

**Effect of tourist disturbance upon bird diversity and activity in Chicaque Natural  
Park, Colombia**

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Artículo 23, Resolución # 13 de 1946

“La Universidad no se hace responsable por los conceptos emitidos por sus alumnos en sus trabajos de tesis. Sólo velará porque no se publique nada contrario al dogma y a la moral católica y porque las tesis no contengan ataques personales contra persona alguna, antes bien se vean en ellas el anhelo de buscar la verdad y la justicia”

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## **Summary**

Tourism, as well as ecotourism has become increasingly popular for both, international and national visitors. Although these activities promote economic development, there are few studies that attempt to shed some light upon the impact that nature based tourism has on local diversity in the tropics, and in the behavior of wild animals. The aim of this study is to test if trails frequently visit by tourists differ in bird diversity and vocal activity compared to those trails less frequently visited by tourists. To do so, sound recordings were made while simultaneously identifying any birds sighted in Chicaque Natural Park, a private entity situated in a cloud forest at north-eastern Andes mountains, in Colombia, where people go to experience recreational, nature based tourism. A database was constructed to compare diversity (number of bird species) and vocal activity (number of vocalizations per 10 minutes recordings) between two descending trails; the main path and other the secondary paths. I found differences between the number of species in main and secondary trails. But, visitors did not apparently impact song rate. Vocal species live in the understory behind a wall of vegetation, these secretive habits probably prevent them from being disturbed, and just keep singing in the wild.

*Key words: Ecotourism, song rate, bird activity, tourist activity.*

## **Introduction**

Nature based tourism implies that a natural area, protected or not, can offer enjoyable experiences to visitors based on landscape and environmental esthetics. The Quebec Declaration states that ecotourism embraces the principles of sustainable development (Butcher, 2006), various authors have defined ecotourism as a subclass or variant within nature tourism, where the difference resides in that ecotourism often implies the need of sustainability or that experience and product management should follow principles and practices that benefits ecological, socio-cultural and economic growth (Weaver & Lawton, 2007; Jianying *et.al.*, 2009). Ceballos (2008) defined ecotourism as a form of travel intended to appreciate nature in an environmentally responsible manner that promotes conservation and involves active socio-economic involvement of local populations (Ceballos-Lascurain, 2008). Given its close relation and dependence to nature, ecotourism has the potential to become an important factor that encourages conservation and contributes to the preservation of Natural Protected Areas and their biodiversity. Also, when companies incorporate social dimensions the link with hosting communities it may become a powerful tool for local development and even for fighting poverty (Sovero *et.al.*,2012).

Many of these sites are located in vulnerable areas which require more than business planning; recreational activities that take place in natural or protected areas must be managed efficiently through sustainable planning and frequent monitoring of tourist satisfaction and the impacts caused by the development of these activities in protected areas (Kreiner *et.al* 2013).

Tourism is a worldwide activity that revolves around clients who can afford to travel with recreational and leisure purposes for short periods of time (Casey, 2013). According to

Anandaraj (2013), tourism had already become the largest industry of the world, promoting economic growth and creating jobs for the local community in most cases (Scheyvens, 2008; Anandaraj, 2013). Its first international appearance in the United States of America was recorded in 1840 where the industrial revolution made trans-continental travels possible for many middle-class citizens and since the 1960s, the expansion of the airline industry set in place a global transportation network of airports that offers safe and comfortable means of traveling lengthy distances (Casey, 2013). As cruise ships became popular around the 1980s, offering exotic accommodations as the main product on board and then esthetics of remote locations, agencies that operated in international waters promoted tropical landscapes contributing to an increased amount of Americans cruising to the Amazon, Asia and Africa, these events encouraged the idea of mass travel (Casey, 2013).

Over the last century, many variants of tourism have emerged, characterized by the specific appeal that sites offer as well as the customer's intention to acknowledge or participate in special or recreational activities that focus on specific expectations that can be taken advantage of in places of interest, ranging from adventure tourism, nature tourism (tourism that focuses on the appreciation of nature landscapes of wildlife and flora but does not necessarily apply sustainable practices), cultural tourism and ecotourism as the most popular (Ceballos-Lascurain, 2008).

