Birds of Rio Muni

Matt Shirley
Yale University
615 Waterside Way
Sarasota, Fl 34242 USA
matthew.shirley@aya.yale.edu

B. Britten Harter
Yale University
britt_harter@yahoo.com

Summary

Equatorial Guinea was chosen for study because little is known about the avifauna of the mainland (Rio Muni) of this small, central African country. Less than 350 bird species are presently listed for Rio Muni; however, as many as half of these are restricted-range species and up to 7 are listed in higher threat categories. Before conservation efforts could be pursued for these regions, it was critical to obtain more detailed surveys of the diversity of species found there. The objective of this study was therefore to determine the avian species richness within this region for two sites: Monte Mitra and the Rio Muni Estuary.

The survey of Monte Mitra yielded 145 species including 108 species restricted to the Guinea-Congo Forests biome (A05) and 1 species, *Phylloscopus herberti*, which is restricted to the Afro-tropical Highlands biome (A07). Two afro-montane species, *Phylloscopus herberti* and *Dryoscopus angolensis*, two species of notable water birds, *Bostrychia rara* and *Podica senegalensis*, and three restricted-range species to the Cameroon and Gabon Lowlands Endemic Bird Area (EBA 085), *Hirundo fuliginosa*, *Picathartes oreas*, and *Malimbus racheliae*, were detected. The most remarkable encounter was the discovery of the Globally Threatened bird *Picathartes oreas*. We observed 9 individuals, 4 nesting sites, and one active colony with an active nest of this enigmatic species. At the Rio Muni Estuary 23 species of water birds were encountered. Of these, 12 species appear to be resident breeders with sustainable populations, while the remaining 11 species are either migrants or uncommon breeders. None of the species encountered here are listed in higher threat categories or are restricted-range species.

In addition to species surveys, conservation efforts were furthered in Equatorial Guinea through the training of local counterparts and donation of equipment to the project INDEFOR. At the Monte Mitra site botany technician Ildefonso Ndong was instructed in aspects avian conservation and field applications. Our team was also able to leave a pair of Eagle Optics Denali 7x32 waterproof binoculars and a Bausch & Lomb Elite 80 mm spotting scope with 20-60x zoom magnification on a Manfrotto tripod system so that technicians from INDEFOR may be better prepared practitioners of conservation.

Conservation in Equatorial Guinea has been, and will continue to be, hindered by a turbulent political past and an on-going economic famine. Threats such as bushmeat hunting, logging, and an increasing population continue to negatively impact the biodiversity in Rio Muni. From an avian perspective, the Monte Mitra region should be considered a key area for conservation, with *Picathartes oreas* acting as a flagship species for bird conservation. This area is likely to provide a stronghold for this species, and the many restricted range species, found there, as it is removed, due to its inaccessibility, from the major threats affecting other parts of the country. Large-scale spending and conservation efforts, however, cannot not be justified avifaunally at the Rio Muni Estuary. Given the relative absence of both bird frequency and species diversity at this site, and the Estuary's relative safety from immediate threats, we feel it is unnecessary to pursue immediate conservation action at the Rio Muni Estuary.

Introduction

Equatorial Guinea is a small country in central Africa comprised of two offshore islands (Bioko and Annobon) and a larger mainland portion (Rio Muni). This project is concerned with the mainland, which lies between Gabon, Cameroon, and the Gulf of Guinea. The country covers approximately 28,051 km^2 (26,017 km^2 in Rio Muni alone) and has a population of nearly 523,000 inhabitants (Forests Monitor 2001, CIA 2004). It remains the only Spanish-speaking country in Africa despite its independence from Spanish colonial rule in 1968. The current government is a republic; however, President Teodoro Obiang Nguema Mbasago has been in power since he usurped the seat in 1979. Like many democracies that have risen from dictatorial rule in the third world, elections are inconsistent and "flawed" (U.S. Department of State 2001, CIA 2004). Until 1996 the economy was almost solely driven by cocoa, coffee, and forest resources exports; however, the economic focus has almost completely shifted to oil since large deposits were found offshore from Bioko. Despite the large oil revenue, the country's per capita GNP remains low (below $2000USD) while the majority of the population is forced to subsist on small-scale agriculture and bushmeat hunting (Forests Monitor 2001, U.S. Department of State 2001).

Equatorial Guinea was chosen for study because little is known about the avifauna. It is estimated that 78% of Rio Muni remains forested, and for this reason most of the country verges on inaccessible. Inaccessibility and political instability have made it difficult for biologists to comprehensively study the area. However, one notable study by Fa and Garcia (2001) concluded, "Conservation of the Monte Mitra region is impossible unless the hunting for profit issue is resolved in Sendje and adjoining villages." Only a few areas in Rio Muni have been assigned elevated status of importance, and of these only one, the Monte Alen National Park, is being actively protected in any form. Logging companies continue to exploit national park areas, and unless the environmental importance of these areas is highlighted, the habitat will be lost.

Little is known of the avifauna of Equatorial Guinea. Most current research focuses on Bioko and Annobon (Fry 1961, Naurois 1994, Perez del Val 1996). Less than 350 bird species are presently listed for Rio Muni (Dowsett-Lemaire and Dowsett 1999, Perez del Val 2001), a much smaller number than expected through extrapolation of the avifaunas of neighboring Cameroon and Gabon (Borrow & Demey 2002). Currently there are four species known from Equatorial Guinea that are listed as Globally Threatened by BirdLife International, and of these only one, *Picathartes oreas*, occurs in Rio Muni. There are 6 species listed in varying categories of threat from Data Deficient to Near Threatened and Vulnerable. Furthermore, 4 species are restricted to the Cameroon-Gabon Lowlands EBA, and as many as half are restricted to the Guinea-Congo Forests Biome (A05), in both of which Rio Muni is geographically located.

Rio Muni contains two Important Bird Areas (IBA): Parque Nacional de Monte Alen and the Parque Nacional de Los Altos de Nsork. Neither site is currently protected from such threats as habitat loss and bushmeat hunting, which could impact bird populations. Before conservation efforts can be pursued for these regions, it is critical to obtain more detailed surveys of the diversity of species found there. The objective of this study was therefore to determine avian species richness within this region for two sites: Monte Mitra and the Rio Muni Estuary.

