

## **HABITAT CONSERVATION, BIODIVERSITY AND WILDLIFE NATURAL HISTORY IN NORTHWESTERN AMAZONIA**

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The Ecuadorian Schuar, Colombian Tikuna and Venezuelan Piaroa inhabit northwestern Amazonia. The interactions of these tribes with wildlife is quite complex, taking place for hundreds of years prior to the Spanish invasion some 500 years ago. For example, these tribes not only utilize “bushmeat” of many large mammals and gamebirds as a major protein source (Brooks 1999), but also utilize the feathers of certain species of Amazonian birds for ornamentation. While many of the tribes use feathers from various species, the main species that feathers are used (in descending order) are from Macaws (*Ara*) and Amazon parrots (*Amazona*), Great Egrets (*Casmerodius*), Curassows (*Crax* and *Mitu*), Toucans (*Ramphastos*) and various members of the family Contingidae; in some cases mammal remains are used to, such Tamarin (*Saguinus*) tails (Brooks unpubl. data). Unfortunately, many of these species are threatened by forest destruction and over-hunting in the case of Curassows (Brooks and Strahl 1997).

In this note I generally describe habitat and current levels of forest destruction in northwestern Amazonia, as well as biodiversity and natural history of some of the species utilized by Schuar, Tikuna and Piaroa.

### **Habitat description and forest destruction in northwestern Amazonia**

Average annual temperature in northwestern Amazonia is 26 Celcius, and annual rainfall exceeds 2500 millimeters (Gorchov *et al.* 1995). Whereas most temperate regions experience several seasons, the Amazon experiences two subtle contrasts over the year in water level: high water season occurs November – May, and low water occurs June – October (Brooks 1998).

The habitats in Amazonia are essentially situated along water, within forest, or a transition situation between these habitats. Regions along the immediate edges of water (e.g., marshes, lakes, streams and rivers) are often dominated by sawgrass or cane, followed by thick undergrowth further inland from the water. Island edge vegetation is similar, unless the island is young, in which case it will be monocultured with rapidly colonizing plant species that are primary successional island specialists (e.g., *Cecropia* sp., *Gynerium* sp., and *Heliconia* sp.). Aquatic edge vegetation is separated from interior rainforest by dense forest with thick undergrowth, with canopy height often not exceeding 10 - 15 meters. The exception includes floodplain, which is characterized by continuous short stems and grasses (e.g., *Tridescantia* sp.) and tall, leafy trees with trunks

spaced 5 - 20 meters apart. Primary, interior rainforest is high in plant diversity, and characterized by a dark understory due to few penetrable light gaps, and contains tall trees that form part of the canopy, buttresses, or canopy emergents (e.g., *Cedrela* sp., *Ceiba pentada*, *Ficus insipida* and *Inga* sp.), often exceeding 35 meters. Other tall trees in the region include palms (e.g., *Euterpes edulis*, *Mauritia flexuosa*, *Scheelea* sp., *Socratea* sp.), often occupying a gradient of habitats, from river edge to interior forest. Virgin forest is distinguishable from forest edge and secondary growth, because the latter habitats are often characterized by more dense undergrowth and a lower canopy that often does not exceed 17 meters (Brooks 1998).

South America accounts for nearly one-quarter of the earth's forest cover. Venezuela and Colombia each account for less than 6% of the continent's forest cover, and Ecuador accounts for slightly more than 1% (FAO 2001). Forest loss in northwestern Amazonia tallies approximately a hectare per minute (CI 2001). When considering forest cover alteration in the last decade (1990-2000), Ecuador has the most severe proportion of forest loss in the country at 1.2% per year, followed by Venezuela and Colombia (each less than 0.5% per year). When considering forest loss in South America, Venezuela accounts for nearly 6% of the continent's forests lost each year, whereas Colombia and Ecuador account for 5% and less than 4%, respectively (FAO 2001). Forest destruction threatens the wildlife, birds, and consequently the Amerindians themselves.