In 2013, outdoor recreation came in second place to shopping (the most popular) in terms of activities most frequently performed by tourists, while visits to historical sites and museums came third and fourth (Casey, 2013). This global increase in demand for commercial outdoor activities placed nature tourism variants such as ecotourism, a theoretically sustainable practice

that will be discussed in the next paragraph, as one of the most important sectors within the global tourism industry (Buckley *et.al.*, 2003).

To sum it up, it is understood that ecotourism differs from nature tourism when the following conditions are met; tourist attractions should be mostly nature-based, they should be focused on learning or education and must involve sustainable management and good practices (Reimer & Walter, 2013). However, there are conflicts with this idea since often companies try to mix market-driven consumption of goods and services with sustainability (Isaacs, 2000. in Sekercioglu, 2001; Maldonado *et.al.*, 2017). This makes sense since fast developing industries have an immense demand for resources that can compromise and backfire sustainability resulting in harmful consequences to the environments that are fundamental for the survival of travel organizations, local communities and wildlife diversity (Moreira, 2012).

In this context, Latin American countries are considered to be very attractive given their geographic location and various landscapes that harbors countless species of flora and fauna as well as diverse cultures that captivate curious travelers (Maldonado *et.al.*, 2017). Colombia stands out amongst the countries in the American tropics for its tremendous potential in ecotourism; its wide diversity of cultural heritage and nature-based activities (Maldonado *et.al.*, 2017) but more importantly because it contains high biodiversity sites such as the Choco-Darian, tropical Andes and Caribbean hotspots (Myers *et.al.*,2000; Peñuela & Primm 2014).

The popular travel guide, Lonely Planet, declared Colombia as the no. 2 best country to visit in 2017 (Peñuela & Primm 2014). Although it is considered as a megadiverse territory (Armenteras & Villareal, 2002), it is also recognized for its vulnerability to the loss of entire ecosystems as a

consequence of the alarming loss rate of biodiversity and landscape transformation; deforestation rate was estimated to be of 600,000 ha per year (DPN,1994; Chavez & Arango, 1998; Armenteras & Villareal, 2002) mainly because of the strong human influence over the landscape. The Andes have captured conservationist's attention, setting this region as a worldwide conservation priority (Birdlife International, 2012, Castaño-Villa, Estevez & Fontúrbel, 2014) due to its vast biological richness, high level of endemism (Olson and Dinerstein, 1997), and also because it is considered one of the less known ecosystems in the tropics (Stadtmüller, 1987). The rising of population density occurring in this mountainous neotropic range has also contributed to the loss and fragmentation of native, natural forests where a high proportion of endemic bird species reside (Armenteras *et al.*, 2003).

Colombia has 59 national protected areas (private and public) supervised by the Environmental Ministry, they are classified in various categories depending on its conservation status to designate the type of activities that can be performed, these areas include: Category 1: Strict Natural reserve (highest protection category), Category 2: National Parks (Protected areas designated for responsible recreational practices), Category 3: Natural Monument (Set out to focus on the protection of specific local species and/or ethnic communities that excludes many forms of market related activities such as construction or urbanization. Category 4: Area Management of habitat and species. (Allows for some intervention intended to conserve fauna or flora. Category 5: Protected Land or Sea Landscape: Protected areas intended to provide recreational spaces and management that benefits humans as well as the environment. Last but not least; Category 6: Protected Area with Managed Resources: This is the largest growing category worldwide, it allows for local and foreign stake-holders to make good use of the natural

resources and allows for most ecotourism practices as long as they are coupled with the sustainability principle, in these last two categories, private landowners or any natural person with property established can register their terrain to be part of the SINAP so that it can be benefited by sustainable policies that can be considered as a governmental aid that prevents unsustainable practices, these landscapes Natural Reserve of the Civil Society (RNSC) (Armenteras *et al.*, 2003).

In spite of the promising arguments that might suggest ecotourism as a thriving market in a country that struggles with poverty and inequity (Cotte, 2002), according to Buckley (2012), very scarce information is available regarding the negative impacts that nature tourism has upon local environments. Therefore, there is a need for studies that may suggest more complex direct and indirect impacts. Also, although studying the effects of nature based tourism and recreation on birds is a growing area of interest in recreation ecology (Liddle, 1997; Buckley, 2004) and that reviews have been published in which tourism in protected areas is associated to bird declining populations, it has not become a popular issue amongst the scientific community (Steven & Castley, 2013).