Site Descriptions

Monte Mitra

Monte Mitra is a low altitude, forested peak in the southwest corner of the Parque Nacional de Monte Alen. Dowsett-Lemaire and Dowsett (1999) recorded 248 bird species at Monte Alen, and they suggested that their findings demonstrate the importance of middle altitude hills as intermediate refuge zones between the mountain chains of Cameroon, Angola, and eastern Africa. It is with this notion

that Monte Mitra was chosen as a study site, to determine if it too was important as a middle altitude refuge zone similar to Monte Alen.

Monte Mitra is the highest peak in the region. The area surrounding Monte Mitra is a series of lowland, evergreen, forested hills ranging in altitude from 250 m to 1140 m at the peak of Monte Mitra. The forest appears to be primary; however, the presence of an old logging road demonstrates it was at least selectively logged for the commercial timber industry in the recent past.

On the slopes of each peak the forest canopy is characterized by being approximately 80-90% closed and generally no more than 25 m in height. In between each slope the forest was characteristically lower in height, generally reaching no more than 20 m, and as expected, these areas were comprised of denser understory vegetation and wetter conditions.

The hydrology is typified by an intense network of waterways, with rivers up to 20 m wide and smaller, interconnecting streams of less than 5 m in width. All rivers and streams inside the forest are at least seasonally inundated, with the majority having at least a small amount of permanent water. This network of waterways has served to create a landscape where large rocks, boulders, and caves/outcroppings are abundant and in areas of steeper slope at least one waterfall with a height in excess of 20 m was present. Additionally, there are several ponds of unknown depth, the largest of which was no more than 40 m x 20 m. These ponds appear to be permanent, because we observed, at the end of the dry season, that all pond sites contained water. None of these permanent water holes were found inside the forest, all occurred next to the old road at the forest edge leaving questions as to their origin. Next to the road at the forest edge were several seasonally flooded landscapes characterized by dense ferns and hydrophilic grasses.

Many trees in the area have large buttress roots or "stilt" roots, with the largest concentration found in rocky areas and areas with increased inundation. Insect diversity seems to be moderate with the greatest diversity, at least superficially, present in the Hymenoptera, Lepidoptera, and Isoptera. The landscape is littered with terrestrial ant columns in addition to concentrations of arboreal ant nests. Furthermore, there existed an extreme density of cicadas that seemed to be in the peak of their breeding cycle, as was evidenced by their non-stop calling at an almost deafening level for up to 8 hours a day.

There appears to be a serious paucity of true microhabitat variation throughout Monte Mitra. No areas with any real density of lianas, bamboo, heterogeneous canopy height, large tree fall gaps, or marshy wetlands were encountered.

At the summit of Monte Mitra the forest was stunted (≤10 m), and trees were covered in mosses and epiphytic plants. The ground was soggy and in places unstable. Unlike other parts of the surrounding forest, the understory was moderately dense. This is expected given the low canopy height and the relative degree of openness. Above 850 m there were no level areas until the peak at 1140 m, and the slope was fairly steep ranging 35º-65º. The peak is better classified as a ridge where the maximum width was no more than 50 m before it dropped off either side onto steeper slopes. Temperatures averaged 5-8 ºC cooler than at the base, and there was a constant fog. There were no true water reserves above 850 m.

Rio Muni Estuary

The Rio Muni Estuary, classified by the government as a Natural Reserve, is located on the southern border with Gabon. Perez del Val (2001) suggested the Rio Muni Estuary is likely to qualify for IBA status; however, detailed surveys of the site are needed. This site was chosen for its potential as an IBA under the provision that migratory and breeding sea, water, and shorebirds utilized the area year round. In 2003, it was listed as a Ramsar Site of International Importance under the Ramsar

Convention on Wetlands. Although the area is afforded status as a Reserva Natural, it is currently not protected in any way and had not been surveyed, resulting in an unknown level of environmental importance.

The Rio Muni estuary is a tidal, mangrove-lined river system comprised of a series of large rivers, most notably the Rios Muni and Congue. The forest surrounding the estuary is thought to be similar to other forest ecosystems in Equatorial Guinea, and is contiguous with the mangrove zone immediately adjacent the estuary that provides up to a kilometer of vegetation buffer zone along the rivers edge. No mud, sand, or rock banks remain permanently exposed; however, during low tide several mud and rock islands of varying sizes are exposed in addition to the shoreline. Small (no more than 10 m x 5 m) and medium (no more than 2 ha) tree islands are found throughout the estuary.

Materials/Methods

Monte Mitra

Monte Mitra was surveyed from 05 February 2004 to 07 March 2004. The base of Monte Mitra is located 29 km southeast of the village of Sendje and is accessible only by foot. ECOFAC recently constructed a hut at this location which we utilized as a permanent base camp. We determined our study area to be the entire north face of the peak as well as all forest within 3 km north of the logging road to a distance of 4 km east and 4 km west of base camp. An initial period was devoted to learning the common birds of the area. The entire cline of habitat variation and climate was observed and the entire 24 hour cycle was covered throughout the survey period in order to ensure that crepuscular and nocturnal birds were detected in addition to the diurnal assemblage. Where available, the tracks of Forest Elephant (*Loxodonta cyclotis*), dry riverbeds, or natural topographical features were followed to minimize environmental impact from cutting trails; however, this was not always possible, and we re-opened some trails with machetes. The region from the base of the mountain up to 800 m in elevation could be surveyed readily during a single day or night excursion. To best study areas above 800 m and to assess bird assemblage changes over altitudinal grades, a party spent 6 continuous days surveying from 760 m to 1140 m. Only the northern, eastern and western faces of the mountain were surveyed due to logistical and safety constraints. Over the 32 survey days we did not encounter an area that was markedly different in habitat composition, and for this reason are operating under the assumption that no real habitat variation was missed by not surveying the southern face.

Identifications were made by two primary methods: visual with reference to *A Guide to the Birds of West and Central Africa* (Borrow and Demey 2002) and *Birds of Africa* (Fry *et al.* 1988-2004), and acoustically with reference to *African Bird Sounds: Birds of North, West, and Central Africa* (Chappuis 2000). At all times sound recording equipment was carried into the field. We used the Sony MZ-N10 portable mini-disc recorder and the Marantz PMD-222 cassette recorder coupled with a Sennheiser ME-66 shotgun microphone. In addition to recording and playback from calls taped in the field, we also employed playback from pre-recorded calls taken from Chappuis (2000) in an attempt to detect vocally inactive or cryptic species.

