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ETHNOECOLOGY OF THE TROPICAL ANDES
AVIAN INDICATORS OF LANDSCAPE CHANGE IN HIGHLAND ECUADOR[1]

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ABSTRACT.- Four Andean birds offer clues to rethink the ethnoecology of neotropical cloud forests, challenging the notion of conservation based only in water resources and biodiversity. Using both archaeological and actuoecological evidence, the role of humans in shaping high Andean landscapes' location and maintenance is argued as an important factor for conservation priorities of tropical montane cloud forests, particularly in the equatorial mountains. Avian examples demonstrate intricate linkages of culture and nature in the tropical Andes. Traditional knowledge associated to ornithological clues, helps understanding the dynamics of cultural landscapes, with birds as proxy of synergisms affecting the complexities of both, nature and culture. A paradox of conservation is highlighted with avian indicators. The four selected species were cases where landscape change and biodiversity help in determining ethnoecological insights. Unlike the preservation of absolute nature reserves, landscape stewardship, conservation easements and cultural landscapes are listed as options for inclusion in the repertoire of conservation scenarios for cloud forests survival, which includes sacred places and spiritual domains as intangibles worth protecting in the Tropical Andes.

Key words: Anthropogenic change, tropandean landscapes, avian indicators, ethnoecology, montology, Tropical Andes, Ecuador.

RESUMÉ.- Quatre oiseaux andins nous donnent des raisons pour repenser l'ethnoécologie des forêts néotropicales humides, ce qui met en question l'idée de la conservation basée sur les ressources d'eau et la biodiversité seules. En se servant des évidences archéologiques et écologiques actuelles, on soutient que les êtres humains ont un rôle dans la formation des hauts paysages andins. On soutient aussi que l'entretien est un facteur important dans la conservation des forêts tropicales humides en montagne, surtout dans les montagnes équatoriales. Les exemples aviaires

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démontrent les liens compliqués entre la culture et la nature dans les Andes tropicales. Les connaissances traditionnelles associées à ces preuves ornithologiques nous aident à comprendre la dynamique des paysages culturels, avec des oiseaux comme mandataires des synergies qui affectent les complexités de la nature et de la culture. Un paradoxe de la conservation est révélé par les indicateurs aviaires. Les quatre espèces choisies sont des cas où le changement de paysage et la diversité biologique nous ont donné des aperçus des avancées ethnologiques. À la différence de la préservation offerte par des réserves naturelles absolues, l'intendance du paysage, les droits de passage de la conservation et les paysages culturels sont énumérés sur la liste de scénarios pour la conservation des forêts humides, une liste qui comprend les lieux sacrés et les endroits spirituels comme des valeurs intangibles dans les Andes tropicales méritant une protection.

Mots clé: changement antropogénique, paysages tropandins, indicateurs aviaires, ethnoécologie, montologie, Andes tropicales, Equateur.

RESUMEN.- Cuatro especies de aves andinas ofrecen pistas para replantear la etnoecología de las pluviisilvas neotropicales, desafiando la noción de conservación basada solamente en recursos hídricos y biodiversidad. Usando evidencias, tanto arqueológicas como ecológicas actuales, se argumenta que el rol de los humanos en la formación y el mantenimiento de los paisajes altoandinos es un factor importante para la conservación de los bosques tropicales montanos húmedos, en particular en las montañas ecuatoriales. El ejemplo de las aves demuestra los lazos intrínsecos que unen cultura y naturaleza en los Andes tropicales. El conocimiento tradicional asociado a las pistas ornitológicas ayuda a entender la dinámica de los paisajes culturales, usando a las aves como aproximación a las sinergias que afectan tanto a la cultura andina como a la naturaleza en toda su complejidad.

Una paradoja de conservación destaca en los indicadores de avifauna. Las cuatro especies seleccionadas señalan casos en donde el cambio de paisaje y la diversidad siguen de cerca los avances etnoecológicos. A diferencia de la preservación en reservas naturales absolutas, la ordenación del paisaje, las facilidades de conservación y los paisajes culturales deben considerarse escenarios conservacionistas para la supervivencia de la pluviisilva, que incluye sitios sagrados y dominios espirituales que merecen protegerse en los Andes tropicales.

Palabras clave: Cambios antropogénicos, paisajes tropandinos, aves indicadoras, etnoecología, montología, Andes tropicales, Ecuador.

1. Introduction

In northern Ecuador, important developments in the conservation arena have occurred in the intervening years since the first International Workshop on Tropical Montane Cloud Forests held in San Juan, Puerto Rico in 1993. Particular gain is noticed in the instrumentation of research of soil erosion, the hydrological cycle of watersheds, and the establishment of a network of

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protected areas for biodiversity conservation, all key recommendations of the first meeting (HAMILTON *et al.*, 1994). In July 2004, the second International Workshop held in Hawai'i brought a robust representation of major players in ecological and hydrological research from many important research centers in the United States, Spain, Canada, Holland, Great Britain and Germany, emphasizing the biophysical aspect of conservation of these important landscapes. Only a few presentations from researchers from developing countries made emphasis on the social and cultural aspect of cloud forest ecology (BRUIJNZEEL *et al.*, In Press).

This contribution adds to the framework requiring more anthropological, sociological and ethnographic research for better understanding the geoecology of the tropical Andes (Tropandean for short) and the geographies of development in Latin America; in particular, its cloud forests' ecology and its priorities for conservation-with-development, in what many scholars are now calling "Montology", the science for integrative mountain studies (MESSERLI & IVES, 1997; SARMIENTO & HIDALGO 1999).

1.2 Scientific rationale

A location analysis of urban centers along the Andean realm clearly shows that no major human settlement exists within the current extent of cloud forest areas. However, a quick look into archeological records supported by radar images that captured subsurface structures shows a wealth of linear features that are captured well in the remote sensed images of geographers and landscape archeologists (MANN, 2005), supporting claims that areas now covered with mountain forests were used in the historical and archaeological past as thriving urban centers. In the case of Bolivia, for instance, an intricate network of raised fields, aqueducts and dry terracing found in what today is considered as Puna grassland (BALLE, 1998) contrasts vividly with the waterless windswept highlands of the present, so the needless effort to build such a monumental work in the past is paradoxical. In Peru, the magnificent series of stone terraces of the Colca canyon, are mute witness of the area that has lost their natural forest cover and hence, destroyed the cloudiness cycle of the Southern Peruvian mountains that used to support significant agricultural production (MUJICA & DE LA VEGA, 2002).

In Ecuador, it is clear that most colonial cities were erected on indigenous towns, in many cases using the building materials preexistent in the indigenous constructions, and this urbanism exacerbated the demise of local Andean forests (HIDALGO, 1998) for the huge amounts of lumber and fuel wood utilized in construction, cooking and heating. Extensive networks of

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well designed pathways ("culuncus") connecting the inter-Andean valleys with either the coastal or the Amazonian territories indicate an active pre-Columbian commerce by roads that zigzagged the mountains ("kingu") for the highland-lowland traders of salt ("kachi"), algae ("kuchayuyu"), colorful feathers ("patpa") or marine shellfish ("churu") whose artifacts have been found in archaeological sites of the Imbabura province (KNAP, 1981), including transects at Imbakucha watershed, near the city of Otavalo ("Utawalu") (César Vázquez-Fuller, pers. comm.). A series of fortresses ("pukara") along the Guayllabamba river's mountain pass and many pyramidal structures ("tula","picaschca") of volcanic tuff ("kangawa") are reminiscent of the extent of prehistoric habitation (SARMIENTO, 1994). On the eastern flank of the Andes, archaeological sites have been surveyed demonstrating a heavy concentration of people, some 20 thousand in pre-Columbian times, occupying the space along the Quijos river valley. Today there are about seven thousand inhabitants (SARMIENTO, 1997a; CHAURETTE *et al.*, 2003).

Traditional mountain studies have developed from geology, geography, ecology, sociology applied to mountain environments, following the Humboltdian model of temperate mountains, where altitudinal belts reflected elevation clines of weather. The new "Montology" proposes to integrate disparate disciplinary physical-geological approaches with cultural geography to understand the tropical mountain environment with a holistic approach and to make stronger case for its conservation and management (IVES *al.*, 1997; SARMIENTO, 2003). Although the dire need for a better conceptual framework for mountain research has been a topic of much concern over a long time (ODUM & SARMIENTO, 1998; SARMIENTO, 2001), it is only recent that the debate of whether forest or grasslands is the natural vegetation of Andean mountains regained strength within the current polemic issue of human impacts of landscape change (ELLEMBERG, 1959; BALSLEV & LUTEYN, 1992; GADE, 1999; SARMIENTO & FROLICH, 2002). Arguments from Palinology favor a weather-driven community of graminoids as the natural vegetation of high tropical mountains, while arguments from Landscape Archaeology emphasize the human drivers of landscape change, noting that deforestation of Andean forests is ancient and that the practices of burning helped to maintain an arrested succession in the Páramos that impedes forest regeneration (SARMIENTO, 1997b). Both fronts of the debate argue with scientific facts that have been researched in past decades. However, both disciplines handle techniques and methods that are neither completely developed nor accurate, making generalizations possible: a fossil pollen grain of the Melastomataceae family, for instance, can represent genera from short shrubs to tall trees; an increase in the pollen count of Poaceae has been interpreted as migrating treeline due to change in climate, etc. On the other hand, charcoal

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from kilns cannot be discerned from charcoal where natural fires could have occurred, despite the lack of documentation about them in the cloud forest literature. In addition, extensive grassing can be inferred from the intricate fabric of trampling on the slope, although paradoxically no cattle have been observed at present.

