

Trophic Activities of Herons (Family: Ardeidae) in the Coastal Wetland in Buenavista, La Guajira (Colombia)

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Abstract

Objective: This investigation had as objective to describe the trophic activities of the heron family Ardeidae in units of Vegetation and Environment (EVU) of the coastal wetland Buenavista (CBH), La Guajira (Colombia). **Methods:** The CBH was divided into four sampling stations and five EVU's: beach (B), aquatic vegetation (VA), quagmire (Q), sand bank (SB) and open water (WO). The observations were carried out through censuses in points 25 fixed radio m., during 30 min. **Findings:** 340 individuals were sighted, of which the majority is found in the Q by the conditions of the place for food. The 71% of the individuals were found foraging, a fact that is given when the bird enters its peak or more than half on the substrate in search of food and 29% feeding activity; it is considered that the bird captures with his beak the dam and engullirla achieved. **Application:** The diversity of the herons was low, it was determined that the abundance of some species is due to the resources that offers this habitat and anthropogenic activities.

Keywords: Activities Food Webs, Coastal Wetland in Buenavista, Herons, Units of Vegetation and Environment

1. Introduction

Aquatic birds are an ecological indicator to evaluate the quality of coastal wetlands. In these natural habitats has been decreased biodiversity, mainly by shocks of anthropogenic origin¹. In the wetland birds play an important ecological role due to participating in links in the food web and nutrient cycling². The herons are biological species with a significant number of Colombian biodiversity affected by habitat destruction and transformation³ on the other hand, the family Ardeidae is constituted by 66 species, of which in Colombia have been recorded about 35%, and in the coastal wetlands of the Guajira Peninsula, including the Coastal Wetland Buenavista (CBH) have

been reported in the 60% of the species reported in the country⁴. This taxonomic group is important because they are part of one of the faunal components of the coastal-marine ecosystems^{2,4,5}.

Conservation strategies in tropical regions are conceived with the perception to prevent the loss of the diversity caused by the disappearance of habitat where the species with some ecological interest⁶. The choice of an area to protect is justified by the presence of threatened species, or regions with a high diversity of species such as are the case of the tropical forests, or by the presence of numerous endemic species. Another methodological approach for the selection of these areas is the formulation of biological indicators of species richness⁶. Such

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is the case that in CBH is counted with the presence of *Egretta rufescens* which is one of the herons that is in the category of threatened. Various authors agree that the ornithological research have focused on the study of the terrestrial and have had little interest in those living in coastal wetlands, mainly^{4,7}. The herons as the majority of the birds are good indicators of the biological quality of terrestrial and aquatic organisms, especially because they are tolerant to human presence, favoring its observation⁶. Wetlands are ecosystems with geomorphologic and hydrological conditions where the accumulation of water temporarily or permanently gives rise to a characteristic type of soil and/or biological species⁸. In the Guajira Peninsula, many of these bodies of water are increasing signs of deterioration in its structural and functional attributes due to overexploitation, fill, construction of civil works, water pollution, deforestation of the water rounds, and conversion of land for agriculture, erosion and fragmentation of the water system⁹.

The CBH is characterized for being a place of passage and residence of various species of birds, among which stand out the water. In addition, this is an important area

for the conservation of the coastal wetland complex of La Guajira. This habitat is not exempt to processes of deterioration by factors such as the settlements. Such is the case of four indigenous communities that inhabit its surroundings; which make extraction of timber and artisanal fishing, increase of indiscriminate hunting of resident and non-resident species with consequences in the increase in the marketing for use as pets. In addition, the increase in the activities of ecotourism is not planned; has influenced permanent disturbances and low rates of distribution, diversity and abundance of this taxonomic group⁶. The objective of this research was to determine the use of the habitat of the heron family Ardeidae, through the monitoring of their activities in the coastal wetland Buenavista (CBH).

2. Materials and Methods

2.1 Area of Study

The CBH is part of the coastal wetland complex of La Guajira, a corridor of approximately 211 km in length and



Figure 1. Area of study in Coastal Wetland Buenavista (CBH).