A third survey method came from the use of mist nets. Four nets measuring 10 m x 3 m were deployed for a total of 150 net hours. The nets were placed at ground level and spread over 0.5 km to cover a range of microhabitats within the existing, limited variation. All birds caught were measured for wing cord, total length, tail length, bill length to skull, bill length at mid-nares, tarsus length, and body mass. Additionally, all birds netted were photographed frontally, laterally, and dorsally with wingspread.

All positive identifications were recorded using the MacKinnon List method (Bibby *et al.* 2000a, 2000b) in order to create a species discovery curve and estimate the completeness of our survey (Fig. 1).

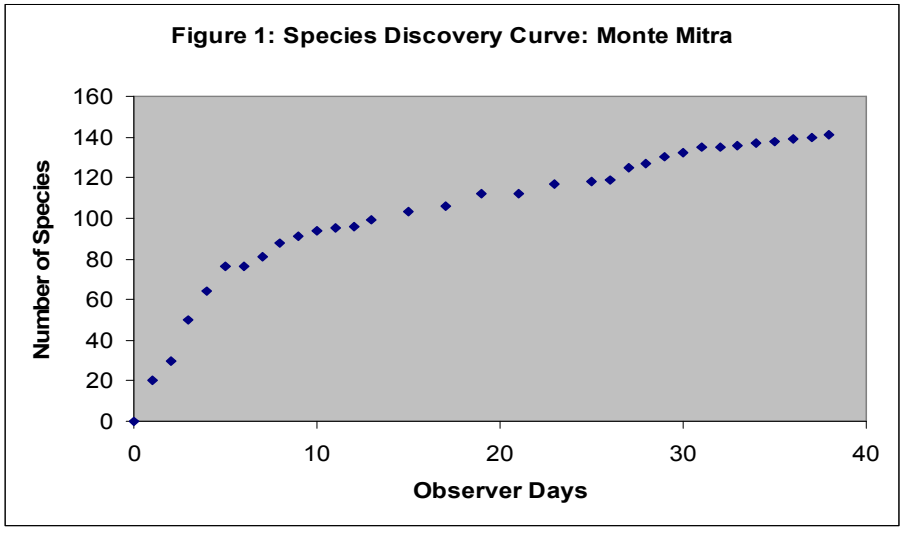
Rio Muni Estuary

The Rio Muni Estuary was surveyed from 19 March 2004 to 26 March 2004. Because the estuary is almost entirely surrounded by mangroves, surveys were conducted by boat from the town of Cogo. Cogo is reached via Akalayong at the southern end of the Rio Muni road from Bata. Surveys took place between 7 am and 7 pm at all tide levels for one and a half days in each of the main river branches with an additional day spent traveling out into the Gulf of Guinea to the Isla Elobey. River surveys were conducted into the farthest reaches of each river until the bordering mangroves made them impassable. Additionally, foot surveys were conducted at small encampments along the estuary, as well as from the forest edge surrounding the town of Cogo and the village of Rio Muni. All identifications were made visually with the aid of binoculars and a Bausch & Lomb Elite 80mm spotting scope with 20-60x magnification.

Results

Monte Mitra

The 32 day survey at Monte Mitra recorded 145 species (Appendix A). From the MacKinnon Lists compiled, the data generated the species discovery curve shown in Figure 1. While the data do generate a shape that approximates a logarithmic curve, it is important to note that the curve does not level off entirely, suggesting that more species could be found.



Two afro-montane species, *Phylloscopus herberti* and *Dryoscopus angolensis*, were detected. Additionally, two species of noteworthy water birds were encountered, *Bostrychia rara* and *Podica senegalensis*. The most remarkable encounter was the discovery of the Globally Threatened bird *Picathartes oreas*.

We encountered at least 108 species restricted to the Guinea-Congo Forests biome (A05) and 1 species (*Phylloscopus herberti*) that is restricted to the Afro-tropical Highlands biome (A07). *Phylloscopus herberti* was previously thought to be endemic to the Cameroon Mountains and a part of the Cameroon Mountains Endemic Bird Area (EBA 086); Monte Mitra represents only the second site where this species has been found to coexist with its semi-montane congener, *Phylloscopus budongoensis*. Three species (*Hirundo fuliginosa*, *Picathartes oreas*, and *Malimbus racheliae*) are restricted-range species in the Cameroon and Gabon Lowlands Endemic Bird Area (EBA 085). The

fourth species found in Equatorial Guinea that is restricted to this EBA, *Batis minima*, was not encountered at Monte Mitra. This species tends to be recorded from open canopy forest or forest edge habitat in or near primary forest (Dowsett-Lemaire and Dowsett 1999, BirdLife International 2003). While we do feel that this bird may occur in the forests of Monte Mitra, there is relatively little habitat congruent with its supposed requirements.

Relatively few frugivorous birds were identified. For example, despite multiple daily encounters with *Psittacus erithacus* in flight, only one individual was observed foraging on or near the mountain. Although frugivore encounters increased over the study period, many expected birds remained undetected. This was most notable in the Columbidae, Bucerotidae, Indicatoridae, and Sturnidae.

Non-avian vertebrates encountered throughout our surveys include the reptiles *Osteolaemus tetraspis*, *Kinixys bellmahni*, *Bitis gabonicus*, *Atheris squamiger, Chameleo sp.*, and *Varanus niloticus*, and the mammals *Panthera pardus* (scat), *Loxodonta cyclotis* (dung and tracks), *Pan troglodytes* and *Gorilla gorilla* (scat and anecdotal), *Colobus satanas*, *Papio sphinx* (voice), *Galago sp.* (up to 3 different species seen), and *Cephalophus sp*.