Because of regeneration experiments with exclusion plots in Cañar province, over several years (JOKISH & LAIR, 2002) it is now possible to exemplify the possibility to restore *Páramo* areas with the original forest cover, where mountain people and nature continue to interact (BORRERO, 1989), maintaining the landscape of today.

Birds, because of their special bonding with people in the Andes, have often served as illustration for ethnoecological interpretation (NAZAREA, 1999) of situated knowledge and local lifescapes. I will take four species of birds and highlight the notion of anthropogenic factors to add to the human driven landscape change hypothesis. Paradoxes of development are listed as underlying the presence or absence of such bird species, thus indicating the status of conservation priority of mountain forests in selected sites of Ecuador.

It is argued that it is time to protect cloud forest ecosystems (BRUINJZEEL & HAMILTON, 2001) for prospective climate change scenarios that challenge water resources and the hydrological cycle coupled with carbon budgets in mountain watersheds. Without the interest to completely debunk the Humboldtian paradigm of mountains (SARMIENTO, 2000) in the tropical Andes, I argue that inclusion of the highly visible role of human activities in shaping natural communities in Tropandean landscapes, because of the implications in natural resource management and environmental planning needed for sustainable mountain development (SARMIENTO, 2002a), is imperative also from ethnoecological grounds.

2. Human drivers of landscape change

The array of factors affecting the use of natural resources in mountain systems emphasize the main mountain character, known as verticality. The third dimension, or the Z axis, exert control over the biophysical realm due to altitude, gravity, lack of oxygen, overexposure to UV-β, reduced temperature, faster wind speed, higher radiance, greater water capture, active volcanism, and many other measurable attributes responsible for shaping the natural vegetation of the Tropical Andes. However, a more difficult set of attributes can be listed, including land-use history, economic activities, specially agricultural production and livestock rearing, silviculture, socio-cultural practi-

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ces, traditional knowledge, including myth and spirituality (ALLAN *et al.*, 1988). These factors are less obvious and hard to measure by conventional techniques.

One possible bridge for understanding the human impact on mountain systems is to determine the ethnoecological significance of the element in the landscape, recorded often as habit of traditional inclusion of a species within the mental construct of the mountain inhabitants and stored in the collective consciousness of each group's identity (SARMIENTO, 2001a). Indicating that a species has ethnoecological significance will help determine whether culture influences the comprehension of nature in a particular mountain system.

Therefore, ethnographic studies, multimethod research and other cultural geographical tools (ZIMMERER, 2003; POSEY, 1999) are needed to unveil factors that can be responsible for change from natural to actual vegetation. In most cases relating to highland Ecuador, the potential vegetation of the place is radically different from the current configuration. Habitat fragmentation becomes rather 'habitat shredding' due to the fact that remnant fragments are left only along deep brooks and ravines and nearby rocky outcrops, in elongated shreds towards the upper reaches of the watersheds. This is a trend clearly defined in montane forests' dynamics not only as related to ornithological observations (WELFORD, 2001), but also in the cultural geographical realm (GADE, 1999; STADEL, 2002) and political ecology at large (ZIMMERER, 2000). I have presented it elsewhere as direct and indirect evidence of change and the need for theorizing new cognitive paradigms for the Tropical Andes (SARMIENTO, 2002b; SARMIENTO *et al.*, 2004).

2.1 Study area and methodology

Ecuador is located in northwestern South America, at the equator. As longitudinally dissected by the Andean cordillera, the country shows three main domains in the continent, one insular domain in the Galapagos, and also its claimed marine domain. The mosaic of vegetation types reflects ecological gradients along elevation clines associated to its equatorial locale. Meteorological conditions favor a cluster of intensity/seasonality options occurring in each of the four main natural regions: the Oriente (Amazon basin) or *cis-Andean* domain to the East, the Sierra (Highland plateau) or *inter-Andean* domain in the Andes mountains, the Costa (Coastal lowlands) or *trans-Andean* domain, and the Galapagos islands or the *oceanic* domain (See Figure 1). The active backbone of the Andes, with topographic and climatic extremes, receives fertility inputs of volcanic origin. The lowlands at each of the two outer slopes receive the intense and constant input of alluvial origin.

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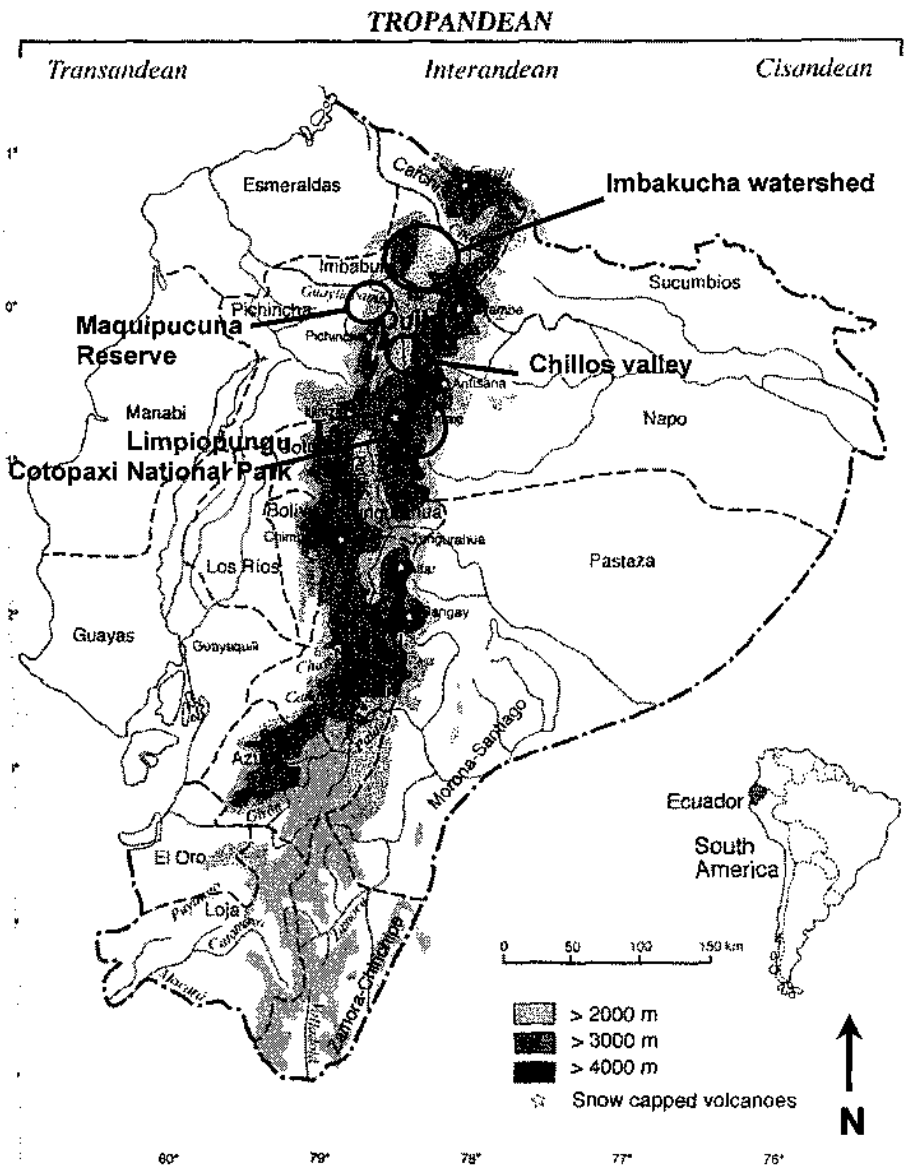

Figure 1. Study site.

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Thus, soil condition varies also because of differential age, weathering, parent material and anthropogenic disturbances, creating micro-sites of enhanced diversity, different from the conditions of the lowland Tropical sites.

The mountains of the Tropandean ecoregion rise in continuous, longitudinal chains of active volcanoes and other plutonic masses that reflect the diversity in the orogeny of the equatorial Andes (See table 1). The ethnoecological relevance of those mountains is listed in rank, reflecting the consensual opinion of inhabitants as to the uttermost reverence (i. e., Apu) to the guardian mountain, and mystic understanding of the tutelary mountain (i. e., High), the inclusion of its geography in folk stories and myths (i. e., Medium) or the occurrence of species for ethnobotanical lore (i. e., Low). References to the ethnoecology of birds will be particular to Mt. Cotopaxi (5897 m), and Mt. Cayambe (5790 m) in the Eastern or Royal chain, and to Mt. Pichincha (4794 m) on the Western chain. Every few kilometers, transversal nexuses link the two main chains with significant elevations, such as Mt. Imbabura (4660 m) in the northern Imbabura province. Other mountain complexes are also located towards the coastal plain and towards the Amazon basin, but they will not be incorporated for the present analysis.

Ethnoecological significance is part of the understanding of the role of an animal or plant within the cultural domain of mountain peoples (sensu TOLEDO, 1992), often driven by habit or tradition, linked to the intergenerational knowledge transmitted because of the deep understanding of how observation and myth interlink to create the *arraigo*, a measure of the settling of a human group that develops ownership of the locale and propriety of the essence of place (SARMIENTO 2001b).

To add in this important registry, I have incorporated in the text many references to local names in Kichwa (often written in Spanish as Quechua), as an effort to gain epistemographic effect for landscape valuation and cultural reinvigoration, by bringing toponymy and emotunymy as descriptors of landscape character (SARMIENTO, 1995), something that brings meaning to the geographical attribute and prompt valuation towards stewardship and landscape conservation.