### **Protected areas and biodiversity: contrasts among Ecuador, Colombia and Venezuela**

As long as 2 million years ago, during the Pleistocene, forest expansions and contractions took place in Amazonia, forming the basis of the Refugia model (Haffer 1974). This theory is among the most widely accepted by scientists for explaining the dramatically high levels of biodiversity in Amazonia. Pleistocene glaciations and interglaciations were characterized by dry and tropical forest expansions, respectively. The rapid formation and dissipation of new Pleistocene biomes enhanced speciation rates in this region, with many new species appearing on the scene. Species derived from drier biomes later lived in the same regions as the tropical forest species when the forest expanded in Amazonia, forcing the dry forest specialists to adapt to tropical forest or perish.

More than one-third of Ecuador is covered in forest, and roughly 17% of the country is comprised of 20 protected areas. However, Ecuador is also the most densely populated nation in South America with the current rate of deforestation exceeding 2% per year; sadly, scientists estimate the country will be nearly denuded by 2025 (CI 2001). Due largely to the smaller size of the country relative to other South American countries, Ecuador has the highest level of biodiversity per hectare of any South American country. There are 1504 species of birds in the country, of which 11 are endemic species (occurring nowhere else on the planet) (J. Pilgrim, WCS, pers. comm.).

Approximately half of Colombia is forest cover, and roughly 10% of the country is comprised of more than 40 protected areas. Colombia ranks among countries with the highest biodiversity, if not the highest overall. For example, approximately 10% of the

planet's biodiversity is found in Colombia (CI 2001). Moreover, Colombia may harbor more bird species than any country in the world, with 1776 species (Hilty and Brown 1986), of which 65 are endemic species (occurring nowhere else on the planet) (J. Pilgrim, WCS, pers. comm.). Additionally an incredibly high diversity of amphibians is found in the country with more than 600 known species (CI 2001). The principal factors that drive the high levels of biodiversity in Colombia are: 1) the proximate location relative to the Panamanian land bridge, permitting representation from both North and South American fauna and flora, and 2) the incredibly diverse habitat mosaic, much of which is attributable to the various Andean valleys that give rise to high levels of endemic species that occur nowhere else on the planet.

Roughly half of Venezuela is forest cover, and 20% is comprised of more than 80 protected areas. While biodiversity is high, it does not approach the levels displayed by Colombia and Ecuador, with 1343 species. Nonetheless, the number of endemic species far exceeds that of Ecuador, with 43 species (J. Pilgrim, WCS, pers. comm.).

### **Natural history of wildlife utilized by Amerindians in northwestern Amazonia**

Most of the large, black feathers used in Amerindian artifacts are from Curassows – gamebirds that size up with large chickens or small turkeys, representative of a family known as Cracids. Sadly, the most remarkable thing about Cracids is that they represent the most threatened family of birds in the Americas.

As primary forest birds that roost and nest in trees, Cracids are extremely vulnerable to habitat destruction and over-hunting. Historically, cracids were an important sustainable protein source for Amerindians. However, since the 'discovery' of South America by Christopher Columbus, the rapid colonisation and steady population growth throughout Latin America has led to widespread destruction of tropical forests and over-harvesting of Cracid populations (Brooks and Strahl 1997). Nearly half of the Cracids are threatened, and several have been pushed to near extinction. Indeed, 11 of the 14 species (79%) of Curassows are considered threatened, endangered or extinct in the wild (Brooks and Strahl 2000).

Cracids are important species, not only as a protein source for local human populations, but also for regenerating the tropical forests they inhabit, by eating and dispersing seed. Scientists study Cracids to shed light on the use of natural resources by local human populations. Curassows are especially invaluable to scientists as 'bio-indicators' or barometers of human disturbance and habitat quality (Brooks and Strahl 1997) – if Curassows are absent but the habitat is in good form, that is often a sign that animals are being over-hunted in the region.