Picathartes oreas

Four nesting sites containing 7 nests, including one active colony, and nine individuals of this Globally Threatened species were observed. Most observations of *Picathartes* were consistent with other observations (Serle 1952, Tye 1987, Thompson and Fotso 1995, 2000). Nest sites were in rocky caves or outcroppings found inside the forest no closer than 1 km to the nearest edge. All nest sites were located within 100 m of permanent or seasonal waterways and within 2 km of each other. Individual nests were positioned 1.5-3 m off the ground and protected from above by an overhang or outwardly sloping rock face and below by sheer rock face or air. The nest cups were constructed of mud reinforced with roots and other fibrous materials plastered to cave faces with mud flanges. The nest lining of the active nest was a woven basket of roots and other coarse fibrous material. The adults around the active nest were heard and recorded making the typical "hhhsssssssshhhhh" hissing or grumbling scolding call. The nestlings, in contrast, were not heard making any sound. The active nest contained two nestlings of nearly equal size and weight (88 g) with eyes open and pins 5% broken. Guano around the nest included remains of crustaceans (freshwater crabs) and insects. Four adults were observed inside the cave and within 10 m of the active nest. At least three of them were seen to be carrying food at the same time, and while they were unmarked and not individually recognizable, we believe that at least three different individuals carried food to the nestlings. After biometrics and photographs were taken and the nestlings returned to the nest, adults were seen feeding the nestlings and resuming normal activity. When we returned three days later for further measurements and observation, the nest was found empty. One bird was observed to scold near the nest and then rip at the nest lining with its beak. No signs of nest destruction or remains of the nestlings were found leading us to believe that the nestlings may have been cannibalized by a member of the colony. Tye (1987) also recorded this activity in *Picathartes*.

Rio Muni Estuary

Seventy-three species were observed within the Estuario del Rio Muni (Appendix A). We observed the resident breeding birds *Butorides striatus, Egretta garzetta,* and *Scopus umbretta*, and low numbers of migratory seabirds including *Sterna caspia*, *Sterna maxima*, *Sterna hirundo*, *Sterna paradisaea*, *Sterna sandvicensis*, and *Chlidonias niger*, as well as shorebirds including *Numenius phaeopus*, *Tringa nebularia, Calidris alba, Actitis hypoleucos*, and *Charadrius marginatus*. With the exception of *Sterna maxima*, *Sterna hirundo*, *Numenius phaeopus*, and *Actitis hypoleucos*, none of the birds seen numbered more than 10 individuals.

Training & Equipment

Accompanying our research team was a botany technician from the Proyecto del INDEFOR, Ildefonso Ndong. Sr. Ndong was instructed in the following avian conservation and field applications: avian conservation theory, bird identification, taxonomy and systematics, bird habitat use and interpretation, binocular and spotting scope use, mist netting including net site choice, net erection, solo net closure and dismantling, bird extraction, and the use of metric instruments to take standard biometrical data. Additionally, our project was able to obtain a pair of Eagle Optics Denali 7x32 waterproof binoculars and a Baush & Lomb Elite 80 mm spotting scope with 20-60x zoom magnification eyepiece mounted on a Manfrotto tripod system to leave at INDEFOR. Proper field equipment will further allow the progress of conservation efforts in Equatorial Guinea.

Discussion

Monte Mitra Species Survey

The list of species compiled for the Monte Mitra region contains several gaps where approximately 60 species remained potentially undetected when compared to other regions of the Parque Nacional de Monte Alen (Dowsett-Lemaire and Dowsett 1999). The most obvious factor leading to these gaps is the time of our study relative to the breeding season. Our survey at Monte Mitra was designed to coincide with the early stages of the breeding cycle to include territory and mate selection for most birds we predicted would be present. However, the breeding cycle had reached the later nestling and fledging phases for the majority of species encountered during our study. This was indicated by the discovery of many active nests and the abundance of fledglings or juveniles of many species. Our concurrence with the nesting and fledging season was also apparent as birds not seen in the first 2-3 weeks appeared in small family groups or in mixed juvenile flocks. Our miscalculation of the breeding season hampered species discovery because identification techniques such as playback were relatively ineffective. Additionally, the adults of most species were focusing their attention on keeping active nests concealed while feeding nestlings and fledglings rather than engaging in the conspicuous activities of defending territories or displaying. In particular, birds from the Accipitridae, Muscicapidae, Lanidae, and Malaconotidae, are relatively difficult to detect or identify when not singing or calling. We suggest that a more appropriate time to survey this region would be the beginning of the dry season in December.

The second possible explanation for the gaps in species composition is the relative lack of habitat heterogeneity when compared to other regions in the Parque Nacional de Monte Alen. The regions surveyed by Dowsett-Lemaire and Dowsett (1999) contained more edge habitat, regions of cleared land, a larger variety in river flow speed and size, more open canopy forest, and more habitat area at higher elevation. In contrast, the region around Monte Mitra consists mainly of continuous primary forest. Monte Mitra contains only one true edge habitat, the abandoned logging road. The road is "new" compared to the roads encircling the peak at Monte Alen, and is in the process of succession back to tropical forest. Additionally, the erosion caused by the creation and use of the cleared logging road most likely formed the few areas of standing water, which are small pools and "swamps". Many of the undetected birds could be explained by this lack of secondary and degraded habitat. And in the case of certain species detected by Dowsett-Lemaire and Dowsett (1999), such as *Bubulcus ibis*, *Milvus migrans*, *Turtur afer*, *Centropus monachus*, *Cypsiurus parvus*, *Ceyx pictus*, *Halcyon senegalensis*, *Pycnonotus barbatus*, *Cisticola anonymus*, *Prinia bairdii*, *Camaroptera brachyura*, *Corvus albus*, *Passer griseus*, *Ploceus cucullatus*, *Pyrenestes ostrinus*, *Estrilda spp.*, and *Lonchura spp.*, their absence is a positive sign of forest habitat continuity and lack of disturbance.

The third possible cause for the gaps between expected and detected species at Monte Mitra is the lack of fruiting trees. In the initial three to four weeks of survey no trees were observed fruiting, although

this did change gradually during our final two weeks which coincided with the beginning of the rainy season; however, the timing and duration of our study and the consequent initial paucity of fruiting trees was most likely responsible for the extreme under representation of certain groups including the Columbidae, Bucerotidae, Capitonidae, Indicatoridae, and Sturnidae. In all we expect that up to 20 species from these groups alone were not present, or at least undetectable, due to this phenomenon.

Rio Muni Species Survey

Our observations indicate that few bird species in the Pelecaniformes, Anseriformes, Ciconiiformes, Falconiformes, and Charadriiformes utilize the estuary, and of the species found there, none are listed in higher threat categories or are restricted-range species. Additionally, very few of the birds were found in great density. We are confident that no large concentrations of species went undetected. There is a small handful of undetected species that are likely to utilize the estuary including *Egretta intermedia*, *Tigriornis leucolophus*, *Glareola nuchalis*, and *Sterna balaenarum*; however, mostly due to their individual ecologies, it is highly unlikely that these birds are ever found there in high concentration.