In each of the mountain complexes, extensive ornithological surveys were conducted, as well as ethnographic work with the communities leaving nearby. Those were part of thesis research (e. g., SARMIENTO, 1988a, 1996; COTACACHI, 2004), final reports and regional surveys (e. g., SARMIENTO, 1998b) or otherwise ecological and ornithological expeditions for bird projects executed while at the Ecuadorian Museum of Natural Sciences (MECN) (e. g., SARMIENTO, 1987). Lists and collections were also utilized during the 1980s and 1990s, particularly for the project "Birds of Ecuador" by the Philadelphia Academy of Natural Sciences, the Western Foundation for

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Table 1. Mountains of mainland Ecuador.

ANDES CORDILLERA	MOUNTAINS AND PEAKS	ALTITUDE m.a.s.l.	PROTECTION STATUS	ETHNOECOLOGY RELEVANCE
Coastal	Mache(Chindul	800	Private Reserve	High
	Jama Coaque (San Pablo)	750	Private Reserve	Medium
	Chongón	450	Private Reserve	Low
	Colonche	834	Private Reserve	Low
Western	Chiles	4768	Unprotected	Low
	Yana-urcu de Piñán	4535	Ecological Rese.	Medium
	Cutakachi	4939	Ecological Rese.	High (Apu)
	Rucu Pichincha	4698	Unprotected	Medium
	Guagua Pichincha	4794	Unprotected	High
	Atakazu-Corazón	4788	Unprotected	Medium
	Illiniza (Norte)	5116	National Park	Medium
	Illiniza (Sur)	5263	National Park	High (Apu)
	Quilotoa	4010	National Park	Low
	Kispicacha	4578	Unprotected	Medium
	Sagatoa	4153	Unprotected	Low
	Cariwairazu	5020	Unprotected	Medium
	Chimburazu	6310	Faunal Reserve	High (Apu)
Central (Royal)	Cayambi	5790	Ecological Rese.	High (Apu)
	Sara-urcu	4676	Ecological Rese.	High
	Puntas (Filo corrales)	4452	Unprotected	Low
	Antisana	5704	Ecological Rese.	High (Apu)
	Sincholagua	4893	Unprotected	Medium
	Cotopaxi	5897	National Park	High (Apu)
	Kilindaña	4919	National Park	Low
	Yurac Llanganati	4571	National Park	High (Apu)
	Tungurawa	5016	National Park	High (Apu)
	Altar/Capak-urcu	5404	National Park	High (Apu)
	Cubillín	4711	Unprotected	Low
	Quillimas	4670	Unprotected	Low
	Sangay	5230	National Park	High (Apu)
	Runa Shayana/Sacra-urcu	4545	Unprotected	High (Apu)
	Ayapungu/Suruchi	4730	Unprotected	Low
Eastern	Reventador	3485	Ecological Rese.	Low
	Sumaco	3793	National Park	High (Apu)
	Napo Galeras	3210	National Park	Low
	Cutucú	3150	Binational Park	Medium
Transverse (Nexus)	Imbabura (Majandacajas)	4660	Unprotected	High (Apu)
	Fuya-fuya (Mojanda)	4263	Unprotected	Medium
	Yana-urcu (Mojanda)	4200	Unprotected	Medium
	Pasochoa (Tiopullo)	4200	Private	Low
	Rumiñawi (Tiopullo)	4712	Recreation Area	High (Apu)
	Igualata (Sanancajas)	4430	Recreation Area	Medium
	Cerro Azul (Azuay)	4200	Private	Low

Modified from CRUZ (1997) and SARMIENTO (1987). Names use phonetic Kichwa and are listed in North-South direction within each chain. Altitude is shown as the elevation in meters above sea level. The protection status sometimes can be mixed, with public and private ownership, but not always conserved as protected area. The ethnoecology potential is gauged by relative importance of the mountain in the belief system of the mountain people as reported elsewhere and their conceptualization of them as divine, tutelary icons or Apus to their communities.

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Vertebrate Zoology, the Danish Museum of Natural History, the Smithsonian Institution, and the Ecuadorian Ornithological Corporation (CECIA). Analyses of ethnoecological significance were made during field seasons spanning some two decades of ecological work for biodiversity conservation initiatives in Ecuador.

3. Anthropogenic impact on landscape change through avian indications

An illustration of how indirect evidence supports the hypothesis of the human-driven landscape change follows with the use of selected avian indicators. From a subset of neotropical birds found in a 3,000 ha montane forests reserve located in northwestern Ecuador, it is important to note the inverse relationship of the frequency distribution of bird species with the significance of those species for ethnoecological applications (see Figure 2). All rare species in the study area are important elements of the cosmovision of the mountain people, yet this important fact is rarely argued in favor of conservation objectives. Loosing the biodiversity of those species will also be loosing the traditional knowledge, myths and legends that make those birds significant components of mountain landscapes.

I have purposely chosen indicator species that are either endemic to pantropical, rare to abundant, resident to migrant, as to reinvigorate the notion of strong human impact in natural populations regardless of taxonomic affiliation, biogeographical distribution or artificial classification of conservation status. Ubiquitous anthropogenic forces make the tropical Andes a good scenario for cultural landscape research. Indigenous cultures that are still thriving need to be looked at within the framework of ethnoecology to assess environmental cognition and protection (NAZAREA, 1999). Yet, there is a paradox in the planning of development due to the geoecological illiteracy and the dominant paradigm of nature versus culture. Only when the new paradigm of "mountains as gardens" is recognized and practiced, true conservation will help sustainability of Andean communities.

3.1 Avian indicator: Vanellus resplendens, CHARADRIIDAE

The plateau of *Limpiopungu*, at 3780m, is one of the highlights of the tour of the Cotopaxi National Park; not only the perfect cone of the huge snow-capped volcano is best seen from the lake shore, but the water body attracts a varied fauna, contrasting the barren lahars of the plateau with the grass and brush of the surrounding slopes, where *Páramo* tussock grasses dominate.

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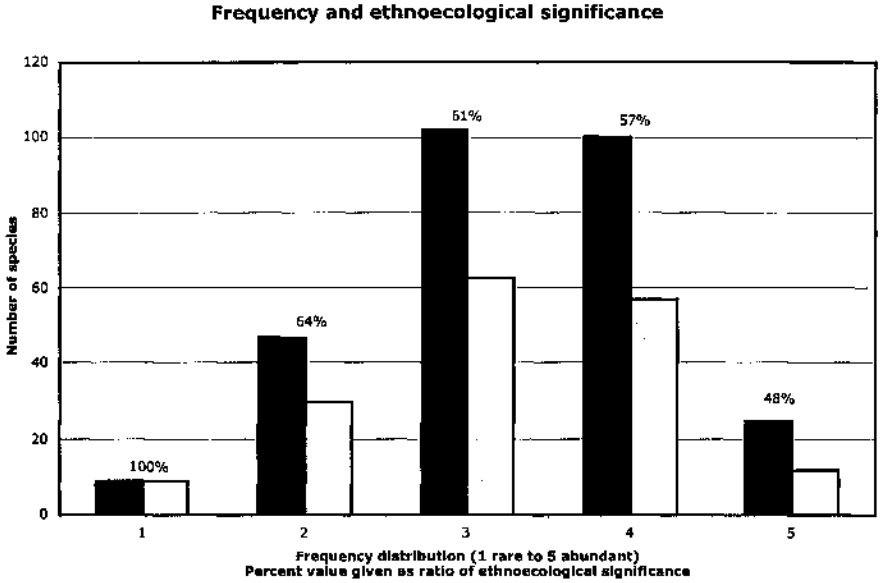

Number of bird species that belong to each rank of Frequency in Table 2.

Value (%) assigned to each frequency for the ecological significance of birds that belong to each rank. All rare species were significant from the cultural standpoint of the locals in the Santa Marianita's valley.

Figure 2. Ethnoecological significance of avian indicators.
A sample of ecological significance surveyed against the bird list developed for a private reserve in Northwestern Ecuador, showed in Table 2. High concordance between relevance and significance for ethnoecology was exhibited with all rare species in the site. Note that the ethnoecological data was obtained in three consecutive field seasons with details reported in SARMIENTO (1996).

Here, the Andean lapwing *(Vanellus resplendens)* thrives in flocks that can be easily seen best during the summer months (June-September). The local name *veranero* points to this character. However, another local name *"ligle"* points to the fact that the bird is quite noisy when disturbed. I called it "guardian" in an environmental education campaign to promote awareness and conservation of this flagship species. During three years, from 1984-87, I studied its habitat selection patterns and reproductive behavior. Soon I realized that the presence of *Vanellus resplendens* in the area, may not just respond to the riparian habitat, but rather to factors associated with food resources and vagrant

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displacements, which was confirmed by additional field observation of the brooks of Cundurmachay and of the Loma de Quito areas within the Cotopaxi National Park.

Despite being a National Park, boundaries of the protected area were often irrelevant for grazing herds that came from surrounding "haciendas", and of course, feral bulls and horses that contributed with their dung to enrich the newly developed volcanic soil. Previous management of the area points to planting grasses which had turned most of the surrounding hills into a grazing paradise. The *Paja de Páramo*, indeed was a key resource for use in many applications, not just for fodder, but also for construction material, insulation, roofing, cords, basketry, fuel, etc. Indigenous people from the area needed a fresh replenishing of the straw, making use of fire as a management tool. Due to frequent burning, the majority of the forest cover was converted to *Páramo pajonal* where herding occurred. Because of the food chain of the Andean lapwing was dependent upon the beetle fauna found in the semidry cow pies, I detected a correlation of habitat selection based on the previous occupancy of cattle for the following lapwing flocks. Indeed, vagrant movement of feral horses and cows determined the vagrant movement of the flock that followed the beetles' population emergence in the dung. I questioned myself if the presence of the Andean lapwing is a reflection of livestock rearing practices, including free range, and induced fires to bring the bunch grasses anew to favor cattle ranching. The genus *Vanellus* includes other species in America, Europe, and Asia. All of them associated to large herding agriculture; however, in Ecuador, specimens of *V. resplendens* collected in the Amazon basin and in the coastal areas of Azuay province show examples that break the norm of highland distribution. Actuoecological anecdotal information recalled ligles in the south of Quito, where now the water table has diminished and urbanization has taken over almost every space of the old hacienda of Turubamba, near Chillogallo, making agriculture and livestock production a thing of the past.

