

EVALUATION OF THE POSSIBLE SCATTERING AREAS OF BIRDS OF THE "VILA RICA DO ESPÍRITO SANTO STATE PARK", FÊNIX CITY, PARANA STATE, BRAZIL, THROUGH LANDSAT TM5 IMAGE.

M. de MOURA-BRITTO⁽¹⁾, G. A. MAXIMIANO⁽¹⁾, & P. SCHERER-NETO⁽²⁾;

⁽¹⁾ Secretaria de Estado do Meio Ambiente - SEMA - IAP
Rua Desembargador Motta, 3384
80430-200 - Curitiba - Paraná - Brasil

⁽²⁾ Museu de História Natural de Curitiba
Rua Benedito Conceição, 407
82810-080 - Curitiba - Paraná - Brasil

Abstract

The analysis of a Conservation Unit and surrounding areas based on the utilization of Remote Sensing techniques and basic data on the movement patterns of some species of birds is the scope of this study. Besides the comparison of the information on banded birds with that found on the specialized literature, we used LANDSAT TM5 image in order to localize and to evaluate the possible scattering areas of the birds.

1 Introduction

The interest for the avian study in the Vila Rica State Park comes from its partial isolation by agriculture activities.

The central region of the state of Parana (South Brazil) shows a mosaic of different types of vegetation, being rare sites where the original forest was not destroyed by human activities.

Since 1982, this park was studied in order to know the composition of the avifauna. This study reveals that more than 250 birds species use this site in different seasons of the year.

Lately a comparative study was done to verify the disappearance of some species and others that arrives to the park after the forest research.

In order to understand partially the population dynamics, according with MacArthur & Wilson theory [1], another study was begun, using birdbanding to know the size of population of different rate and its change with another sites and the space of time that individuals remains in the study area. In the Vila Rica State Park there is some mammals, like Monkeys (*Cebus apella*) and the Nasua (*Nasua nasua*) that can interfere in the equilibrium of birds population and should be a important factor to be analysed.

In the region in which the park is located there are similar sites that can facilitates the genetic changes, useful to keep the healthy of the population for a long time, meanwhile those changes can be possible through gallery forests, streams, "capoeiras", used by species with short flight. Those small areas one considered islands of an archipelago that should keep small populations specially to those in habits the understone, like Band-tailed Manakin (*Pipra fasciicauda*), White-eyed Foliage-gleaner (*Automolus leucopthalmus*) and Red-crowned Ant-tanager (*Habia rubica*).

2 Study Site and Methods

The "Vila Rica do Espirito Santo State Park" is situated at 23°54' to 23°56' S and 51°56' to 51°58' W in Paraná State, Brazil. The area is 353,86 ha, and its typology is Semideciduous Seasonal Forest (pluvial forest) in secondary forestation with regeneration since 1630, after the people of Spanish colonization to leave the urban and agricultural area [2].

2.1 Remote Sensing

In this study we used a digital satellite image of LANDSAT TMS orbit 222/77 March 18, 1991. This image was loaded in Image Treatment System - SITIM, where through LUT function (LOOK UP TABLE) we changed the histogram of the image in order to obtain a better spectral answer. Later, we photographed the image directly from the monitor screen to facilitate the identification of the study area.

2.2 Birds

To study the birds of Vila Rica State Park, we used traditional techniques of ornithological research, i.e., we did the identification of species by visual and auditive contact, during long walks by ways of the State Park.

We achieved twenty phases bimonthly during three days, where we settled the mistnets (23) to capture birds. We opened the mistnets in dawn and we closed in nightfall. Each bird was marked with a metallic ring supplied by Studies Center to Birds Conservation (CEMAVE-IBAMA), with a alpha numerical code specifying each bird.

With the continuity of the study, it will be possible to get recaptures which will show the utilization of the State Park by each bird, and other sites around.

The data of capture, weight and morphometrics were putted in suitable cards. These informations allow to attend the population of birds with rings PESOLA spring balance, of 30, 50, 100, 300 and 1000 g., pachimeters (300 mm), MYTUTOJO and binocles NIKON 8 x 30.

The check list of species with the data relative to the inventory is according the phylogenetic order adopted in [3].

3 Results and Discussion

3.1 Remote Sensing

Remote sensing techniques were used to identify different forest coverage of Vila Rica State Park.

We analysed the LANDSAT satellite image with the combination 5 Red, 4 Green and 3 Blue in order to make it possible to distinguish the land use, showing the forest in green and exposed soil in red.

We were able to distinguish three different forest stages: the stage "A" is a kind of vegetation with high density, i.e., there are lots of old trees surrounded by low vegetation, increasing the answer of high density. This LANDSAT image was characterized by the presence of darker tones of green and texture more wrinkled than that of the other two stages.

The stage "B" is also composed by forest vegetation, but not so dense as "A". This forest is more open than the previous one characterizing a lower forest density that was identified in the image through light tones of green and intermediary wrinkled answer.

The third stage, "C", is composed by smaller trees, called "capoeira", presenting small forest gaps that interfere on the spectral answer of the image, being also identified by light tones of green but presenting a smoother and more homogeneous texture of the two stages. After identifying the patterns of the different forest stages of Vila Rica State Park we used these patterns to compare them with the answer observed in the surrounding (6 km apart) forest areas. These areas, were then considered as possible "refuges" for the birds.

3.2 Birds

We recorded more than 250 species of birds in the Vila Rica State Park. The birds live in different vegetation types. Some species are characteristic of regenerated areas and other of the forest and similar associations. Regenerated areas are the result of the development of ornamental young trees of nursery abandoned.

The forest and the richest environment in number of species. Such use different strata but is in the canopy that one finds the greatest number of species.

