

## **IMPLICATIONS OF ECOTOURISM AND TOURIST SATISFACTION FOR CONSERVATION AND BIODIVERSITY IN LAPA RIOS ECOLOGE, OSA PENINSULA**

### **Introduction**

A leading example of how sustainable ecotourism can deliver social, environmental, and economic benefits can be found at Lapa Rios Ecolodge in the Osa Peninsula. Since its inception in 1992, Lapa Rios has been a leading model for ecotourism and conservation protecting 1000 acres of rainforest land (LR Nature Preserve) and increasing forest cover in their property. It is expected that this increase in forest cover, together with LR remote and specific location and commitment to local community development, has resulted in an increase in the biodiversity within LR Preserve, particularly in reforested and regenerated areas around the ecolodge under significant deforestation before the reserve was established.

The Lapa Rios Ecolodge sustainable ecotourism model was established as means of financing, protecting and maintaining the Nature Preserve and thus conserving biodiversity, thus LR financial security is directly related to achieving the highest tourist satisfaction, particularly since lodging competition around the area has increased in recent years. Wildlife sightings enhance the tourist experience and LR is potentially selected among other neighbouring ecolodges for its large preserve and the possibility to encounter wildlife along its extensive network of rainforest trails and wide range of tours. However, the reasons and the expectations of tourists with regards to wildlife sightings when visiting or selecting Lapa Rios Ecolodge are poorly understood.

The proposed investigation included: a) field surveys of bio-indicator species to evaluate differences between primary and secondary forest, and b) questionnaires to measure tourist preferences for selecting LR Ecolodge and specific species sightings, c) a citizen science and environmental education, awareness component.

### **Activities Report**

#### **Monitoring Biodiversity**

11 survey sites across the trail systems within the LR Preserve were selected including 6 primary and 5 secondary forest. Each site included a camera trap, a Wildlife Acoustics bird SM3 recorder, as well as a SM4 FS bat recorder. The project produced massive amounts of data just from these 11 points. Both, audio recording methods produced more than 500 hours recordings expected to be analyzed within the next few months. Preliminary camera trap data analysis comprised more than 8000 pictures collected from all trails and sites. Approximately, 25% of the pictures taken by movement detection cameras include wild animals, the rest of the images taken were tourist legs on LR organized tours and dogs most often. Although, I did catch, with my cameras, three local inhabitants hunting with guns and dogs in the forest at night proving that regardless of

the private status and highly human occurrence in the LR property forests, hunting is still a threat that is tangibly resulting in biodiversity loss. Despite of anthropogenic pressures, 20 species of terrestrial mammals and ground birds have been identified around LR Preserve including: 1 Jaguar (*Panthera onca*), 4 different Pumas (*Puma concolor*), 4 Ocelots (*Leopardus pardalis*), 1 Margay (*Leopardus weidii*), White-Lipped Peccaries (*Tayassu pecari*), Collared Peccaries (*Pecari tajacu*), Northern Tamandua (*Tamandua mexicana*), Great Tinamou (*Tinamus major*), Great curassow (*Crax rubra*), etc. Agouti is the animal with more pictures, most of those pictures are from resident agouties constantly foraging on camera at the same location. At this moment, the only differences between primary and secondary forest are the Jaguar and White-Lipped Peccaries only found in primary. Please, see Appendix 1 for the best images of wild animals taken during this summer field work.



Some of the recording equipment: left SM4 bat and ARBIMON recorders, Bat Echo Meter on the right



Beatriz Lopez collecting camera trap images and SM3 audio recording equipment at LR Preserve

### **Tourist Questionnaires**

The survey included two sections: on arrival, provided shortly after the guest check in and including socio-demographic information, motivations for choosing Lapa Rios, preferred local animal species and the likelihood to encounter those, in their opinion, within the LR Preserve, and 2) before departure, carried out shortly before the guests check out and including tourist satisfaction in terms of animal sightings and Lapa Rios experience. 14 surveys were carried out while I was in the field; data collection will be re-established after new protocol extending data collection dates is granted by the IRB. Preliminary analysis of surveys suggest wildlife, tours, and location are some of the most significant motivations for selecting Lapa Rios. Most have realist expectations of the animals that they might potentially encounter in the Preserve, even when sighting a Jaguar was their most preferred selection for their visit. Both species of Sloths, Toucans, and Primates are selected by guest as the most preferred sightings at their departure questioner. All 14 people has learnt from the LR experience and most of those have learnt a great deal about local species and their ecology and conservation during their LR visit. All surveyed subjects are extremely satisfied with wildlife sightings within the Reserve.

### **Citizen citizen science and environmental education, awareness**

Another component of this project is the tight integration of visitors and community groups such as Carbonera School and staff members providing environmental education and training in various aspects of the research, the animals and conservation of the Osa Peninsula. Every Wednesday was dedicated fully develop these outreach activities. Wednesday Science included a visit to the local school in the morning and various



educational activities ranging from camera trap management to visiting survey sites and collecting or helping with data collection. A night survey for bats and amphibians was also included within the Lapa Rios night walk to promote citizen science. In addition, a presentation was carried out during Sundays evenings containing a description of the project, objectives and methodologies, highlighting the importance of ecotourism and the significance Lapa Rios Preserve, as well as the significance of this study and weekly updates. Also, I oversaw of the annual Lapathon Kids Race celebrated by LR each year to raise funds for different community necessities. This year we raise enough money to build a new roof for the local and public kindergarten.