15 km wide along the coast. Located in the municipality of Manaure, North of the Cultural and tourist district of Riohacha. Between the coordinates 11°34' 55" N y 72° 52' 05" W. It has an area of approximately 10.40 km² and is fed by the temporary streams: Ugarrasirro, Kejemahana, Totopajaja, Cucharamahana and Marueyo. Depending on the time of year this wetland can be connected with the sea and in winter seasons, usually receives the waters of the River Rancheria, because it is in the flood plain level. The mirror of water in breadth and depth decreases dramatically during dry periods. The waters are brackish and transparent; the pH ranges between 8.10 and 8.60. The average annual rainfall in the area of studies is between 5 and 150 mm. In the area of influence of the wetland is the indigenous community La Raya; composed of 45 people, all belonging to the indigenous Wayuu community (Figure 1).

2.2 Identification and Delimitation Units of Vegetation and Environment (EVU)

The identification and delimitation of the environments are effected by Visual recognition in the field, taking into account the EVU's^{10,11}. For this study, the following EVU: *Beach - B (H1)*; it is defined as the unconsolidated materials, such as sand or gravel, which is present in the interface shore wetland, *Quagmire- Q(H2)*; are muddy areas that are protected from the direct action of the waves by sand bars. Occupy part of the mirror of water between the edge and the dry, *Aquatic vegetation-AV(H3)*; is the area adjacent to the beach, *Sand banks- SB(H4)* are mounds of sand, which are arranged inside the mirror of water. Are formed when water levels in the wetlands with the help of the northeast trade winds? Usually host ictio fag as birds and serves as resting areas for other y *Open Water - WO*



Figure 2. Sampling areas in the CBH. A= Beach, b= aquatic vegetation, C= Quagmire, D=banks of sand.

(H5); are defined as water tanks that owe their formation to the waters of the rivers, lagoons, ponds or rain water, thanks to the fact that these serve as receptors hydrological.

To study the habitat use by birds in the CBH, 2 were established monthly visits (3 days per visit), including from the 24 of October of 2012, until the 17 of November of 2013, for a total of 22 days of sampling. The study area was divided into 4 sampling stations (S1... S4), each station has about 1 Ha, which was zoned by habitats, (H1... H6) as the dominant types of vegetation and the characteristics of the substrate¹². At each station is defined two observation points of fixed radio separated by 200 m., the radius used for each point was 25 meters, for a total of 8 points¹³. Fixed radio spots were chosen taking into account, the ease of access, and the advantageous location for the observations, as well as for the photographic records, also took special care to minimize the alteration of the normal activities of birds by the presence of the observer. The distance between the points and its geographical coordinates were measured with GPS (Garmin Etrex 10). Each sampling station (S) was divided into the following sampling areas: H1: outside area of the wetland, located 6 meters from the edge of the wetland, its soil is characterized to have a great capacity of water infiltration, being of sandy-rocky, and does not possess any type of vegetation, this area is one of the access roads and communication between the different settlements of people living in the area of influence of the wetland, it is very frequent the transit of vehicles and people, H2: It is constituted of a soil type sandy, loam and saltpeter, has a sparse vegetation, composed of *Batismaritima*, grouped in small meadows, H3: prairie with peaty without vegetation cover, H4: Body of water in the wetland type brackish, with swampy, with a depth of less than 25 cm, H5: Sand Bar, with sandy soil, saltpeter, with presence of vegetation composed only by *Juncus* sp, on the periphery of the bar and H6: free water in the wetland, with a depth of more than 20 cm with swampy soil (Figure 2).

2.3 Observation and Recognition of the Ardeidos

The samplings were carried out by direct count in the area and in time defined, different methods were used on the collection of information, auditory and visual capture¹⁴. The observation time at each point was 30 minutes, taking into account that the observation time at each point was counted from arrival, as well all the morning had the start time of the 05:30 h and end-time 09:30 h, sampling of the afternoon had the start time of the 14:00 h and end-time 17:00 h. The activities were stratified in four samples in the morning and four in the afternoon. The tour was conducted in two directions, one with a home in point 1 of the 1 station and ending at Point 8 of the 4 station, in the first period of observation and the other with home in point 8 and 1 at the completion point, in the second period of observation. These tours are alternated during the three days of sampling. To move from one station to another is roamed free transects in a time of 20 min to record birds and thus avoid the ballot recount of the species⁹. For the identification of the observed species used the Field Guide to the Birds of Colombia^{14,15}. The observations and data collection were carried out with binoculars (10×25) Celestron 71133 UpClose.