In the *Páramo* areas of Mt. Cotopaxi, ecological succession, of course, has been arrested by practices associated with highland cattle ranching. Pine plantations now cover significant areas surrounding the park; those same areas were previously occupied by bunchgrasses. Within the adjacent El Boliche National Recreation Area, for instance, a forestry experiment by Andrade Marín from 1950s has given credit that huge native trees can be possible to prosper amidst the introduced conifer *Pinus radiata*, particularly Quishuar (*Buddleia* spp.), Pumamaqui (*Oreopanax* spp.), and Yagual (*Polylepis* spp.). Paradoxically, remnant forests of these species now subsist only in steep slopes and rocky outcrops incapable of use for neither agriculture nor livestock.

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3.2 *Avian indicator: Semnornis ramphastinus, CAPITONIDAE*

The western flank of the equatorial Andes is one of the most active areas for bird watching in the world, when professional birdwatchers, researchers, aficionados and ecotourists want to cognize the pristine montane forests: a significant concentration of regionally endemic species occur in pockets of high diversity, particularly along the Chocó bioregion. In the foothills of the active Pichincha volcano, west from the dormant Pululahua volcano, the Nanegal ranges stretch downwards in the upper Guayllabamba river basin. These are jungle-covered flanks with abundant avian diversity. A particular case is the "Yumbo", *Semnornis ramphastinus*, colorful small toucan-like bird species that inhabit the brooks and often is heard in harmonious singing to its mate. Deep in the jungle, a male starts the calling and then the female responds, every time shortening the intervals of sound, until they are singing at unison, and then silence for a while before the new performance. This bird is difficult to see as its found within tree cavities, formed in dead and decaying trees or snags. Sometimes, these birds can be seen under the wooden bridges of the montane brooks where they fly away when disturbed: in Colombia, people of the southwestern mountains call them *tirapuentes* because of this particular trait. In the Maquipucuna reserve, where I studied birds and bats as dispersal agents for forest regeneration from 1992-95, the bird list is impressive. I include here an example (see Table 2) of how even the most primeval species relate to human activities in the area.

Yumbo is the name Spaniards used to describe the indigenous people leaving in the montane forests *(Yunguruna)*, on both side of the Andes. Originally from Kichwa, the word "yungu" described anything from the tropical mountains (literally, from the warm Yungas); Yunguruna, then, was originally castellanized to Yungo and then *Yumbo*. These indigenous people were often seen in colonial times helping to bring water to the houses from the plaza where a communal water fountain was located in most Andean cities. They were also the best porters and guides for expeditions into the mountains and the jungles of lowland Ecuador, where they existed as numerous groups, as indicated by artifacts of pottery pieces sparsely found by archaeologists working in Northwestern Ecuador.

Semnornis ramphastinus, because of its habitual cavities preference, favored tree species that can rotten quickly within the forest near the water edge. Therefore, it is easy to find them on "Wuarumu" *(Cecropia obtusifolia)* growing tall in old secondary growth, along with Balsas *(Ochroma* spp.) and Wadwa *(Bambusa guadua)*, typical of secondary growth. Because of its rather joyful reaction when both male and female sing together, it is often seen as a good omen to the people in the mountain paths. Once you see one such a bird, you

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Table 2. Maquipucuna Bird List for successional pathways and regeneration.

LATIN NAME	*LOCAL NAME*	*ENGLISH NAME*	9 3	9 4	9 5	DIET	USE	FRE	HUM	LOC	STR
ACCIPITRIDAE											
Accipiter bicolor	gavilán	bicolored hawk	√		√	C	R	1	Me	In	Cn
Accipiter collaris	collarejo	semicollared hawk		√		C	R	2	Me	In	Cn
Buteo leucorrhous	aguilán blanco	white-rumped hawk			√	C	T	1	Me	In	Cn
Buteo magnirostris	aguilán caminero	roadside hawk		√		C	R	4	Me	Ed	Cn
Buteo platypterus	aletón	broad-winged hawk			√	C	M	2	Me	Gp	Cn
Elanoides forficatus	tijereta	swallow-tailed kite	√	√		C	T	3	Me	Gp	Cn
Harpagus bidentatus	aguilucho	double-toothed kite			√	C	T	3	Me	In	Cn
Leucopternis princeps	barreteado	barred hawk			√	C	R	2	Me	In	Cn
Leucopternis plumbea	plomizo	plumbeus hawk	√		√	C	R	1	Me	In	Cn
Geranoaetus melanoleucus	guarro	black-chested buzzard-eagle		√		C	T	2	Me	Gp	Cn
Oroaetus isidorei	águila de zamarros	black-chesnut eagle	√	√		C	T	1	Me	In	Cn
ALCEDINIDAE											
Chloroceryle americana	martín pescador	green kingfisher	√			P	R	4	Ud	Ed	Un
ANATIDAE											
Merganetta armata	pato de agua	torrent duck	√	√		P	R	3	Ud	Gp	Un
APODIDAE											
Streptoprocne zonaris	golondrina cóndor	white-collared swift	√	√	√	I	R	4	Me	Gp	Cn
Cypseloides rutilands	avioncito	chesnut-collared swift		√		I	T	2	Me	Gp	Cn
Chaetura spinicauda	vencejo	band-rumped swift	√			I	R	2	Me	Gp	Cn
Chaetura cinereiventris	vencejo	gray-rumped swift			√	I	T	2	Me	Gp	Cn
ARDEIDAE											
Bubulcus ibis	garcita bueyera	cattle egret	√		√	I	T	3	Me	Gp	Sh
BUCCONIDAE											
Hapaloptila castanea	monja cariblanca	white-faced nunbird	√			F-I	R	1	Me	Ed	Do
Malacoptila panamensis	buco bigotiblanco	white-whiskered puffbird		√		I	R	3	Me	Ed	Do
Micromonacha lanceolata	monje	lanceolated monklet		√		F-I	R	2	Me	Ed	Do
Nystalus radiatus	buco	barred puffbird				I	T	2	Me	Ed	Do
CAPITONIDAE											
Capito squamatus	barbudo	orange-fronted barbet	√			I	R	1	Ud	In	Sh
Eubucco bourcierii	barbudo cabecirrojo	red-headed barbet	√		√	I	R	3	Ud	Ed	Do
Semnornis ramphastinus	yumbo	toucan barbet	√	√	√	I	R	2	Ud	Ed	Do
CAPRIMULGIDAE											
Lurocalis rufiventris	chotacabras, ociosa	rufous-bellied nighthawk		√		I	R	2	Me	Ed	Un
Chordeiles minor	añapero	common nighthawk			√	I	M	2	Me	Ed	Un
Nyctidromus albicollis	pauraque	pauraque	√		√	I	R	5	Me	Ed	Un
Caprimulgus longirostris	chotacabras	band-winged nightjar	√			I	R	4	Ud	Ed	Un
CARDINALIDAE											
Pheucticus chrysogaster	huiragchuro	southern yellow grossbeak	√			F	T	4	Me	Gp	Sh