This industry has been proved to have both direct and indirect impacts upon the environment and more specifically on bird populations which are more vulnerable to habitat reduction and tend to be more cautious of intruders (Steven & Castley, 2013; Finney *et al.*, 2005; Guillemain *et al.*, 2007; Cardoni *et al.*, 2008). Globally, more than 12% of bird species are threatened to extinction due to tourism and other activities (Steven & Castley, 2013) and locally, tourism has been identified as a threat to many species of birds (Hesse and Duffield 2000; Karp and Root 2009;

Anderson *et al.* 2010). Nature tourism has been found to alter bird species and populations in various negative aspects (Liddle, 1997); altering the physiology in terms of changes in temperature, heart rate or stress hormone secretion (Müllner *et al.*, 2004), and immediate behavior such as changes in foraging, vigilance and evasion (Regel & Putz, 1997; Buckley, 2004). Recreation can have indirect effects upon wildlife when they spend time and energy avoiding humans as though they were potential predators (Bennett *et al.*, 2013; Frid & Dill, 2002). To make matters worse, some Eco-touristic companies have taken advantage of its popularity to purport eco-tours, meaning that they offer eco-tours but fail to meet the terms necessary for sustainability, For example, in Costa Rica, a tourism project posed as an eco-development that included unsustainable practices such as shopping center and a golf course, these structures require high maintenance, changes to the landscape, and even incite commerce which needs roads to be developed causing forest fragmentation(Clarkin & Kähler, 2013). Considering these facts is important for ecotourism to continue developing successfully in Colombia and for its survival as a market that thrives on local biodiversity and diverse landscapes.

To contribute to the understanding of the effect of tourism within natural areas, it is helpful to understand how bird species, populations and communities may be affected by different recreational parameters such as group size, noise level and time exposure between humans and wildlife. Some of these parameters have been studied such as group size and orientation reaction during direct encounters (Geist *et.al.*, 2005) and simulating various paths based on trail use rate (Rodriguez-Prieto *et.al.*, 2014). However, it has not been measured the impact of tourists in trails that have had steady visitor trail use to possibly understand the consequences of these activities

in a longer time frame. This study aims to identify whether active trail use affects bird diversity and behavior or more specifically, upon their vocal activity in a tropical cloud forest protected area that has been involved in nature-based tourism and ecotourism since 1991. Greater size groups may represent higher perceived risk of predation, also considering that people often talk in leisure recreational activities, the acoustic niche could also be compromised in wildlife that relies on calls and songs as an integrate part of breeding and thus on reproductive success and survival (Geist *et.al.*, 2005; Frid & Dill, 2002; Dowling, Luther & Marra, 2011). The least active trail was named “secondary trail”, it was expected to have lower diversity and lower vocal activity compared to the most active trail, named “main trail” due to the amount of people that pass through it. These results are expected to bring further understanding of the effect of tourism upon bird species to implement ecologically safer management policies.

## **METHODS**

To identify whether there is or isn't an impact caused by visitor activity upon bird diversity and vocal activity, two paths were selected in terms of the most/ least taken by visitors; the main path and the secondary paths. Both paths must be taken to pass downhill from the park entrance to the gathering site where lodging and restaurant services can be obtained, the main trail is characterized by a series of stones assembled to form a path, it crosses the cloud forest through a combination of robust walls of vegetation and openings that reveal sharp drops but is however safer and easier to walk on in comparison to the secondary path. This main trail is recommended by staff for family-size groups which may include children or elder adults that take longer to move safely and are usually engaged in conversation.

The secondary trail, on the other hand, is a very irregular and steep terrain that requires greater skill and precaution to pass by, this path is usually recommended to the adventurous or well fitted travelers. In this path, the topography and vegetation resembles that of the main path, although this trail is more challenging, groups tend to be smaller and tend to move through more quiet and faster thus reducing the amount of time the trail is frequented and thus time shared between wildlife and tourist encounters.

Seven locations along each path were selected, the coupled sites in each treatment (Main and Secondary) had similar altitudes ( $t = 0.36896$ ,  $p\text{-value} = 0.72$ ) and general perceived similarities in the structure of vegetation. Site A is the highest sample point (2650-2550 m). Other sites were at lower elevation, site G for instance was located in the lowest part of the sample design (2200-2300 m). On each sample point, I counted the number of species sighted and heard, in addition to their vocal activity (i.e. the number of songs given by each species recorded during ten minutes recordings).