Laymen often consider macaws the 'charismatic Amazonian bird' due to their large size, loud vocalizations, and beautiful colors. There are approximately 15 living species of macaws in the world, with most belonging to the genus *Ara* (Stotz et al. 1996).

The three species of macaws whose feathers are used most frequently in Amerindian ornamentation are the three largest Amazonian macaws: the Blue-and-Yellow (*A. arauna*), Scarlet (*A. macao*) and Green-winged (*A. chloroptera*) macaws (Brooks unpubl. data). The largest of all macaws, the Hyacinth (*Anodorhynchus*

*hyacinthinus*), is one of four species of blue macaws (*Anodorhynchus* and *Cyanopsitta*) that are found in parts of South America outside Amazonia, and are all rare or extinct in the wild.

As characterized by their bright color, vivid beauty and loud vocalizations, macaws are members of the parrot family. Many species of parrots, especially *Ara* macaws, are highly threatened in several areas of Amazonia due to over-collecting for the pet trade, among other factors. Such over-collecting is one of several factors exacerbated by an ever-expanding human population. For example, population levels of macaws in the western Amazonian basin are lower in regions with higher human population densities than in more remote and pristine regions (Brooks and Begazo 2001).

The Cock-of-the-Rock (*Rupicola sp.*) is quite a spectacular species. It belongs to a bird family containing over 60 species called the Cotingas. Cotingas are characterized by tremendous variation in color and size; for example, species range smaller than a sparrow to larger than a crow, with the largest species weighs 80 times that of the smallest (Snow 1976).

The breeding behavior of Cotingas, especially the Cock-of-the-Rock, is quite spectacular – several males dance around an area of the rainforest lacking understory in what is called a “lek”. A lek is a group of males dancing in an area ‘arena style’ and vying for the female’s attention and subsequent mating rights (Brooks et al. 1999). Other species of lekking birds include manakins, grouse and prairie chickens, and even certain species of hummingbirds.

There are two species of Cock-of-the-Rock: Andean (*R. peruviana*) and Guianan (*R. rupicola*). The latter is the species found in northern Amazonia, and the male is orange, whereas most forms of the Andean species are scarlet. The Guianan Cock-of-the-Rock, while absent in Ecuador, is present in Colombia and Venezuela (Hilty and Brown 1986).

Birds are extremely important to Amerindians, primarily for ornamentation of their tools and dress. While some birds (i.e., Cracids) are an important source of protein for Amerindians, many species of mammals are the most important elements of comprising the Amerindian diet. The species most frequently consumed are: Collared (*Tayassu tajacu*) and White-lipped (*T. pecari*) Peccaries, Gray (*Mazama americana*) and Red (*M. rufa*) Brouck Deer, large rodents including Capybara (*Hydrochaeris hydrochaeris*), Paca (*Agouti paca*) and Agouti (*Dasyprocta sp.*), and Lowland Tapir (*Tapirus terrestris*). Other species of mammals taken include various species of Primates, Armadillos and Anteaters, and Coatis (*Nasua*).

Unfortunately, like Cracids, species such as Woolly (*Lagothrix lagotricha*) and Spider (*Ateles sp.*) Monkeys, as well as Tapir cannot sustain intensive harvest. In the case of the tapir, the intrinsic reproductive constraints of this species make sustainable harvest virtually impossible: the long inter-birth interval of every third year, low litter size of one offspring, and short breeding duration of most mature females makes this species quite rare where it is harvested (Bodmer and Brooks 1997).

The interactive dynamics of seed cropping and dispersal by certain Amazonian mammals is truly fascinating. Species such as Peccaries serve to crop seeds, whereas Tapirs will disperse seeds far from the parent plant, insuring gene flow within the plant

population to prevent chronic inbreeding depression (e.g., Fragoso 1997). The effects of seed predation are just as important to insure a given plant species does not dominate a specific patch of forest. Amazonian animal ecologists are only beginning to uncover the intricate interactions of this precious ecosystem which we all hope to preserve for many generations to come.

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