The estuary appears to be prime habitat for water birds, including migrants; however, it was characterized by its emptiness. Whole sand bars would be stalked by a pair of *Butorides* or nothing at all. The area is likely unappealing to many shorebirds because of the lack of permanent sand/mud banks, shoreline, or rocky areas lining the water. What is there is only available on a tidal basis leaving the birds without suitable habitat for half of the day. Furthermore, the area is surrounded by relatively undisturbed forest habitat leaving no room for salt pans, grass prairie, fields, or any other open type habitat that could be utilized by such birds as *Circus aeruginosus*, and any number of Rallidae, Charadriidae and Scolopaciidae whose migratory/wintering ranges include the coastlines around the Bight of Biafra and the Gulf of Guinea. Finally, the forest surrounding the estuary, even as far as 8 km inland, is bordered immediately adjacent to the water by a thick band of mangrove forest. Because of this, suitable habitat is lacking for the 2 species of duck (*Pteronetta hartlaubi* and *Anas sparsa*) known to inhabit forested streams and rivers throughout the rest of the country. Additionally, while interviews with local people suggested that estuary birds were not hunted for bushmeat, ducks are notoriously easier to catch and are a more productive food source than other water birds. Therefore, ducks may be under some amount of hunting pressure if they do ever enter the waters of the estuary.

In addition to the surveys of water birds, we were able to inventory species found in the forest and other habitat surrounding the estuary. We recognize the incomplete nature of our species list for land birds, and the information should only be considered supplemental to enhance the knowledge of bird distributions around the country. In addition to the 108 species restricted to the Guinea Congo Forests biome found in Monte Mitra, 3 more species were found here. Though undetected, it is likely that *Batis minima* will be found in the forests surrounding the estuary given the larger proportion of suitable habitat for this species.

Conservation Assessment

To fully understand the potential future of conservation in mainland Equatorial Guinea, it is first necessary to understand the current state of affairs. In 2000, the Ministry of Forests and the Environment ratified legislation that established 4 levels of protected area within Equatorial Guinea (Perez del Val 2001, Crisantos Obama pers. comm.). These include National Park (Parque Nacional de Monte Alen, Parque Nacional de los Altos de Nsork), Natural Reserves (Estuario del Rio Muni, Rio Campo, Monte Temelon, Punta Llende, Corisco y Elobeyes), Scientific Reserves (Reserva Cientifica de Playa Nendyi), and Natural Monuments (Piedra Bere, and Piedra Nzas). The examples listed are the 10 protected areas in Rio Muni and do not include those on the offshore islands. It is unfortunate to report that while the government has shown strong initiative by developing “protection-

on-paper" for these areas, they have not proven that conservation action is a high priority. The Ministry of Forests and the Environment (Ministerio del Bosques y Medio Ambiente) was recently changed to the Ministry of Forests and Infrastructure (Ministerio del Bosques y Infrastructura). This seemingly illogical combination of jurisdictions makes more sense as the current minister is now eligible to sell logging concessions and grant permission to build roads for easier access to areas to be logged.

Currently, two bodies exist in Equatorial Guinea to research and protect these designated areas. The first was a European Union funded project established in 1996 named CUREF (Conservacion y Utilizacion Racional de los Ecosistemas Forestales). This project, however, ran out of funding in 2003 and has changed into a government-funded body by the name of INDEFOR (Instïtuto Nacional de Desarrollo Forestal y Gestion del Sistema de Areas Protegidas). However, INDEFOR is currently paralyzed due to a lack of government funds. The EquatoGuinean director of this project, Crisantos Obama, is a respected botanist and conservationist who employs every effort to encourage the research of fauna and flora of Rio Muni. He acknowledges potential benefits and willingly cooperates with foreign entities that wish to do research in the country, and he is currently soliciting aid, in the form of personnel and funds, from Conservation International. In addition to Sr. Obama, there are several other botanically trained INDEFOR staff seemingly dedicated to conservation but they are faced with some professional limitations. Due to a lack of resources, they are mainly trained in just the basics of flora identification, usually limited to one or two plant families. The staff recognizes the need to progress in other areas of biology but the absence of courses and books inhibits this development. On a traditional level, it is seen as more prestigious to work for a government body and many of the employees of INDEFOR are from relatively affluent families allowing them to succeed through will or connections to have higher education and to work there. As a result some may be temporarily passionate about the conservation of their country more for its employment status than its outcome.

The other organization is ECOFAC (Conservation et Utilisation Rationelle des Ecosystemes Forestiers en Afrique Centrale) which exists throughout central Africa with EU funding, and in Equatorial Guinea with Spanish cooperation and funding. ECOFAC is charged with the long-term management and conservation of the Parque Nacional de Monte Alen. They have created a system in which locals from the villages surrounding the borders of Monte Alen (i.e. Moca, Niefang, and Evinayong) are hired as park rangers. Their main duties are to police illegal activities in the park, to monitor the movements of certain flagship species like the lowland gorilla and the forest elephants, and to guide visiting researchers and eco-tourists. To accommodate the researchers and tourists, ECOFAC has established the Hotel Alen, as well as a rudimentary facility for researchers, and they have erected lean-tos throughout the park for overnight stays. Unfortunately, due to unstable and occasionally corrupt management, ECOFAC has been experiencing some difficulties in carrying out and maintaining its objectives at a grass-root level. Shortage of reliable transport and bad leadership means that the eighteen guards are unable to patrol the entire park efficiently or even regularly. Though trained in various potentially useful methods of patrolling such as cybertracking, these skills are not used and hunting is still rampant throughout the park's interior and to areas near Monte Mitra. Additionally, from an altruistic point of view, many of the guards find cutting traps or confiscating bushmeat difficult when it is the main source of diet and income for them and their families.