Audio recordings were made since it allowed to register any call or song made by any birds and also recordings can be used for posterior identification when listening the recordings. On each trail, the recorder (Sony IC recorder icd-P630F) was placed or held steady by an observer who counted and identified every individual sighted and heard in a 25 meters radius for 10 minutes, both activities were done simultaneously and always by the author in order to avoid personal bias. During each sample, the use of audio playback was never used, participants refrained from talking and pishing during the sampling period. There were always only two people; one holding the recording device and another recording sighted and heard individuals. Recordings were

listened to using the iTunes desktop application to account for the presence of sighted and heard species that were registered, they were verified using the bird identification guide: Birds of Northern South America by Restall (2006), binoculars and the Xeno Canto web page reference ([xeno-canto.org](http://xeno-canto.org)). Also, every call or song identified (independent of its duration or whether it was interrupted or not) was counted as “one” every time the identified individual begun singing or chanting, the total vocalizations of each species was compared in each trail and within sites using the R Studio statistical analysis platform.

Chicaque Natural Park is a private natural park within Category 6 (Protected Area with Managed Resources) that opened its doors to visitors in 1991 (Fandiño, pers.com). This natural area offers daily guided tours (through the main and secondary trail), a zipline or canopy attraction, horseback rides (none near the sampling sites) and hiking trails as well as occasional bird watching activities since this area is occupied by over 200 bird species within 28 families (Chicaque, 2018). This private entity is classified as a Natural Reserve of the Civil Society (RNSC) that can guarantee visitors safety, it is located on the outskirts of the capital and it is accessible by car or public means of transportation, thus is likely to be visited frequently in relation to other outskirt cloud forests.

This forest is located on the western side of the eastern cordillera and in the San Antonio del Tequendama municipality in the Cundinamarca department (Colparques, 2018). This area has an altitudinal range that goes from 2000 m.s.n.m. to 2720 m.s.n.m., mean annual temperature is estimated at 14,5 °C and receives an annual precipitation of 1590 mm. Main characteristics include mountainous landscapes and relatively cold and humid climate (Climate-Data s.f;

Colparques, 2018; Espinosa, 2011). There are patches of secondary mixed forests with ongoing processes of reforestation (Ma. Eugenia Fandiño pers.com., 2018; Boyla & Estrada, 2005). In these forests, there is an interphase between subtropical wet forest and low mountain wet forest (Colparques, 2018; EPM, 2017).

The park has its entrance situated at the top of the mountain where several paths can be walked to reach all the tourist destinations. These are commonly the highest density walkthroughs, where the impact of visitors upon bird activity was exposed. Chicaque Natural Park belongs to a thin strip of clouded forest in the Andes mountain. The park connects the Magdalena Valley to the Bogotá savanna and is known for its high bird diversity: with more than 200 species of 28 families

I performed Shapiro Wilks test of normality to meet the criteria for using parametric method.

The data exhibits a normal distribution, then, I ran t-student and two-way ANOVAs (i.e type of trail and site as the two independent factors) to test if there is an influence of the number of visitors per trail (these are categorical values, not numerical), in the number of species and in the vocal activity of birds. Analyses were performed in R studio (Version 1.1.447 – © 2009-2018 RStudio, Inc.).

## RESULTS

The most abundant order identified was Passeriformes and within the order the most abundant family was Grallariidae and its most represented species in this classification was the Chestnut-Crowned Anttpita (*Grallaria ruficapilla*, Lafresnaye, 1842).

The most vocally active species was the Blackish Tapaculo (*Scytalopus latrans*, Hellmayr, 1924) placing the Rhinocryptidae family as the most vocally active within the Passeriformes recorded.

I found an effect of the type of trail in the number of species recorded ( $p=0.0047$ ,  $t=-2.97$ ,  $df=43$ , Figure 1). Then, when I checked the differences between type of trails (i.e. main and secondary) including the seven sites sampled, I did find differences between the number of species but differences were not similar across sites ( $F=7.151$ ,  $p=0.01$ , Figure 2). Although there was not an interaction effect between the type of trail and sites ( $F=0.339$ ,  $p=0.91$ , Figure 2), in sites C to G the difference between the number of species was stronger. Although sites A and B had similar values the secondary path always had a higher amount of bird species (higher diversity) than the treatment site: the more frequently used main trail. This can be due to similarities in the occurrence of fog in high altitude sites such as A and B which can be found near the entrance of the park. Site F had the highest number of bird species recorded while site G had the lowest. Finally, there was not an effect of the site in the number of species recorded ( $F=1.271$ ,  $p=0.29$ ).