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LATIN NAME	*LOCAL NAME*	*ENGLISH NAME*	9 3	9 4	9 5	DIET	USE	FRE	HUM	LOC	STR
Pitylus grossus	picador	slate-colored grossbeak				F	R	3	Me	Gp	Sh
Saltator atripennis	saltador	black-winged saltator		√		F	R	2	Me	Gp	Sh
Saltator maximus	saltador	buff-throated saltator				F	R	2	Me	Gp	Sh
CATAMBLY-RHYNCHIDAE											
Catamblyrhynchus diadema	pinzón diadema	plushcap			√	F	R	3	Me	Ed	Do
CATHARTIDAE											
Coragyps atratus	gallinazo	black vulture	√			X	T	4	Me	Gp	Cn
Cathartes aura	gorrianra	turkey vulture	√		√	X	M	3	Us	Gp	Cn
CINCLIDAE											
Cinclus leucocephalus	frailecito, dominico	white-capped dipper	√	√	√	I	R	4	Ud	Ed	Un
COEREBIDAE											
Coereba flaveola	platanero	bananaquit	√	√		G	R	4	Me	Ed	Do
COLUMBIDAE											
Columba fasciata	paloma collareja	band-tailed pigeon		√		F	R	2	Me	In	Sh
Columba plumbea	torcaza	plumbeous pigeon			√	G	R	2	Me	In	Do
Columba subvinacea	guapona	ruddy pigeon	√			F	R	2	Me	In	Do
Geotrygon montana	cuturpilla	ruddy quail-dove	√			G	R	3	Me	In	Do
Geogtygon frenata	perdiz	white-throated quail-dove			√	G	R	4	Me	In	Do
Leptotila verreauxi	tórtola	white-tipped dove		√		F	R	2	Me	In	Do
Leptotila pallida	tortolita	pallid dove	√			F	R	4	Me	In	Sh
COTINGIDAE											
Ampelion rubrocristatus	cárcaro	red-crested cotinga	√			F	R	1	Ud	In	Do
Ampelioides tschudii	cabezón	scaled fruiteater		√	√	F	R	1	Me	Ed	Sh
Cephalopterus penduliger	pájaro toro	long-wattled umbrellabird			√	F	R	3	Me	In	Do
Lipaugus cryptolopus	higuero	olivaceus piha	√			F	R	2	Ud	In	Do
Pipreola riefferii	frutero	green-and-black fruiteater		√		F	R	3	Me	Ed	Sh
CORVIDAE											
Cyanolyca pulchra	cuervo, urraca	beautiful jay		√		F	R	3	Me	Ed	Do
Cyanolyca turcosa	urraquita	turquoise jay	√			F	R	5	Ud	Ed	Do
CRACIDAE											
Aburria aburri	wisha aburrida	wattled guan	√	√		F	R	4	Me	In	Do
Chamaepetes goudotii	pava	sickle-winged guan			√	F	R	2	Me	In	Do
Penelope montagnii	pava de monte	andean guan		√		F	R	3	Me	In	Do
Penelope purpurascens	pava crestada	crested guan	√			I	R	4	Me	Ed	Un
CUCULIDAE											
Crotophaga ani	garrapatero	smooth-billed ani	√	√	√	I	R	3	Me	Ed	Do
Piaya cayana	cuclillo ardilla	squirrel cuckoo	√			I	R	3	Me	Ed	Do
Piaya minuta	ticterere	little cuckoo		√		I	R	2	Us	Ed	Sh
Tapera naevia	cucuve, crespín	striped cuckoo			√	I	R	4	Me	In	Sh
DENDRO-COLAPTIDAE											
Campylorhamphus pusillus	piquiguadaña	brown-billed scythebill		√		I	R	2	Me	Ed	Sh
Dendrocincla tyrannina	trepatroncos	tyrannine woodcreeper	√			I	R	4	Me	Ed	Sh
Dendrocincla fuliginosa	trepatroncos pardo	plain-brown woodcreeper			√	I	R	5	Me	In	Sh
Glyphorynchus spirurus	piquicuña	wedge-billed woodcreeper		√		I	R	4	Me	Ed	Sh
Lepidocolaptes affinis	subepalo	spot-crowned woodcreeper	√			I	R	3	Me	Ed	Un

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LATIN NAME	LOCAL NAME	ENGLISH NAME	93	94	95	DIET	USE	FRE	HUM	LOC	STR
Xiphocolaptes promeropirhynchus	agachadizo	strong-billed woodcreeper			√	I	R	2	Me	In	Sh
Xiphorhynchus erythropygius	agachadizo	spotted woodcreeper	√			I	R	3	Me	Ed	Un
EMBERIZIDAE											
Amaurospiza concolor	semillero	blue seedeater	√			G	R	3	Me	Ed	Sh
Arremon cuadrantiirostris	gorrioncillo	orange-billed sparrow			√	F-I	R	4	Me	Ed	Sh
Arremonops conirostris	gorrioncillo	black-striped sparrow				F-I	R	4	Me	Ed	Sh
Atlapetes brunneinucha	pinzón matorralero	chesnut-capped brush finch	√	√		F-I	R	2	Me	Ed	Sh
Atlapetes rufinucha	nuquirufo	rufous-naped brush finch	√			F-I	R	3	Me	Ed	Sh
Atlapetes torquatus	pinzón	stripe-headed brush finch				F-I	R	3	Me	Ed	Sh
Atlapetes tricolor	pinzón	tricolored brush finch				F-I	R	2	Me	Ed	Sh
Lysurus castaneiceps	pinzón	olive finch	√		√	F-I	R	5	Me	Ed	Sh
Sporophila americana	espiguero	variable seedeater				G	R	2	Me	Ed	Sh
Sporophila luctuosa	semillero negro	black-and-white seedeater	√	√	√	G	R	4	Ud	In	Do
Sporophila nigricolis	semillero colinegro	yellow-bellied seedeater	√			G	R	4	Me	Ed	Sh
Tiaris obscura	espigón negro	dull-coloured grassquit		√		G	R	2	Me	Gp	Un
Tiaris olivacea	espigón verde	yellow-faced grassquit	√			G	R	4	Me	Gp	Un
Volatinia jacarina	semillero azul	blue-black grassquit				G	R	3	Me	Gp	Un
Zonotrichia capensis	gorrión común	rufous-collared sparrow		√		F-I	T	4	Us	Gp	Sh
FALCONIDAE											
Falco rufigularis	comechímbilaco	bat falcon				C	T	3	Ud	Gp	Cn
Falco sparverious	quilico	american kestrel	√			C	M	4	Me	Gp	Un
Micrastur ruficollis	halcón franjeado	barred forest falcon		√		C	R	3	Ud	In	Do
FORMICARIIDAE											
Dysithamnus mentalis	hormiguerito	plain antvireo				I	M	3	Me	Ed	Sh
Drymophila caudata	hormiguero	long-tailed antbird	√			I	R	4	Ud	Gp	Do
Formicarius nigricapillus	hormiguero	black-headed antthrush			√	I	R	5	Ud	Gp	Do
Formicarius rubipectus	hormiguero	rufous-breasted antthrush		√		I	R	4	Ud	Gp	Do
Grallaria guatemalensis	gralaria	scaled antpitta		√		I	R	4	Me	Gp	Un
Grallaria haplonota	gralaria	plain-backed antpitta			√	I	R	3	Ud	Gp	Sh
Grallaria ruficapilla	gralaria	chesnut-crowned antpitta				I	T	4	Ud	Gp	Un
Grallaria flavotincta	gralaria	yellow-breasted antpitta	√	√		I	R	3	Me	Gp	Sh
Grallaricula flavirostris	gralariata	ochre-breasted antpitta				I	T	3	Us	Ed	Sh
Pyriglena leuconota	ojona blanca	white-backed fire-eye			√	I	R	3	Us	Ed	Sh
Myrmeciza nigricauda	hormiguero	esmeraldas antbird				I	T	2	Us	Ed	Sh
Myrmeciza immaculata	hormiguero	immaculate antbird			√	I	R	3	Us	Ed	Sh
Myrmotherula schisticolor	hormiguero	slaty antwren				I	R	3	Us	Ed	Sh
Thamnophilus atrinucha	hormiguero	western slaty antshrike	√			I	R	3	Me	Gp	Un
Thamnophilus unicolor	hormiguero	uniform antshrike	√			I	R	4	Me	Ed	Do
FRINGILLIDAE											
Spinus xanthofaster	jilguero	yellow-bellied siskin	√			G	R	3	Me	Ed	Do

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LATIN NAME	*LOCAL NAME*	*ENGLISH NAME*	9 3	9 4	9 5	DIET	USE	FRE	HUM	LOC	STR
Spinus psaltria	jilguero	lesser goldfinch	√			G	R	4	Me	Ed	Do
FURNARIIDAE											
Anabacerthia variegaticeps	canastero	scaley-throated foliage-gleaner		√		I	R	3	Me	Gp	Sh
Automolus rubiginosus	rascahojas	ruddy foliage-gleaner				I	R	2	Me	Gp	Sh
Automolus ochrolaemus	rascahojas	buff-throated folliage gleaner			√	I	R	4	Me	Gp	Sh
Cranioleuca erythrops	colaespino	red-faced spinetail				I	T	3	Me	Gp	Sh
Hylocistes subulatus	maderero franjeado	striped woodhaunter	√			I	R	3	Ud	In	Sh
Margarornis squamigera	subepalo perlado	pearled treerunner			√	I	R	3	Ud	In	Un
Philydor rufus	limpiafrondas	buff-fronted foliage-gleaner		√		F-I	T	5	Me	Ed	Sh
Premnoplex brunnescens	colebarba	spotted barbtail	√			F-I	R	4	Me	Ed	Sh
Premnornis gutilifera	colebarba	rusty-wingled barbtail				F-I	R	4	Me	Ed	Sh
Pseudocolaptes boissonneautii	subepalo	streaked tuftedcheek				F-I	R	3	Me	Ed	Sh
Pseudocolaptes johnsoni	subepalo	buffy tuftedcheek				F-I	R	2	Me	Ed	Sh
Sclerurus mexicanus	lanzahojas	tawny-throated leaftosser				F-I	T	2	Me	Ed	Sh
Synallaxis azarae	pues-pues	azara's spinetail			√	F-I	T	5	Me	Ed	Sh
Synallaxis brachyura	colaespina	slaty spinetail		√		F-I	R	3	Me	Ed	Sh
Syndactyla subalaris	colaespina	lingated foliage-gleaner				F-I	R	3	Ud	Ed	Sh
Thripadectes ignobilis	hornero	uniform treehunter				F-I	R	2	Us	Gp	Sh
Thripadectes virgaticeps	hornero	streak-capped treehunter	√			I	R	3	Us	Gp	Sh
Xenops minutus		plain xenops				I	R	2	Us	Gp	Sh
Xenops rutilans		streaked xenops			√	I	R	2	Us	Gp	Sh
HIRUNDINIDAE											
Notiochelidon cyanoleuca	golondrina pechiblanca	blue-and-white swallow	v	√	√	I	R	4	Ud	Gp	Cn
Neochelidon tibialis	golondrina	white-thighed swallow		√		I	R	3	Ud	Gp	Cn
Stelgidopterix ruficollis	guayanay	southern rough-winged swallow	√			I	R	3	Me	In	Do
ICTERINAE											
Cacicus microrhynchus	cacique	scarlet-rumped cacique		√		F	R	4	Me	Ed	Do
Molothrus bonariensis	boyero brilloso	shiny cowbird	√			F	T	3	Ud	Gp	Sh
Psarocolius angustifrons	cucupaccho	russet-backed oropendola			√	F	R	3	Ud	In	Do
Scaphidura oryzivora	oriola	giant cowbird	√			F-I	R	3	Me	Gp	Do
MOMOTIDAE											
Electron platyrhynchum	gulu-gulu	broad-billed motmot	v	√	√	F-I	R	4	Ud	In	Do
Baryphthengus martii	colorado	rufous motmot	√			F-I	R	4	Ud	In	Do
PARULINAE											
Basileuterus coronatus	gorrioncito	russet-crowned warbler			√	I	R	3	Me	Ed	Sh
Basileuterus nigrocristatus	gorrioncito	black-crested warbler				I	R	3	Ud	Ed	Sh
Basileuterus tristriatus	gorrioncito	three-striped arbler				I	R	4	Me	Ed	Sh
Dendroica fusca	gorrión	blackburnian warbler		√		I	M	3	Me	Ed	Sh
Geothlypis semiflava	antifacito coronioliva	olive-crowned yellowthroat				I	M	2	Me	Ed	Sh