The future of foreign research and eco-tourism in Equatorial Guinea is clouded by a turbulent political past. We combine these two seemingly unrelated activities into one discussion, because they are linked by their common goal of utilizing the country's natural resources and common needs for existence. In most countries in the world, it is necessary to obtain permission from the government or some local conservation NGO to conduct research. Additionally, it is necessary and prudent to include these local entities, or at least personnel from them, in the research. This is no different in Equatorial Guinea; however, Equatorial Guinea presents an extreme case. Fortunately, obtaining permission and the appropriate documentation is relatively easy, as the local directors of INDEFOR

and, to a much lesser extent due to their status as an NGO, ECOFAC are both very cooperative. However, INDEFOR not only requires that you have a field technician from their organization, but they require that you pay the salary of this individual(s) as well as their board. In our case, supporting our INDEFOR intern was more expensive than the other four members of the expedition combined. To further exacerbate the issue, our experience was that these individuals are more than content to shirk responsibilities and instructional opportunities. Once a researcher has obtained documents and local cooperators, the next challenge is arriving at the field site. Travel is where the connection of research and eco-tourism is most evident. The roadways are lined with police and military barricades. Each one requires travelers to stop for as short as 5 minutes to as long as 2 hours while the guards interview the travelers and often search their gear. Travelers with authorization from proper authorities are not normally hassled extensively; however, most blockades require a bogus "vehicle registration fee" and/or attempt to solicit some other bribe which can seriously whittle down funding. Travelers who lack proper documentation, which includes stamped passports, and signed and stamped letters of authorization, which tourists are almost certain to lack, are at the whim of the blockade and will be subject to extensive searches, random confiscation, and inflated "fees" simply to pass, or if they are unlucky, to stay out of jail. We were routinely hassled by a variety of government officials on the street who required our passports and papers at all hours of the day and night. We see the paranoid political system as an ultimate barrier to both research and eco-tourism.

Aside from the large threat posed to conservation from the government, there exist two other major threats. The first is logging and forest clearance. Fortunately, this practice has slowed to a crawl in recent years, but this is only because the government is more interested in the revenues it is earning from offshore oil ventures. Interviews with oil company personnel suggest that these reserves will last no longer than 10-15 years, at which time logging and small amounts of agricultural exports will again be the main sources of revenue for the country. Despite the designation as protected areas, loggers are not actually barred access to Parque Nacional de Monte Alen and the Reserva Natural del Estuario del Rio Muni.

The second major threat is bushmeat hunting. This is the primary vocation for males living outside major cities. Hunting is almost indiscriminate, without regard for the borders of protected areas. Compared to other groups, very few birds are actually taken. These birds include the hornbills, turacos, guineafowl, almost anything else of size on an opportunistic basis, and parrots for the illegal pet trade. The mammals, including primates, duiker, leopard, antelope, and wild pigs, crocodilians and giant land snails feel the bulk of the pressure. Several studies have examined this issue in the past, and at least one more is currently underway examining the issue. All have concluded that for at least certain faunal groups if not whole ecosystems, this will be a major threat to their conservation and continued existence (Fa *et al.* 1995, Fa *et al*. 2001, Garcia and Mba 1997, Albrechtsen pers. comm.). Additionally, despite the potential for a strong fishing-based economy, the government has thus far failed to encourage the development of national fisheries. Instead, the main fish crop comes in the form of frozen mackerel imported from Cameroon. The Guineans also do not have the resources or technology to clear land for larger-scale domestic agriculture, and thus further rely on Cameroon for the importation of all cattle and virtually all vegetables. Furthermore, because of the recent oil boom, Equatorial Guinea is considered to have the fastest growing economy in the world (CIA 2004). Because of this, Guinean nationals are returning from abroad and non-National Africans from countries like Senegal, Ghana, Cameroon, Gabon, and Congo are moving to Equatorial Guinea in search of jobs. This rapidly increasing population, when coupled with the undeveloped local economy, will further deplete wildlife by fuelling the market for bushmeat.

Monte Mitra

The area surrounding Monte Mitra will likely prove itself a much stronger candidate for long-term protection of certain key species than will most areas in Equatorial Guinea, including Monte Alen. Several factors lend to this assessment, the most obvious of which is its sheer distance from any

human settlement. The closest villages are those of Sendje and Sendje II along the Rio Muni Road from Bata. Both of these villages, northwest and southwest of the site respectively, are a minimum of 30km away through undisturbed forest. From these villages, Monte Mitra would be impossible to access with a vehicle without first clearing a road, and on foot the distance is at the outside range of efficient productivity for local hunters. While they can access the site in a long days walk, it is nearly impossible to carry any significant amount of bushmeat the return distance. One of our local guides from Sendje is the only hunter from his village to utilize the area and he reported only traveling there once a year in search of crocodiles (mostly *Osteolaemus tetraspis*, though occasionally *Crocodylus cataphractus* is encountered). The other guide, also from Sendje, was the nephew of the village president and claims that the last time a local villager climbed the peak was before his lifetime, over 32 years ago, and most locals were in fact afraid to do so. Approaching from the east at a distance of nearly 70km is the logging road, which appears to begin at the ECOFAC field office positioned along the Monte Alen road leading south from Monte Alen. While this route would appear more accessible both on foot and by vehicle, the distance is over twice as long so hunters do not come from that direction and, as mentioned above, the road is in the early to mid stages of succession back to forest and so would have to be re-cleared, and several small bridges rebuilt, before a vehicle could pass. While this information is a boon to preservation, the difficult access is the main obstacle to setting up and maintaining long-term monitoring or eco-tourism efforts similar to those at Monte Alen.

A second reason for the potential of this site as a long-term protected area is its supposed lack of commercially valuable tree species. Interviews with personnel from INDEFOR, as well as other locals, suggested that the family Burseraceae, which contains some of the most valuable species for commercial logging, is not present in high enough densities to make logging efforts worthwhile in this region of the park. Anecdotal evidence suggests that the logging road has been fallow for at least 15 years (possibly as much as 25-30 years). The degree of succession supports these conclusions. While this is mostly attributable to political factors such as de-emphasized timber production and a post-colonial proclamation that temporarily halted logging, it is also likely that the area was not productive enough to warrant continued efforts, given the continuation of logging in other regions of the country currently.

The focal point for avian conservation at Monte Mitra should be the *Picathartes oreas*. As mentioned in the results, 4 nest sites, including one active nest, and 9 different individual *Picathartes*, were observed by our team. Considering that each nest site represents a minimum of two individuals (and up to 8), all of our sightings were recorded within 3km of each other on the north face of the mountain, and this species' naturally low density throughout its range, all coupled with the observation that the entirety of forest surveyed by our team had optimal habitat, it is likely that this area holds a relatively high density of this species. Given the inaccessibility of Monte Mitra and the surrounding peaks, we predict this area could represent a stronghold for *Picathartes* conservation.