2.4 Determination of the Diversity of Herons

“Para determinar la composición de la familia Ardeidae se realizó una tabla para las especies registradas con su respectiva abundancia. La diversidad se determinó usando el índice de Margalef. Con respecto al esfuerzo de muestreo se realizó una curva de acumulación de especies para el número de visitas al humedal costero Buenavista, las cuales fueron calculadas de acuerdo con los estimadores JackKnife 1, JackKnife 2 y Bootstrap. Estos últimos permiten obtener una estimación del esfuerzo de muestreo mediante una aleatorización de las muestras. Para determinar la uniformidad en la distribución de la abundancia las especies se calculó el índice de Shannon – Wiener para calcular la diversidad, se utilizó la ecuación de Simpson”.

3. Results and Discussion

The feeding activity is given from the moment in which the bird captures with his beak the dam until it makes engullirla and foraging as the process that occurs when the bird enters its peak or more than half on the substrate in search of food of the 340 registered, 79% herons were foraging and the remaining birds feeding. For foraging the ardeidos have a high preference for the dry and wet. The presence of individuals in these EVU explains the abundance in these environments because of the availability of the substrate; mainly the muddy which favors at the time of forage (Figure 2)^{4,16,17}.

Of the 340 individuals registered in this study, 30.50% of the species of herons belong to the 23 species reported in the country⁴. These data corroborate the described those who believe that in the Caribbean region is a significant number of herons reported for Colombia^{18,19}. Table 1 describes the abundance of species in the study area and *Egretta thula* with 197 individuals was the one that had the greatest abundance and species less abundant were the *Ardea herodias* and *Egretta caerulea* with an individual each.

The data reported in this study are relatively low compared to the 14 species of herons reported in several wetlands of the Guajira Peninsula, including the area of study²⁰. These results may be a consequence of the development of industrialization activities near the wetland, siltation, soil erosion and deforestation, the low presence of herons can be an indicator of the environmental quality of the wetland. The areas where the ardeidos have been identified they become important sites to conserve to other taxonomic groups that are present in the majority of the country's wetlands²¹. The above-mentioned gives standing to assert that the Herons are easy to detect, identify, quickly and easily. In addition, has information about your growth or decline in populations²².

The aim of this study in the CBH have a significant representation in accordance with the observations made are the populations of *Egretta thula* and *Ardea alba*. This representation is similar to other coastal habitats. In Table 2 we show the results of estimating indices of Margalef, and the Shannon-Wiener²³. The diversity of the CBH is low as described by the Shannon-Wiener index²⁴. The value of the Index of Margalef estimate indicates a low

Table 1. Species, absolute abundance and percentage of herons identified in the CBH during the study

Species	Absolute abundance	%
<i>Ardea alba</i>	114	33,59
<i>Ardea herodias</i>	1	0,27
<i>Egretta caerulea</i>	1	0,27
<i>Egretta rufescens</i>	11	3,23
<i>Egretta thula</i>	197	57,94
<i>Egretta tricolor</i>	11	3,23
<i>Nyctanassa violácea</i>	5	1,47
Total	340	100

Table 2. Margalef indexes, the Shannon-Wiener estimated in the CBH during the study

Índice	Valor
Índice de Margalef (D_{mg})	0,80
Índice de Shannon – Wiener (H')	0,78

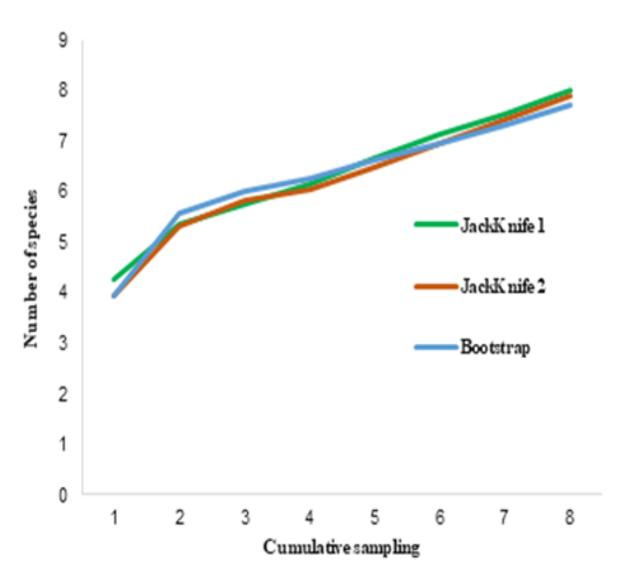


Figure 3. Species accumulation curve by random sampling in the study area.

diversity in the study area, can be associated with the non-uniform distribution of the heron family Ardeidae in the country²⁵.