Table 1. Characteristics of sites and sample points. Elevation, altitude, number of times sampled each point, number of species and song rate.

Site	Trail	Species	Song Rate	Altitude	Times sampled
<b>A</b>	<i>Main</i>	30	822	2466	4
	<i>Secondary:</i>	33	740	2422	4
<b>B</b>	<i>Main</i>	38	782	2479	6
	<i>Secondary:</i>	31	448	2410	4
<b>C</b>	<i>Main</i>	14	294	2385	3
	<i>Secondary:</i>	28	386	2361	3
<b>D</b>	<i>Main</i>	26	313	2318	4
	<i>Secondary:</i>	17	173	2342	2
<b>E</b>	<i>Main</i>	19	363	2315	3
	<i>Secondary:</i>	23	305	2305	3
<b>F</b>	<i>Main</i>	12	116	2235	2
	<i>Secondary:</i>	21	263	2223	2
<b>G</b>	<i>Main</i>	10	278	2206	3
	<i>Secondary:</i>	10	149	2209	2

Figure 1: Number of species recorded on each type of trail. Notice the higher number of species recorded in secondary trails.

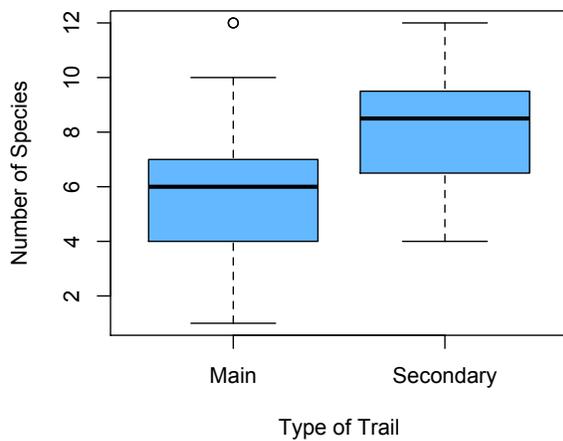
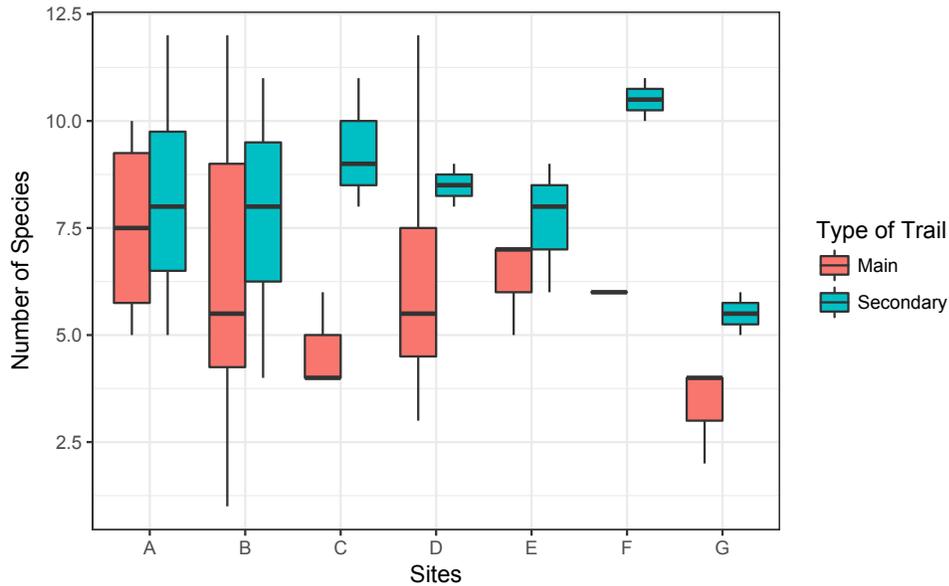
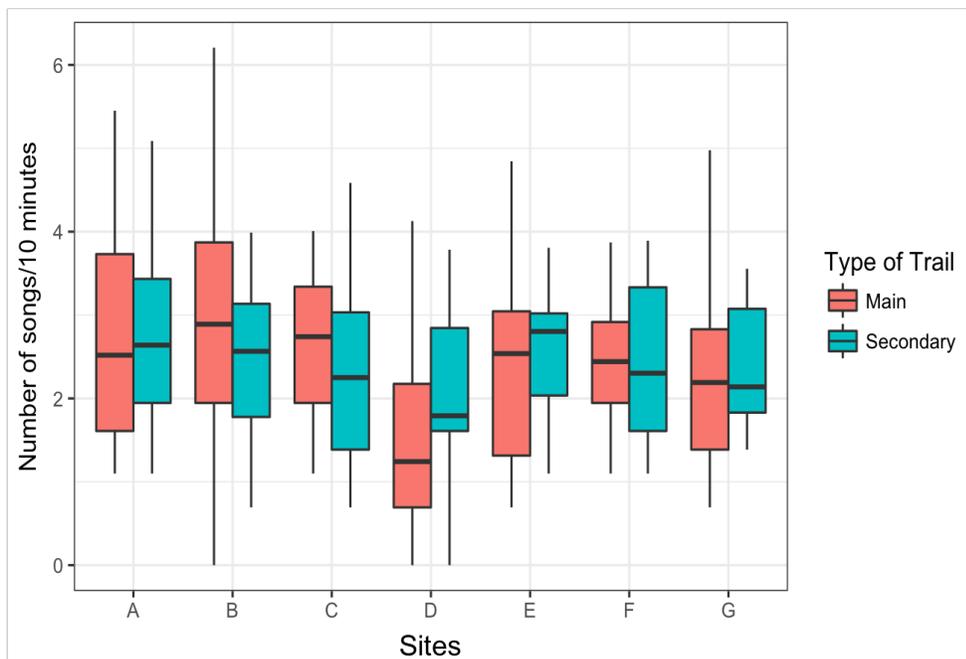