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LATIN NAME	*LOCAL NAME*	*ENGLISH NAME*	9 3	9 4	9 5	DIET	USE	FRE	HUM	LOC	STR
Miniotilta varia	candelita	black-and-white warbler			√	I	F	2	Me	Ed	Sh
Myioborus melanocephalus	carishina de altura	spectacled redstar	√			I	R	4	Ud	In	Sh
Myioborus miniatus	candelita chica	slate-throated whitestar				I	R	3	Me	Ed	Sh
Parula pitiayumi	parula tropical	tropical parula		√	√	I	R	2	Me	Ed	Sh
PHASIANIDAE											
Odontophorus melanonotus	codorniz	dark-backed wood quail		√		F	R	3	Ud	In	Un
PICIDAE											
Campephilus guayaquilensis	carpintero grande	guayaquil woodpecker	√	√		I	R	4	Me	Ed	Do
Campephilus pollens	carpintero chalecón	powerful woodpecker				I	R	3	Ud	In	Do
Piculus rivolii	carpintero carmesí	crimson-mantled woodpecker		√		I	R	4	Ud	Ed	Do
Piculus rubiginosus	carpintero	golden-olive woodpecker				I	R	3	Ud	In	Do
Venilliornis dignus	carpintero	yellow-vented woodpecker			√	I	T	2	Ud	In	Do
Venilliornis fumigatus	carpintero	smoky-brown woodpecker				I	R	4	Ud	In	Do
PIPRIDAE											
Machaeropterus deliciosus	saltarín	club-winged manakin			√	F-I	R	3	Me	Ed	Sh
Masius chrysopterus	rondín	golden-winged manakin				F-I	R	4	Me	Ed	Sh
PSITTACIDAE											
Amazona mercenaria	lora	scaly-naped parrot	√	√	√	F	T	5	Ud	Ed	Cn
Bolborhynchus lineola	periquito	barred parakeet				F	T	4	Ud	Ed	Cn
Pionus sordidus	lora	red-billed parrot	√	√	√	F	R	5	Ud	Ed	Cn
Pionus chalcopterus	catarnica	bronze-winged parrot				F	R	4	Ud	Ed	Cn
Pionus tumultuosus	lora	speckle-faced parrot		√		F	R	3	Ud	Ed	Cn
Pyrrhura melanura	perico	maroon-tailed parakeet	√			F	R	3	Ud	Ed	Cn
RALLIDAE											
Laterallus albigularis	gallineta	white-throated crake		√		F	T	2	Ud	Ed	Cn
RAMPHASTIDAE											
Andigena laminirostris	tucán pico laminado	plate-billed mountain toucan	√	√	√	F	R	4	Ud	In	Cn
Aulachorynchus haematopygius	marrajo	crimson-rumped toucanet	√	√	√	F	R	4	Ud	Ed	Do
Pteroglossus erythropygius	pilche	pale-mandibled aracari	√	√		F	R	3	Ud	Ed	Do
RHINOCRYPTIDAE											
Scytalopus unicolor	tapaculo	nariño tapaculo		√		I	R	4	Me	Ed	Sh
Scytalopus vicinior	tapaculo	unicolored tapaculo				I	R	3	Me	Ed	Sh
RUPICOLINAE											
Rupicola peruviana sanguinolenta	gallo de la peña	Andean cock-of-the-rock			√	F	R	4	Ud	In	Cn
SCOLOPACIDAE											
Actitis macularia	andarríos, patillo	spotted sandpiper		√	√	I	T	4	Ud	Gp	Un

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STRIGIDAE											
Ciccaba virgata	lechuza manchada	mottled owl				C	R	2	Me	In	Do
Glaucidium jardinii	cochuelo	andean pigmy owl	√			C	R	1	Ud	In	Sh
Otus colombianus	lechuza	colombian screech owl			√	C	R	3	Me	In	Do
Pulsatrix perspiciliata	buho	spectacled owl				C	T	4	Me	In	Do
TERSININAE											
Tersina viridis	azulejo	swallow tanager	√	√	√	F-I	M	4	Us	Ed	Cn
THRAUPIDAE											
Anisognathus flavinucha	platero azulado	blue-winged mountain tanager	√			F	R	4	Ud	In	Do
Anisognathus igniventris	platero pechirojo	scarlet-bellied mountain tanager			√	F	R	3	Me	Ed	Cn
Anisognathus notabilis	platero	black-chinned mountain tanager		√		F	R	4	Ud	Ed	Sh
Buthraupis montana	tanagra montera	hooded mountain tanager	√			F	R	4	Me	Ed	Cn
Chlorochryza phoenicotis	tangara verde	glistening-green tanager				F	R	3	Me	Ed	Cn
Chlorophanes spiza	mielero	green honeycreeper				F	R	5	Ud	In	Sh
Chlorophonia flavirostris	tangara de collar	yellow-collared chlorophonia				F	R	4	Me	Ed	Cn
Chlorornis riefferii	tangara verdiesmeralda	grass-green tanager				F-I	R	4	Me	Ed	Cn
Chlorospingus canigularis	tanagra corbatin	ash-throated bush tanager				F	R	5	Me	Ed	Sh
Chlorospingus flavigularis	tangara matorralera	yellow-throated bush tanager				F	R	5	Me	Ed	Sh
Chlorospingus semifuscus	tangara matorralera	dusky-bellied bush tanager		√		F-I	R	5	Me	Ed	Sh
Chlorothraupis stolzmanni	tangara pechibronceada	ochre-brested tanager				F-I	R	4	Me	Ed	Cn
Cnemoscopus rubrirostris	tangara caracolorada	gray-hooded bush tanager				F-I	R	4	Me	Ed	Sh
Conirostrum albifrons	picocono	capped conebill				F-I	R	5	Us	Ed	Un
Dacnis egregia	dacnia	yellow-tufted dacnis				F-I	R	3	Me	Ed	Cn
Diglossa albilatera	chongo aliblanco	white-sided flower-piercer				F-I	R	4	Me	In	Sh
Diglossa caerulescens	chongillo	bluish flower-piercer	√			F-I	R	3	Me	Ed	Sh
Diglossa cyanea	chongo	masked flower-piercer		√		F-I	R	4	Me	Ed	Sh
Diglossa humeralis	pinchaflor	black flower-piercer				F-I	R	4	Me	Ed	Sh
Diglossa lafresnayii	chongillo	glossy flower-piercer				F-I	T	3	Me	Ed	Cn
Dubusia taeniata	tangara pechona	buff-breasted mountain tanager				F-I	R	2	Me	Ed	Cn
Euphonia xanthogaster	platanero	orange-bellied euphonia	√	√	√	F-I	R	5	Us	Ed	Sh

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LATIN NAME	*LOCAL NAME*	*ENGLISH NAME*	9 3	9 4	9 5	DIET	USE	FRE	HUM	LOC	STR
Euphonia saturata	jilguero	orange-crowned euphonia	√			F-I	R	3	Me	Ed	Cn
Euphonia laniirostris	jilguero	thick-billed euphonia			√	F-I	R	4	Ud	Gp	Cn
Hemispingus atropileus	hemispingo	black-capped hemispingus				F-I	R	3	Me	Ed	Cn
Hemispingus malanotis	hemispingo	black-eared hemispingus				F-I	R	4	Me	Ed	Cn
Hemispingus superciliaris	hemispingo	superciliaried hemispingus				F-I	R	4	Me	Ed	Cn
Iridosornis rufivertex	tangara dorado	golden-naped tanager	√			F-I	T	3	Me	Ed	Cn
Pipraeidea melanonota	azulejo pechihabano	faw-breasted tanager				F-I	R	4	Ud	In	SH
Piranga flava	piranga	hepatic tanager				F-I	R	2	Me	Ed	Cn
Piranga rubra	piranga	summer tanager				F-I	R	3	Me	Ed	Cn
Piranga leucoptera	piranga	white-winged tanager				F-I	R	3	Me	Ed	Cn
Ramphocelus flammigerus	tangara lomiflama	flame-rumped tanager				F-I	R	3	Me	Ed	Cn
Tachyphonus luctuosus	tangara hombriblanca	white-shouldered tanager				F-I	R	3	Me	Ed	Cn
Tachyphonus rufus	tangara colorada	white-lined tanager				F-I	R	4	Me	Ed	Cn
Tangara rufigula	sigcha	rufous-throated tanager				F-I	R	4	Me	Ed	Cn
Tangara arthus	grano de oro	golden tanager	√	√	√	F-I	R	5	Ud	In	Sh
Tangara icterocephala	sigcha	silver-throated tanager				F-I	R	4	Me	Ed	Cn
Tangara xantocephala	sigcha	saffron-crowned tanager				F-I	R	4	Me	Ed	Cn
Tangara parzudakii	sigcha	flame-faced tanager	√			F-I	R	3	Ud	In	Do
Tangara labradorides	sigcha	metallic-green tanager				F-I	R	4	Me	Ed	Cn
Tangara cyanicollis	tangara capuchiazul	blue-necked tanager				F-I	R	5	Me	Ed	Cn
Tangara ruficervix	sigcha	golden-naped tanager		√		F-I	R	4	Ud	In	Do
Tangara gyrola	sigcha	bay-headed tanager				F-I	R	4	Me	Ed	Cn
Tangara nigroviridis	sigcha	beryl-spangled tanager				F-I	R	3	Me	Ed	Cn
Tangara vassorii	sigcha	blue-and-black tanager				F-I	R	3	Me	Ed	Cn
Tangara heinei	sigcha	black-capped tanager				F-I	R	5	Me	Ed	Cn
Thlypopsis ornata	pechón	rufous-chested tanager				F-I	R	4	Us	Gp	Cn
Thraupis cyanocephala	capuchón azul	blue-capped tanager	√			F-I	R	3	Me	Ed	Cn
Thraupis episcopus	azulado	blue-grey tanager		√	√	F-I	R	4	Me	Ed	Cn
Thraupis palmarum	palmerito	palm tanager		√	√	F-I	R	1	Ud	In	Do
TINAMIDAE											
Crypturellus soui	perdiz yuta	little tinamu		√		I	R	2	Ud	In	Un

