity, through the direct participation of the community and involving a large extension of territory (2.1 million hectares), is the Biorreserva del Cóndor (within the Parks in Peril Program The Nature Conservancy, TNC) which mainly constitutes the upper basin of the Napo River. The Bioreserve covers 7 protected areas of the PANE: Ecological Reserves, Antisana, Cayambe Coca and Cofán-Bermejo; National Parks, Sumaco Napo-Galeras, Llanganates and Cotopaxi; and Pasochoa Wildlife Refuge; in addition to its buffer zones. This program includes a series of innovative strategies to achieve connectivity between the different protected areas, and

thus reach a large geographical area of effective conservation, as well as strengthen the management of protected areas and create alliances with and between owners [11].

MATERIALS AND METHODS

MATERIAL

The Republic of Ecuador is located in South America, northwest, latitude 0º 00 '. It is a riparian of the Pacific Ocean and has an area of 281,341 km2. It limits with Colombia, to the north; with Peru to the south and east; and with the Pacific Ocean to the west [12].

Fig. 1 Ecuador map.

The orography of Ecuador is very varied, highlighting the Cordillera de los Andes, which crosses it from North to South forming two parallel chains, the eastern and western mountain ranges. Among the great heights of the Ecuadorian Andes are, among others, the Chimborazo volcano (6,310 m), the highest peak in the country, Cotopaxi (5,897 m), Cayambe (5,790 m) and Antisana (5,704 m). The Andes divide the country into three well-differentiated regions: 1) the coastal plain or coast, lowland and flatland that is dotted with islands, highlighting the Puná in the center of the Bay of Guayaquil; 2) the Andean mountains or Sierra; and 3) the Amazon rainforest or East. There is a fourth region, the Galapagos Islands, a group of 13 volcanic islands located in the Pacific Ocean about 1,120 km from the coast. The most important rivers are the Esmeraldas and Guayas in the western region, which flow into the ocean, and the Aguarico, Napo, Tigre and Coca in the eastern area, which flow into the Amazon River [13].

METHODOLOGY

The methodology used was based on a current and historical bibliographical review. For the tabulation of the information, the process was divided into stages:

Stage 1: compilation of pertinent information of all the current Protected Areas included within the PANE, physical, geographic, ecological and management of the area itself; For this, the Physical and Virtual Libraries

of the Ministry of the Environment (MAE), Coordinating Ministry of Natural and Cultural Heritage, Eco Ciencia Foundation and some higher education centers were visited. In the case of some Protected Areas it was necessary to raise the information by telephone or in a personal way in the Regional Directions of the MAE.

Step 2: the data of the Areas of the PANE were registered and ordered in large matrices of information (the First with creation data, location and ecological, the second with information on the presence-absence of different types of major ecosystems in the PAA, and the third with data on presence-absence of problems and / or management realities), each of the matrices was addressed through a Principal Component Analysis made based on secondary Matrices of Correlation or Covariance.

Stage 3: included the observation and / or discrimination of the trends found in the ordering plans generated by the ACP, as well as the structuring of the respective conclusions and recommendations, based on the findings made.

RESULTS AND DISCUSSION

Protected areas attract the most profitable tourist.

68% of foreign tourists say that their main motivation to travel to Ecuador is to visit the protected areas of the country. Visitors arriving in these areas stay five more nights in the country and spend approximately USD 2,797, which is USD 1,200 more than the average foreign tourist who visits the country. Per day, the foreign visitor spends on average USD 147 in the protected areas, while the national tourist spends approximately USD 110 [14].

The Galapagos Islands a paradise on Earth

The Galapagos Islands are a unique eco-region, where the fundamental ecological processes are active and operate with little interference from the human being, which is why they are recognized as the "natural laboratory of evolution". They were declared Natural Patrimony of the Humanity by UNESCO in 1978, recognition to which other international ones are added like: Sanctuary of Whales, Reserve of the Biosphere and Site RAMSAR. The Galapagos National Park is the oldest protected area in Ecuador and, without a doubt, the most representative of the country at an international level. It was created in 1936, with the purpose of conserving one of the most complex, diverse and unique oceanic archipelagos in the world, which still maintains its ecosystems and biodiversity without significant alterations. In addition, it is a world reference and, at present, it is one of the best conserved protected areas in Latin America. In 2016, the National Government created the Marine Sanctuary between the Darwin and Wolf Islands to protect the hammerhead shark, an endangered species. This area is cataloged as the best place worldwide for the practice of sports diving [15].

The protected areas in evolution.

Ecuador invested around USD 51.3 million in tourism infrastructure between 2012 and 2015. This allows the Protected Areas to be projected as a key player in Good Living and generates the conditions for boost rural economic development with social inclusion. The total expenditure of the MAE in protected areas * was around USD 52.2 million in 2015, practically more than 5 times the amount invested 12 years ago. The personnel working in the protected areas amount to 1,091 people, who have been properly trained and equipped. By 2016, 735 park rangers work in the conservation of protected areas, 3.5 times more than in 2003 [16].

Productive initiatives and protected areas.

The management of the protected areas of Ecuador is carried out through various tools and instruments that have been standardized in recent years, to consolidate the National System of Protected Areas, reduce costs and optimize resources. In addition, protected areas have an incentive system that rewards productive initiatives developed by surrounding communities, through a mechanism of competitive funds. During 2015, the competitive fund invested USD 1.2 million in 20 projects, with a maximum contribution of USD 50,000 per venture as seed capital, obtaining a return of up to USD 3 for each dollar invested [17].

Unprecedented investment in protected areas.

The Ecuadorian State has proposed that the National System of Protected Areas be the best conserved in Latin America, through an efficient management model that meets conservation objectives, take into account social participation and ensure the sustainable use of goods. And environmental services, as well as through the

identification of opportunities, generation of capacities and promotion of the conditions to ensure a stable and long-term financing [18, 19].

CONCLUSION

Ecuador's protected areas cover the four geographic regions of the country and 20 provinces and, at present, are the main national strategy of in situ conservation of biodiversity. The National System of Protected Areas is the set of natural areas that guarantee the coverage and connectivity of terrestrial, marine and marine-coastal ecosystems, their cultural resources and the main water sources. The protected areas of Ecuador cover an area of 18.5% of the national territory, with a total of 4'611,849.22 hectares.

Ecuador is the second country in Latin America with the largest territory dedicated to the protection of its ecosystems, with 33.26% of its territory under conservation or environmental management. Ecuador is home to 1,642 bird species, 4,300 species of orchids, 540 species of amphibians and 403 species of mammals. 79% of the plant formations existing in the Ecuadorian territory are in the National System of Protected Areas. The protected areas of Ecuador are home to 26 indigenous nationalities [20].

The protected areas of Ecuador are the main tourist destination of the country, to the year 2015 they received around 2 million visitors. Protected areas contribute more than USD 527 million per year to national tourism revenues. This amount represents 35% of the total tourist income of the country. The number of tourists that received annually in the 2010-2015 period grew 58%, almost seven times faster than the total number of tourists entering the country. In addition, 962 naturalist guides and approximately 1,338 tourism businesses operate in protected areas, distributed throughout Ecuador [21, 22].

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