Figure 2. Number of species recorded on each site on the different types of trails.



The type of trail apparently did not impact vocal activity, I did not find any effect between the main and secondary trail on the number of songs produced in ten minutes recordings ( $F=0.463$ ,  $p=0.49$ ) However, there was an effect of the site between the number of songs ( $F=2.91$ ,  $p=0.009$ )

Figure 3: Vocal activity measured as the number of songs recording in ten minute periods



There was not an interaction between these two factors ( $F=0.74$ ,  $p=0.61$ )

## DISSCUSSION

Trails frequently use by visitors had significantly lower number bird species in comparison to less visited trails (Figures 1 and 2). These results are similar to Rodriguez-Prieto et al. (2014) since they determined that the type of trail and how often it is used strongly influences the amount of disturbance experienced by a forest bird community. Since the trails sampled in Chicaque Natural Park have been exposed to constant use by groups of undetermined visitors (ranging from one to one hundred (María Eugenia Fandiño, *per.com.*, 2018) for almost 20 years, it might be possible to predict that some species have a history of encounters with visitor groups in determined areas that could have been learned to avoid. However, further studies are needed before we truly understand a long-term effect of tourism along types of trails within naturally protected areas.

Vocal activity does not appear to be influenced by the frequency of visitors (Figure 3). The singing birds recorded belong to secretive and shy birds that occupied the understory (i.e. tapaculos, and pittas, wood-wrens). Understory birds are not as exposed like other birds that uses the canopy, or open areas, for example; this characteristic can allow these birds to keep singing regardless the number of visitors, they are hidden in the deep and dense understory, and probably they do not perceive any risk of predation (Şekercioğlu, 2002).

Both sets of results have only begun to scratch the surface of the understanding of how behavioral traits such as singing in birds change under the pressure of constant human encountered areas. In short, it is probable that most bird species in the Chicaque neotropical cloud forest would rather move to a site where fear of predation is not triggered by human

intrusion. This is probably a result of the highly energetic costs that birds spent avoiding danger instead of their regular routines (Şekercioğlu, 2002). Therefore, unrestricted or ill managed ecotourism scenarios can lead to interrupted efforts in foraging, breeding, parental care and even survival in cases where birds become more tolerant to possible predation risk (Şekercioğlu, 2002). These effects can potentially affect population viability generating high levels of disturbance (Rodriguez-Prieto *et.al.*, 2014).