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TROGLODYTIDAE											
Cinnycerthia unirufa	chochín	rayfous wren	√			F-I	R	4	Mc	Gp	Un
Cinnycerthia peruana	chochín sabanero	sepia-brown wren			√	F-I	R	4	Us	Gp	Un
Cyphorhinus thoracicus	chochín	chesnut-breated wren				F-I	R	3	Me	Ed	Sh
Henicorhina leucophrys	chochín	gray-breasted wood-wren		√		F-I	R	4	Me	Gp	Un
Microcerculus marginatus	chochín	southern nightingale-wren				F-I	R	2	Ud	Ed	Sh
Thryothorus euophrys	tambolero	plain-tailed wren		√		F-I	R	3	Me	Gp	Un
Thryothorus mystacalis	tambolero	whiskered wren	√			F-I	R	4	Me	Gp	Un
Thryothorus nigricapillus	tambolero cabezón	bay wren			√	F-I	R	4	Me	Gp	Un
Troglodytes aedon	chochín	house wren	√	√	√	F-I	T	5	Us	Gp	Un
Troglodytes solstitiales	chochín	mountain wren			√	F-I	R	4	Ud	Ed	Sh
TURDIDAE											
Catharus dryas	zorzal moteado	spotted nightingale-thrush		√		F	R	3	Me	Ed	Sh
Catharus ustulatus	zorzal, tordo	swainson's thrush	√			F	R	2	Me	Ed	Sh
Entomodestes coracinus	solitario negro	black solitaire			√	F	R	3	Me	Ed	Sh
Myadestes ralloides	solitario	andean solitaire		√		F	R	3	Ud	In	Sh
Platycichla leucops	sinsonte	pale-eyed thrush		√		F	R	4	Me	In	Do
Turdus fuscater	mirlo grande	great thrush	√			F	R	4	Me	Ed	Do
Turdus maculirostris	mirlo	ecuadorian thrush				F	R	3	Ud	Ed	Sh
Turdus obsoletus	mirlo	pale-vented thrush	√			F	R	3	Me	Ed	Do
Turdus serranus	mirlo serrano	glossy-black thrush		√	√	F	T	2	Us	Gp	Sh
TYRANNIDAE											
Capsiempis flaveola	tiranito	yellow tyrannulet			√	I	R	4	Me	Ed	Do
Camptostoma obsoletum	tiranito sureño	southern-bearless tyrannulet			√	I	R	3	Me	Ed	Do
Contupus fumigatus	cenizo cantor	smoke-colored pewee		√	√	I	R	2	Me	Ed	Do
Contupus sordidulus	negrito cantor	western wood-pewee				I	R	2	Me	Ed	Do
Contupus virens	mosquerito cantor	eastern wood-pewee	√			I	R	4	Me	Ed	Do
Elaenia albiceps	tijerita blanca	white-crested elaenia				I	R	3	Me	Ed	Do
Elaenia chiriquensis	tijerita	lesser elaenia	√			I	R	4	Me	Ed	Do
Elaenia pallatangae	tijerita	sierran elaenia				I	R	2	Ud	In	Sh
Empidonax virescens	mosquero	acadian flycatcher	√			I	R	4	Me	Ed	Do
Legatus leucophaius	comemoscas pirata	piratic flycatcher		√		I	R	4	Me	Ed	Do
Leptopogon superciliaris	comemoscas cejón	slaty-capped flycatcher		√		I	T	4	Me	Ed	Do
Lophotriccus pileatus	comemoscas enano	cale-crested spygmy tyrant			√	I	R	4	Me	Ed	Do
Mionectes olivaceous	atrapamoscas	olive-striped flycatcher		√		I	R	5	Me	Ed	Do
Mionectes striaticollis	atrapamoscas	streak-necked flycatcher		√		I	R	5	Me	Ed	Do
Mecocercus poecilocercus	solitario	white-tailed tyrannulet				I	R	2	Us	Gp	Un

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Myiarchus tuberculifer	atrapamoscas	dusky-capped flycatcher	√			I	R	5	Me	Gp	Cn
Myiodynastes chrysocephalus	mosquero coronado	golden-crowned flycatcher				I	R	4	Me	Ed	Do
Myioboius barbatus	atrapamoscas barbón	sulphur-rumped flycatcher				I	R	4	Me	Ed	Do
Myiobius villosus	atrapamoscas	tawny-breasted flycatcher			√	I	R	4	Me	Ed	Do
Myophobus flavicans	atrapamoscas	flavescent flycatcher				I	R	4	Ud	In	Sh
Myiophobus fasciatus	atrapamoscas	bran-coloured flycatcher		√		I	R	4	Me	Ed	Do
Myiotheretes fumigatus	solitario cenizo	smoky bush tyrant		√		I	R	4	Me	Ed	Do
Myiotheretes striaticolis	solitario colorado	streak-throated bush tyrant	√	√		I	R	2	Us	Gp	Un
Myiotriccus ornatus	mosquero decorado	ornate flycatcher				I	R	3	Me	Ed	Do
Pachyramphus versicolor	atrapamoscas	barred becard			√	I	R	3	Me	Ed	Do
Ochthoeca rufipectoralis	mosquero	rufous-breasted chat tyrant			√	I	R	3	Me	Ed	Do
Ochthoeca cinamomeiventris	mosquero	slaty-backed chat tyrant	√			I	R	4	Me	Ed	Do
Pachyramphus cinnamomeus	comemoscas	cinnamon becard	√	√		I	R	2	Me	Gp	Cn
Pachyramphus polychopterus	comemoscas	white-winged becard			√	I	R	3	Me	Gp	Cn
Pachyramphus albogriseus	comemoscas	black-and-white becard		√		I	R	2	Me	Gp	Cn
Pachyramphus versicolor	comemoscas	barred becard	√			I	R	3	Me	Ed	Do
Phyllomias cinereiceps	fruterito	asmy-headed tyrannulet				F-I	R	4	Us	Gp	Sh
Phyllomias uropigialis	fruterito	tawny-rumped tyrannulet			√	F-I	R	4	Us	Gp	Sh
Phyllomias griseiceps	fruterito	sooty-headed tyrannulet	√			F-I	R	4	Us	Gp	Sh
Phylloscartes ophthalmicus	mosquero	marble-faced bristle-tyrant	√	√		I	R	3	Me	Ed	Do
Platyrinchus mystaceus	mosquero	white-throated spadebill		√		I	R	3	Me	Ed	Do
Pseudotriceros pelzelni	mosquero	bronze-olive pygmy tyrant			√	I	R	3	Me	Ed	Do
Pyrrhomyias cinnamomea	mosquero canelón	cinnamon flycatcher				I	R	3	Me	Ed	Do
Sayornis nigricans	mosquero guardarríos	black phoebe	√	√	√	I	R	4	Me	Ed	Do
Serpophaga cinerea	mosquero de torrentes	torrent tyrannulet		√		I	R	3	Me	Ed	Do
Silvicultrix diadema	mosquero de diadema	yellow-bellied chat tyrant	√			I	R	3	Me	Ed	Do
Tityra semifasciata	puerquita	masked tityra	√	√		F	R	2	Me	Gp	Cn
Todirostrum cinereum	papamoscas	common tody flycatcher				I	R	3	Us	Ed	Do
Tyrannus melancholicus	zota gavilán	tropical kingbird	√	√	√	F-I	T	4	Me	Ed	Cn