The regenerated areas of the State Park, form a continuous zone with the forest allowing the occurrence of many species of birds characteristic of primitive associations like: Surucua Trogon (*Trogon surrucura*) and Black-throated Trogon (*T. rufus*).

Many species like Giant Cowbird (*Scaphidura orizivora*) present occasional records indicating that the State Park was occupied only temporarily. At the beginning of the qualitative inventory some species quite conspicuous were recorded. Later some of them disappeared from this Conservation Unit and we can not guess what was the cause of the local extinction. The main example is Spot-backed antshrike (*Hypodalis guttatus*), no more recorded in the State Park.

Some species of the bird community were emphasized in the analysis due to their habits or easiness of identification. One of the species selected for a population analysis is Band-tailed Manakin (*Pipra fasciicauda*). This species lives in inner forest in the lower and middle strata. Band-tailed Manakin is hardly seen despite of the bright colours of the males. It is characteristic of forested environment with little disturbance but is also found in regenerated areas.

At present there are 58 individuals of this species marked with metal rings. We already recaptured 32 birds and some of them are in Vila Rica State Park for more than 30 months. The Band-tailed Manakin fly to similar nearby areas through the vegetation avoiding the agricultural areas which surround the Vila Rica State Park. The high number of birds captured must be related to their reproductive success that includes an antipredatory system. Most of the nests of *Pipra* spp. has a protective mimicry [4]. The importance of the gallery forest and remnant vegetation areas will be proved when we recaptured Band-tailed Manakin in another "islands".

Other selected species is the White-eyed-Foliage-gleaner (*Automolus leucophtalmus*). It inhabits the lower strata of the forest and is very few selective in terms of environment. This bird lives in different habitats, and the identification is facilitated by its vocalization. Just in few field trips its presence was not detected. A total number of 16 birds was already captured and some of them were recaptured 20 months after the first capture. This furnarid also needs similar and contiguous environments to facilitate its movements to nearby areas.

A very common bird in several habitats is the Golden-crowned Warbler (*Basileuterus culicivorus*). Its frequency of observations in the Park is high but its population is declining in the last year of study. We captured 21 birds until the present made 12 recaptures. Such recaptures proved that some these birds are in the Park for about three years. This parulid is also recorded in the remnant areas close to the Park and the continuity of this research in similar sites could show through the recapture of banded birds in these sites that there is dispersal of young and adult birds.

The Green-winged Saltator (*Saltator similis*) also presents a high number (53) of banded individuals but only 9 were recaptured until the present. This bird is found in disturbed areas and can fly to similar areas through the agricultural zones. Many young birds were banded, however it is not possible to know if they were born in this Park or they came from another areas. Anyway this species can be considered a good qualitative indicator of the importance of the maintenance of remnant forests or an archipelago of similar environment.

Little tyrannids are abundant in some seasons of the year. Among the three species that occupy both the forest and the "capoeira", is Fuscous Flycatcher (*Cnemotriccus fuscatus*) with 34 individuals captured and same site two years after the first captured, indicating a high fidelity to the regeneration zones of the Park. This is the species that seems to have the majority of its population in those secondary habitats, since the captured in the forest was lower. Its displacement potential is high allowing its distribution to other area. It is also a good indicator of the health and importance of the forest fragments.

The other two species of tyrannid that are simpatric in the same environment are the Sepia-capped Flycatcher (*Leptopogon amaurocephalus*) and the Euler's Flycatcher (*Lathrotriccus euleri*). We captured 32 birds. The first species is more common in the forest while the second is more frequently recorded in regeneration areas. Applying the same methodology to another "islands" of forest, we will be able to verify the population dynamics within those habitats.

One the most conspicuous bird species in the Park is the Blond-crested Woodpecker (*Celeus flavescens*). Until the present this Woodpecker inhabits the forest and the secondary vegetation is constantly recorded since the beginning of the study. It flies within the vegetation or above it. This bird can be used as a too for the evaluation of similar areas because it can be easily identified through its voice and appearance.

We do not know about immigration and local extinction rates of birds. Meanwhile, there are a great paucity of experimental data on other group of organisms [5] and only with the continuity of study we will obtain a better comprehension of local dynamics.

The analysis of the bird community in other "islands" of the considered archipelago will be very useful for an action plan or the protection of small forested areas. The comparison of the results of this analysis with satellite imagery at least once in a year allow the monitoring of these areas and, consequently, the orientation for ther conservation. So, one of the procedures of this work will be the utilization of the satellite imagery and its comparison with biological information from other zoological groups, as an indicator of the environment quality and also to know the patterns of movement and migration of endangered species.

Acknowledgements

The authors wish to thank Sandra Bos Mikich and Gerson Jacobs for Technical assistance.

References

- [1] MacArthur, R. H. & Wilson, E.O., 1967. The theory of island biogeography. Princeton Univ. Press, Princeton, N.J., 203 pp.
- [2] Instituto de Terras, Cartografia e Florestas. 1987. Parque Estadual de Vila Rica do Espírito Santo, Fênix, PR. Plano de Manejo. SEAB-ITCF, 86 pp.
- [3] Scherer-Neto, P. & Straube, F.C. 1995. Aves do Paraná (História, Lista anotada e Bibliografia). Ed. dos autores. Curitiba, PR. 79 pp.
- [4] Sick, H. 1985. Ornitologia Brasileira, uma introdução. Brasília. Ed. UnB. 2 vols. 827 pp.
- [5] Rey, J.R. 1984. Experimental Tests of Island Biogeographic Theory. In: Biological Communities Conceptual Issues and the evidence. Strong-Jr, D.R., Simberloff, D., Abele, L.G. & Thistle, A.B.(eds), Princeton Univ. Press, Princeton, N.J., p.101-112.