Site “D” (Figure 3) showed the lower mean values in comparison to other Sites along either trail, this difference is likely because of its proximity to a road actively used mainly as an alternative to walking for customers too tired to walk back to the entrance uphill or with special needs that can choose to pay to come up on horseback or in heavy duty vehicles that can carry 6 to 10 people at a time, three or four times a day. These 4x4 Jeeps also allow for the transportation of goods and staff but also affect animal behavior in ununderstood ways, this is an example of the many challenges that ecotourism managers must face constantly when choosing between customer service and environmentally safe alternatives. There is not an obvious choice or solution in this problematic dilemma since the paradigm of sustainability enforces the development of socio-economic growth which in most cases requires special infrastructures that can accommodate tourists comfortably to outdoor recreation (lodging, trail and appealing site construction) (Torres-Sovero *et al.*, 2012) but has well known negative impacts as a result. Knowing how trail use rate affects local bird biodiversity can help developing ecotourism enterprises and local Eco touristic initiatives plan for adequate management along different types of trails when choosing active sites for customer satisfaction or special nature-based activities that are not ecologically viable such as motorized sports (Cardoni *et al.* 2008).

### **Management efforts and recommendations:**

As mentioned, a likely scenario for many managers in active eco-tourist sites is the creation (if not already there) of trail networks that allow visitors to move in between sites of interest, considering that if there is an understanding of how local species react to this movement, better management decisions can help mitigate negative impacts upon wildlife (Rodriguez-Prieto *et.al.*, 2014). Most trails designed for these experiences are usually informed by a standard of practices that include reducing trail density in pristine areas, avoid placing long trails adjacent steams and river banks, taking advantage of vegetation or topography that can serve as a screen to sensitive wildlife (Flink *et al.* 2001).

Since sites that are located in natural protected areas, they must be managed efficiently through sustainable planning and frequent monitoring of tourist satisfaction and the impacts caused by the development of these activities in protected areas (Kreiner *et.al* 2013). To do so, bio-acoustic approaches can become important tools when monitoring diversity changes in eco-touristic destinations that are willing to participate in the active conservation the localities occupied by it. This can be done practically anywhere and is relatively inexpensive and easy to apply, the recording unit is sold in technology stores starting at \$40 USD and allows noninvasive procedures such as song recordings and quiet observation to identify and count bird species without bird traps or handling of fauna. Estimating diversity changes through these techniques is possible since birds have wide distributions and are easy to detect in comparison to other animal groups, additionally, there is a wide amount of information and knowledge of their calls and songs (Gutzwiller *et al.* 2010). Recording vocal activity can be useful as follow-through strategy

to manage human disturbance in reserves and parks to account for species diversity, abundance and interactions in to continue implementing environmental friendly practices as well as sustainable social-economic development (Blumstein, 2011).

In first world countries, like the ones that make up North America, specialized forms of tourism have been developed in response to the fast growing popularity of bird watching recreational activities (IDB, Audubon & CREST, 2015), the same can be said about some European countries such as the United Kingdom, where bird watching has been identified as one of the more frequently practiced hobbies by educated and wealthy enthusiasts that are willing to pay admission fees and specialized tour guides to observe rare or endemic species (Booth & Gaston, 2001).

Bird watching is a relatively low expense activity, small groups of birders walk silently and pause to identify birds and flocks while taking pictures and making videos. It can be performed nearly anywhere with little physical effort and without the need of very sophisticated or expensive equipment (Maldonado *et.al.*, 2017). Growing concern for the environment in developed countries has resulted in nature-related or “nature friendly” variants of tourism that attempt to create a safe space for visitors to interact with nature (Maldonado *et.al.*, 2017).

This activity can give strong economic support when it comes to sustainability since it is recognized by local communities as a good opportunity for social and economic growth (Maldonado *et.al.*, 2017). Local communities can offer services such as entertainment, shelter and tours among other activities. This is an important income that has been quantified and shows

promising results in the United States of America, where five birdwatching sites each generated \$USD 2.4–\$40 million (Callaghan, 2015; Şekercioglu, 2002). This is not the only case, in Canada, Point Pelee National Park produces \$USD 3.2 million dollars each year (Hvenegaard, Butler, & Krystofiak, 1989).

Finally, bird watching attracts many people who are fascinated with the idea that getting in touch with nature, escape the stresses of daily life, and enjoy views of natural landscapes and wildlife (Connell, 2009; Nyaupane, Morais, & Graefe, 2004; Sinha, 2001). It is a non-consumptive, non-consuming leisure activity in which resources are neither captured nor harvested. In other words, it is consistent with increased public concern for environmentalism, nature tourism and its variants (Kreiner *et.al* 2013).

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