In addition to the *Picathartes* as an avian flagship species, the technicians of ECOFAC have expressed an interest in learning more about the floral and faunal compositions of the region providing prior motivation, and there is a willingness among local villagers to act as park patrols, to provide an alternate source of income, if properly trained by INDEFOR or ECOFAC. To this end, we recommend that future conservation actions within Rio Muni, and more specifically the Parque Nacional de Monte Alen, incorporate Monte Mitra and the surrounding area.

Rio Muni Estuary

It is our assessment that the birds of the Rio Muni Estuary are not at great risk from any kind of human-induced infringement. The largest threat to the estuary is logging in the surrounding forest. Currently the logging rate is not high due to the oil production and revenues in Equatorial Guinea, but it is likely to increase as oil stores evaporate. This will likely cause large-scale erosion into the estuary decreasing its viability as a fishery and making it less suitable for water birds. In addition,

there exists a large amount of fishing by the inhabitants of the villages of Cogo and Akalayong. However, it appears that this is a sustainable effort given the history of the area as a fishing-based culture, and the fact that few motorboats (ca. 10) can be found and are almost entirely used for the transport of goods and people. A third threat to the estuary is in the form of bushmeat hunting; however, interviews with local people led us to the conclusion that estuarine birds are not at risk from this threat.

Considering the lack of threats to the estuary, the avifaunal assemblage, and the low densities of species present, it is our assessment that from an ornithological perspective the Rio Muni Estuary is not a sound candidate for large conservation efforts and spending. While we do advocate the protection of any remaining natural area, within the scope of Equatorial Guinea and even neighboring Gabon with whom the estuary is shared, many more sites exist with documented conservation need that it cannot be justified in the Rio Muni Estuary. We do recommend that the biota of this area is further surveyed, and more bird surveys should be conducted in other seasons and months of the year.

Acknowledgements

This project was financed by the BP Conservation Programme (BPCP) and by the Ministry of Agriculture, Nature and Food Quality LNV and the Ministry of Foreign Affairs DGIS of the Netherlands, as part of a Wetlands International project under the International Policy Programme Biodiversity, 2002-2006 of The Netherlands. We would like to thank the above listed organizations for their support and dedication to conservation in Equatorial Guinea.

We are indebted for life to Kristof Zyskowski and Jorge de Leon without whose countless hours of help and enthusiasm this project would never have happened. We are especially grateful to Marianne Dunn, Kate Stokes, and Robyn Dalzen of the BPCP because without their patience and aid this project would not have been successful. Thank you to Crisantos Obama and the members of INDEFOR for supporting our project in Equatorial Guinea. We are also especially indebted to Brigid Barry and Lise Albrechtsen, without your help we would have been paralyzed in Bata. This project would also not have been possible if it were not for the following individuals who provided their expertise, aid, time, and criticism: Melissa Garren, Erica Westerman, Stephanie Anestis, Dr. Michael Craig, Dr. Nate Rice, Dr. Anne Yoder, Dr. Gisella Caccone, Dr. Francoise Dowsett-Lemaire, Dr. R.J. Dowsett, Richard Ranft, Amy Graham, and Pam Pannozzo. And finally, much gratitude is due to our friends and family for providing their love and support.

References

Bibby, Colin, Neil Burgess, and Simon Mustoe. 2000a. Bird Census Techniques. Academic Press, Inc, London.

Bibby, Colin, Martin Jones, and Stuart Marsden. 2000b. Expedition Field Techniques: Bird Surveys. BirdLife International, Cambridge.

BirdLife International. 2003. BirdLife's online World Bird Database: the site for bird conservation. Version 2.0. Cambridge, UK: BirdLife International.

Borrow, N., and R. Demey. 2002. A guide to the birds of Western Africa. Princeton University Press, Princeton, New Jersey.

Chappuis, C. 2000. African Bird Sounds: Birds of North, West, and Central Africa. 15 CDs. Societe d'Etudes Ornithologiques de France, Paris. 4-15.

CUREF. 1999. Mapa de Guinea Ecuatorial. Ministerio de Bosques y Infrastructura. Fondo Europeo de Desarollo. Proyecto N°6-ACP-EQG1020.

Doolan, Shawn. 1998. New Site for White-necked Rockfowl *Picathartes gymnocephalus* discovered. Bird Conservational International. 8(2): 207.

Dowsett-Lemaire, F., and R. J. Dowsett. 1999. Birds of the Parque Nacional de Monte Alen, Rio Muni, mainland Equatorial Guinea, with an updating of the country's list. Alauda. 67:179-188.

Dunning, John B. 1993. CRC Handbook of Avian Body Masses. CRC Press, Boca Raton, Fl.

Durrell, G.M. 1949. Grey-necked Picathartes. Avicultural Magazine. 55: 229-230.

Fa, John E., Javier Juste, Jaime Perez, and Javier Castroviejo. 1995. Impact of Market Hunting on Animal Species in Equatorial Guinea. Conservation Biology. 9(5): 1107-1115.

Fa, John E., and Yuste JE Garcia. 2001. Commercial Bushmeat Hunting in Monte Mitra Forests, Equatorial Guinea: Extent and Impact. Animal Biodiversity and Conservation. 24(1): 31-52.

Ferguson-Lees, J., and D. A. Christie. 2001. Raptors: birds of prey of the world. Houghton Mifflin, New York.

Forests Monitor. 2001. Sold Down the River: The need to control transnational forestry companies: A European case study. Forests Monitor Ltd, Cambridge.

Fry, C.H., S. Keith, E.K. Urban (eds.). 1988, 2000, 2004. The Birds of Africa, vols. 3, 6, 7. Academic Press, London.

Fry, C. H. 1961. Notes on the birds of Annobon and other islands in the Gulf of Guinea. Ibis 103a: 267-276.

García, J.E., and Jesus Mba. 1997. Distribution, Status, and Conservation of Primates in Monte Alen, Equatorial Guinea. Oryx. 31(1): 67-76.

Grimes, L.G. 1976. The occurrence of cooperative breeding behaviour in African birds. Ostrich. 47: 1-15.