Lapa Rios Lapathon Race Day: Kids Lapathon, me and other runners and community members at the Race finish line



Wednesday Science poster and Learning the Mammals of the Osa for data management with LR guests

### **Citizen Science Surveys**

4 locations were selected around the Lapa Rios installations and/or staff quarters to maximize guest participation, as well as carry out surveys within guided tours or LR night activities. Locations included two points located along the secondary forest topographical gradient and two within riparian and costal ecosystem, respectively.

Wildlife Acoustics Echo Meter Touch Bat Detector was used to measure and identify bat species within each point for 5 min with the help of keen guest and/or staff members. Preliminary analysis suggests 16 species of bat present in all locations: one bat species of the genera *Centronycteris*, *Eumops*, *Noctilo*, and *Pteronotus*, two species of *Myotis* and *Saccopteryx*, and three species of *Lasiurus* and *Molossus*. *Saccopteryx bilineata* and *Myotis nigratus* most detected among locations with *Myotis riparius* found only on the beach and river ecosystems. Most calls produced double identification between species of the same genera making potential identification bias. In addition, 133 calls were not identified to any species due to bad call quality or background noise.

Sieve Analytics Automated Remote Biodiversity Monitoring Network (ARBIMON) audio recorders were used to measure birds using guest and staff members to set and collect equipment while learning about audio recording methods, advantages and disadvantages. Despite multiple attempts, 10 nights to be precise, no usable recording has been produced by this equipment. The recordings are basically noise. I think this is related with the microphone somehow, not sure as test produced 5 seconds of decent quality recording.



Staff members helping with equipment installation around the lodge and guest searching for frogs in the amphibian survey



Citizen Amphibian survey data collection was carried out for three consecutive nights with 5-10 guests and participants per survey. Participants slowly walked a 200 meter transect along the LR self-discovery trail (i.e. guided night walk tour) detecting the presence and the diversity amphibian species within 1meter radius of the trail. 5 species were detected along the transect, particularly in areas close to artificial ponds created by Lapa Rios: *Leptodactylus savage*, *Agalychnis callidryas*, *Eleutherodactylus fitzingeri*, *Eleutherodactylus diastema*, *Agalychnis callidryas*.

### **Carbonera School**

Four educational visits were carry out to the local school founded by Lapa Rios and now part of the Government and one of the biggest schools in the area. Two presentations to talk about the camera trap project, how it worked, local animals, ecology, threats, and conservation within the Osa Peninsula. During two workshops, we prepared waterproof camera covers that I will be using throughout my research. In total, we painted 14 covers. Since the covers were re-used plastic, I also provided information and awareness of plastic pollution and ways to avoid, reduce, recycle and re-use plastic material.



Presentation at Carbonera School and materials preparations for the Camera Cover Activity/Workshop



Carbonera school kids painting the Covers



Some of the Waterproof Camera Trap Covers designed and painted by Carbonera students

### **Lapa Rios Presentations**

9 presentations were carried at LR to showcase my research in general and the work in Lapa Rios. This activity was quite popular including up to 15 people at a time.



Weekly presentations at Lapa Rios

### **Canopy Camera Trapping Pilot Study**



Two canopy camera traps were installed two *Ficus insipida* trees in different secondary forests within the LR Natural Preserve to evaluate the arboreal diversity, seasonality and connectivity. The camera in a secondary forest close to the road malfunctioned producing 9000 pictures of just leaves and branches. The other site deep within the LR Preserve produced amazing videos and pictures of two species a Kinkajou and Geoffrey's Spider monkeys and giving a different perception on some of their behaviors. More results in January when cameras get installed again.

Community member and friend Agustin climbing the Ficus tree to set the camera, notice him on the right picture high in the canopy.



Kinkajou and Spider Monkeys found at the Ficus tree deep within the forest of the LR Preserve





### Limitations

A month into the summer field work, I had re-design the project to adapt to logistical limitations such as the lack of transportation from/to sites or climatological conditions. The latter hindered many parts of the project, for example the acoustic recordings quality was affected by the constant rain specially in the evening and early morning where bird chorus are recorded and or the constant torrential rain and wind created H&S risks for the surveyor and the equipment in the field. In addition, the acoustic monitoring schedule was re-adjusted from 3 to 6 days per site to maximize the probabilities of recording 3 sunsets and sunset choruses. This limited the amount of monitoring sites possible.

Camera trap malfunction or breakage because of mainly rain and humidity or simply because of animal interaction such as spiders nesting in the lens or peccaries scratching with the physical camera altering the field of vision. Climatological conditions also produced condensation within the camera, thus the quality of the pictures was significantly diminished. Another, key problem was the use of Bushnell 2016 Model Camera Trap. This model is not well constructed and the batteries do not adjust properly, thus losing electrical connection. I had 17 cameras all together and 9 of them at time were in the dry box and under “treatment” so they would work. Two extra cameras were stolen potentially by poachers when installed in the Lapa Rios Property.



On the left Bushnell Model 2016 under “treatment” to keep batteries in place and spider web in lens on the right



**Camera Trap Best Pics**

Ocelot selfie and ocelot casually walking



More ocelot pics: Rarest encounters of two adult ocelots in a single pic and mother and baby crossing the trail





Jaguar picture and the first picture taken of this top predator in LR Preserve in 3 years



Puma in top condition and Margay an elusive arboreal cat rarely photographed







White-Lipped and Collared Peccaries



Two Tayras, included in the same family than weasels (Mustelidae)







Hunters at the Lapa Rios Property.