The species accumulation curve according to the indices calculated in the study area, which displays the number of species observed in function of the sampling effort required to observe them you can see how the curve has a tendency to grow even above the total species observed (Figure 3). This curve presented no trend toward the asymptote, which indicates that the number of species found on the site could increase with the increase in the number of samples⁴. The number of individuals in the EVU studied: Q, BS, B, WO, and AV²⁶.

The EVU with greater abundance of the heron family Ardeidae was the Q, on the preferences of the herons

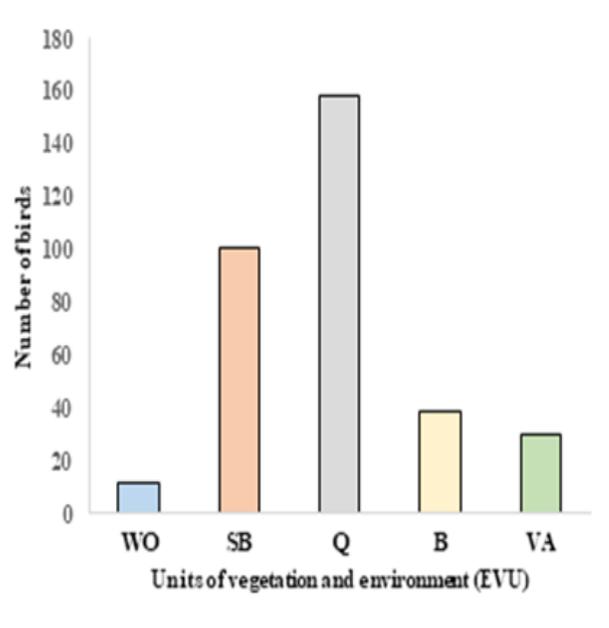


Figure 4. Number of birds per unit of vegetation and environments in the CBH during the study.

by the humid for the rest and foraging (Figure 4). The low number of individuals registered in the EVU: WO lies mainly in the average depth of the CBH (50 cm), herons have a preference for shallow water or surface water (10 to 30 cm); given that in these depths are the foods that make up your diet²⁷. Despite the fact that it was found a low diversity of herons according to the indicators used, it was determined that there is an abundance of some of the species, this due to the resources provided by this habitat. Factors such as deforestation, buildings close to the wetlands and agriculture directly affect the CBH, leading to a decline in the species of herons and the environmental quality of the wetland²⁸⁻³⁰.

4. Conclusions

In the CBH are 7 of the 23 species of herons reported for the country which corresponds to 30.5%, this confirms that a significant number of herons reported for Colombia are in the Caribbean Region. The birds studied, have represented a significant amount of species characteristic of this habitat are reported populations of *Egretta thula* (197) and *Ardea alba* (114). Like similar coastal habitats,

the family Ardeidae has a high representativeness compared to other families of the water mirror.

“Los valores de diversidad medidos con el índice de Shannon Wiener (H') arrojaron valores bajos, $H' = 0,78$ lo cual nos muestra la diversidad baja del humedal con poca equitatividad, probablemente como consecuencia de la intervención antrópica”. With regard to the index of Margalef (DMG) that indicates a low diversity which is associated with the distribution of the family Ardeidae in the country (DMG = 0, 80). The EVU with greater abundance of the heron family Ardeidae was Quagmire; (Q), which coincides with the preferences of the herons by the humid for the rest and the foraging. The low number of individuals registered in the EVU: WO lies in the fact that the average depth of the coastal wetland Buenavista is of 50 cm; and the herons have a preference for wading through shallow waters in search of food, and on rare occasions they are seen in open waters and deep.

The ardeidos have a high preference for the dry and the wet for foraging, the high presence of individuals in these EVUs, coincides with the abundance of the herons in these environments that is due to the availability of the substrate, mainly the muddy, which delimits the abundance of birds to forage. The abundance of individuals of the family Ardeidae in the EVU - Quagmire (Q) can be explained by the presence of wetlands and soft sands which can encourage foraging, to feed and spend long periods of rest.

6. References

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