MacKinnon, J., Karen Phillips, Paul Andrew, and Frank Rozendaal. 1993. A Field Guide to the Birds of Borneo, Sumatra, Java, and Bali. Oxford Press, Oxford.

Marian, W.R., T.E. O'Meara, and D.S. Maehr. 1981. Use of Playback in Studying Elusive or Secretive Birds. Journal of Avian Biology. 6: 81-85.

Mudd, Harvey and Rod Martins. 1996. Possible display behaviour of the White-necked Picathartes. Bulletin of the British Ornithological Club. 116(1): 15-17.

Naurois, R.de. 1994. As aves das ilhas do Golfo da Guiné (São Tomé, Príncipe e Ano Bom). Instituto de Investigação Científica Tropical, Lisboa, Portugal.

Perez del Val, J. 1996. Las aves de Bioko, Guinea Ecuatorial. Edilesa, Leon, Spain.

Perez del Val, J. 2001. Bibliografía de fauna de Guinea Ecuatorial (1831-2000), Manuales Técnicos de Museología No. 12 , Museo Nacional de Ciencias Naturales, Consejo Superior de Investigaciones Científicas, Madrid, Spain.

Perez del Val, J. 2001. Catalogo de las colecciones zoologicas de Guinea Ecuatorial del Museo Nacional de Ciencias Naturales II: Vertebrados. Museo Natural de Ciencias Naturales Consejo Superior de Investigaciones Cientificas, Madrid.

Perez del Val, Jaime. 2001. Equatorial Guinea. i*n* Fishpool, L. D. C., and M. I. Evans (eds). Important bird areas in Africa and associated islands: priority sites for conservation. BirdLife Conservation Series No. 11. Pisces Publications and BirdLife International, Cambridge, UK.

Salewski, V., F. Goken, J. Korb, S. Schmidt. 2000. Has the White-necked Picathartes *Picathartes gymnocephalus* still a chance in Lamto, Ivory Coast. Bird Conservation International. 10: 41-46.

Serle, W. 1952. The affinities of the genus *Picathartes* Lesson. Bulletin of the British Ornithologists Club. 72: 2-6.

Sibley, C.G. and J.E. Ahlquist. 1990. Phylogeny and the Classification of Birds: a Study in Molecular Evolution. New Haven: Yale University Press.

Smith, T.B. and K. Holder, D.Girman, K. O'Keefe, B. Larison and Y. Chan, 2000. Comparative avian phylogeography of Cameroon and Equatorial Guinea mountains: Implications for conservation. Molecular Ecology. 9(10): 1505-1516.

Svensson, Lars and Peter J. Grant. 1999. Birds of Europe. Princeton University Press, Princeton, New Jersey.

Thompson, Hazell S. 2001. Body mass measurements in moult of the White-necked Picathartes, *Picathartes gymnocephalus*, in Sierra Leone. Ostrich. 72(3-4): 209-222.

Thompson, HS and R. Fotso. 2000. Conservation of two threatened species: *Picathartes*. Ostrich. 71(1-2): 154-156.

Thompson, HS and R. Fotso. 1995. Rockfowl. The genus Picathartes. Bulletin of the African Bird Club. 2: 25-28.

Tye, Hilary. 1987. Breeding Biology of *Picathartes oreas*. Le Gerfaut. 77(3): 313-332.

van Perlo, Ber 2002. Birds of Western and Central Africa. Princeton University Press, Princeton, New Jersey.

Wheatley, N. 1996. Where to watch birds in Africa. Princeton University Press, Princeton, New Jersey.

Online resources:

Bioko Biodiversity Protection Program - http://www.bioko.org

BirdLife International – http://www.birdlife.org

CIA - The World Factbook 2004- http://www.cia.gov/cia/publications/factbook/

CUREF (Proyecto de Conservación y Utilización Racional de los Ecosistemas) - http://www.internetafrica.com/curef

ECOFAC (Conservation et utilisation Rationnelle des Ecosystemes Forestiers d'Afrique Centrale) - http://www.ecofac.org

Gulf of Guinea Conservation Group - http://www.ggcg.st

U.S. Department of State - Country Report on Human Rights Practices 2001- http://www.state.gov/g/drl/rls/hrrpt/2001/af/8367.htm

Birds of Rio Muni Budget Report

Transportation			
Airfare	2 x USA - Malabo - USA	$2,998.90	
Airfare	2 x Malabo - Bata - Malabo	$226.42	*
Airfare	1 x Washngton D.C. - NYC	$109.00	
Baggage Fees		$84.91	*
Boat Fuel	$28.30 x 6 Days	$169.81	*
Car Fuel	$23.87 x 2 Days	$47.74	*
Transportation		$66.04	*
Sub-total		*$3,702.82*	
Equipment			
Field Guides		$176.00	
Sound Guides		$104.00	
GPS		$260	
Water Treatment		$180	
Tent		$170	
Mist Nets	$38.75 x 4 Nets	$155	
Biometric Instruments		$100	
Sub-total		*$1,145*	
Medical			
Vaccinations		$295	
Insurance	$115 x 2 Months x 1	$230	
Sub-total		*$525*	
Personnel			
Guides	$8.21 x 37 Days x 2	$607.55	*
Intern	$18.87 x 23 Days	$433.96	*
Porters	$14.15 x 4 Days x 4	$226.42	*
Driver + Boat	$16.98 x 6 Days	$101.87	*
Sub-total		*$1,369.80*	
Food			
Field Rations	43 Days	$220.95	*
Food Bata	6 Days	$94.34	*
Sub-total		*$315.29*	
Other			
Lodging (Urban)	$13.81 x 8 Nights x 2	$275.47	*
Film Development		$100.00	
Bank Fees		$24.00	
Miscellaneous		$50.00	*
Communications		$35.00	*
Water		$94.34	*
Sub-total		*$578.81*	
Total		**$7,636.72**	

Notes:
* Expenses incurred in CFA Francs where $1USD ≈ 530 CFA
- Our final budget report only loosely follows the original budget outline. Due to a significant discrepancy between requested and granted funds, the project time was shortened by half, the team was decreased by half, and many capital purchases were not made.
- The unusually high urban lodging and food costs were incurred due to a period of internationally recognized political instability during which we were instructed by the United States Consulate not to return to the field.