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Uromyias agilis	dormilona	agile tit tyrant		√		F-I	R	4	Me	Ed	Do
Zimmerius chrysops	mascarita	golden-faced tyrannulet				F-I	R	3	Me	Ed	Do
TROCHILIDAE											
Adelomyia melanogenys	colibrí	speckled hummingbird	√			N	R	3	Me	Ed	Do
Aglaiocercus coelestis	silfo colivioleta	violet-tailed sylph			√	N	R	2	Me	Ed	Do
Aglaiocercus kingi	silfo coliazul	long-tailed sylph				N	R	4	Me	Ed	Do
Amazilia franciae	amazila	andean emerald		√		N	R	4	Me	Ed	Cn
Amazilia tzacatl	bravicón	frufous-talied hummingbird	√	√	√	N	T	5	Me	Ed	Do
Boissonneaua flavescens	coronado	buff-talied coronet				N	R	3	Ud	In	Do
Chlorostilbon mellisugus	quinde mosca verde	blue-tailed emerald				N	R	4	Me	Ed	Sh
Coeligena wilsoni	inca	brown inca	√			N	R	4	Me	Ed	Sh
Coeligena torquata	inca corbata blanca	collared jnca			√	N	R	3	Me	Ed	Do
Colibri delphinae	quinde real	brown violet-ear				N	R	2	Me	Ed	Do
Colibri thalassinus	quinde	green violet-ear				N	R	3	Me	Ed	Do
Colibri coruscans	quinde ventriazul	sparkling violet-ear	√	√		N	R	4	Ud	In	Cn
Doryfera ludoviciae	viudita picolanza	green-fronted lancebill		√		N	R	4	Me	Ed	Do
Florisuga mellivora	picaflor	white-necked jacobin		√	√	N	T	5	Me	Ed	Do
Haplophaedia lugens	zamarrito canoso	hoary puffleg				N	R	2	Me	Ed	Do
Heliangelus strophianus	corbata maigua	gorgeted sunangel		√		N	R	4	Me	Gp	Sh
Heliodoxa emperatrix	brillante	empress brilliant				N	R	3	Ud	Ed	Do
Heliodoxa jacula	brillante	green-crowned brilliant				N	R	3	Ud	In	Sh
Heliodoxa subinoides	brillante	fawn-breasted brilliant	√			N	R	3	Ud	In	Sh
Lafresnaya lafresnayi	pechiatorciopelado	mountain velvetbreast				N	R	3	Me	Ed	Do
Ocreatus underwoodii	colaespátula	booted racket-tail				N	R	2	Me	Ed	Do
Phaethornis yaruqui	ermitaño bigotiblanco	white-whiskered hermit	√	√	√	N	R	4	Me	Ed	Do
Phaethornis syrmatophorus	ermitaño	tawny-bellied hermit			√	N	R	3	Me	Ed	Do
Phaethornis longuemareus	ermitaño	little hermit	√			N	R	3	Me	Ed	Do
Philodice mitchellii	coqueta	purple-throated woodstar				N	T	2	Me	Ed	Do
Thalurania colombica	ninfa	crowned woodnymph		√		N	T	2	Ud	In	Sh
Urochroa bougueri	estrellita	white-tailed hillstar			√	N	R	4	Me	Ed	Do
Urosticte benjamini	puntablanca	purple-bibbed whitetip	√			N	R	3	Me	Gp	Sh
Schistes geoffroyi	piquispino	wedge-billed hummingbird			√	N	T	3	Me	Ed	Do
TROGONIDAE											
Pharomachrus auriceps	pilco	golden-headed quetzal	√		√	F	R	3	Ud	In	Do

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Trogon collaris	guajalito	collared trogon		√	√	F	R	4	Ud	In	Do
Trogon personatus	pan de maíz	masked trogon	√			F	R	3	Me	In	Do
VIREONIDAE											
Cyclaris nigrirostris	vaguito	black-and-white peppershrike	√	√		F-I	R	3	Me	Gp	Sh
Vireo leucophrys	vireo capetón	brown-capped vireo		√		F-I	M	2	Me	Gp	Sh
Vireo olivaceus	vireo ojirrojo	red-eyed vireo			√	F-I	M	2	Me	Gp	Sh

CODES: Loc: Local habitat of preference: *In:* forest interior; *Ed:* forest edge; *Gp:* open gaps; *Cn:* canopy and flying. **Str:** Stratum of preference: *Do:* arboreal and boles; *Sh:* shrubs midstory; *Un:* understory. **Hum:** Humidity regime of preference: *Me:* mesic humidity; *Ud:* udic humidity; *Us:* ustic humidity. **Frequency:** 1: rare, 2: scarce, 3: common, 4: frequent, 5: abundant. **Use:** *R:* Resident, *M:* Migratory, *T:* Transient. **Diet:** *F:* Frugivorous, *G:* Granivorous, *I:* Insectivorous, *C:* Carnivorous. √: ethnoecological significance. **93, 94, 95:** field seasons. ***SOURCES:*** British team check list 1989; Western Foundation birdlist 1990; Paul Greenfield checklist 1991; Charlie Vogt birdlist 1995; Fausto Sarmiento birdlist 1996.

have always to recognize the wonders of the land and their bounty given to you daily. A good omen, indeed, for when if you hear them singing, popular belief assures that your partner is also waiting to see you. Mountain farmers, both "campesinos" and "montubios", think that the bird is a reincarnation of the soul of the ancient *Yumbos*.

Despite the presence of private reserves in the area, because more bridges are now located throughout the region in the ever growing road network, and because deforestation creates patches of secondary growth, it is now easier to see the birds in the boundaries of pastures, along the forest edges, and in snags within secondary forests. Often, they are seen feeding at the Clusias (*Clusia* spp.); its sighting seems to denote a rather abundant presence of this endemic bird. Deforestation rates are high and the denudated slopes of the brooks near the reserve are there to demonstrate it. In areas where logging has already finished, very little –if any- is regenerated back to forest. On the contrary, even in steep slopes, introduced *Setaria* spp. grasses are planted to promote livestock production, particularly dairy.

I asked myself if the presence of *Yumbos* in high numbers were due to their biogeographical distribution, or rather that secondary growth is so ubiquitous that new cuts have cleared the boundaries of forest patches that are now more populated with shade intolerant, fast growing, secondary tree species. Of course, away from the bamboo, the balsa and the guarumos, the *Yumbos* are now without their proper tree cavities to recur. Disappearing populations of this bird species is already of preoccupation in areas where bird watching is expected to find them, without success. Remnant forests with these birds

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now subsist only in steep slopes and rocky outcrops incapable of use for neither agriculture nor livestock.

3.3 Avian indicator: Bubulcus ibis, ARDEIDAE

One of the most ubiquitous species in tropandean landscapes was the cattle egret associated with open spaces where cattle roamed freely. Indeed, this paleotropical bird came to America at the end of the 19th century and invaded every single habitat where cattle was introduced, making it one of the most successful invaders to the neotropics. Its presence often referred to tropical bucolic landscapes. As other gregarious flocks, these herons usually dominated the rural landscape. In Imbakucha lake, surrounding agricultural lands and the riparian environment provided *Bubulcus* ibis its main staple: disturbed insects, larvae and other small invertebrates. Reportedly, the garza bueyera as was known because of its habit of accompanying oxen (*buey* in Spanish) when plowing, fed also from small fishes, frogs, snakes, small mammals that could be found in the reeds surrounding the western edge of the lake. As strong competitor to other herons, the bueyera was the last white heron to be seen around the lakeshore. All others, including nocturnal ones have already disappeared from Imbakucha.

It is not only clear that the land-use of former agricultural plots have changed from agriculture to either floriculture or urban uses, but that the entire fauna on which the *bueyera* fed has also been altered. The extend of the crop of reeds of totora *(Scirpus totorae)* introduced to Ecuador from the Altiplano with the Inka conquest, has also changed, increasing the harvestable area of the lakeshore, which in turn has a reduced perimeter, drying out the ground nearby, with encroaching resort-oriented construction by the water edge and rocketing prices of real state. Pollutants from floriculture and other smaller farms' pesticides are being washed down the hill, making Imbakucha a recipient of non-point source pollution basin with rampant eutrophication. Small fishes (e. g., *Rhamdia* spp., *Gastroblepus* spp.) cannot be seen in streams surrounding the lake, as fewer and fewer oxen plowed lands are available. Tractors and other mechanical farming have now supplanted the role of the oxen plow.

The disappearance of its food sources, and the reduction of its vector, is arguable the direct cause for the extinction of the white cattle egret from Imbakucha. This is a phenomenon that questioned popular culture, because many writers wrote novels asking why the herons are gone? Remnant populations of these species now subsist only where traditional agriculture preserves the bucolic balance fueled by ecotourism, with nearby steep slopes and rocky outcrops incapable of use for neither agriculture nor livestock.

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3.4 Avian indicator: Pheucticus crhysogaster, EMBERIZIDAE

Once common species of the inter-Andean valleys, it is now restricted to wetter valleys and slopes towards the western flanks of the equatorial Andes. The "pico grueso amarillo sureño" as it is known in Spanish, is a large fringillus, reminiscent of cardinals of northern latitudes. In the Imbabura province, the bird was considered a pest due to its voracious appetite for corn *(Zea mais)*. As one of their important basic staple, Kichwa Otavalo indigenous practices have maintained a huge variety of corn available to the communities around the lake. Famous festivities celebrating the harvest of corn *("raimi", "yamur")* are still very popular amongst the Otavalo ethnic groups. The maize produced in the watershed is of several colors, tastes, sizes, nutrition and economic values. Originally developed in Mesoamerica, corn is one of the fundamental cultural icons for Andean groups, just as potatoes, quinoa, ulluco and tarwi. Because of the bird's presence often was associated with diminishing crop yields, this bird soon became known as "huirac-churo" from the original Kichwa *wirukchuruna* that describes the habit of eating grain by discarding the husks *("churuna")* perched on the cane *("wiru")*.

The same habit has been observed in the Chillos valley, in the Pichincha province, where I prepared a bird list over the span of many years (1978-82). The valley was drained during colonial times for cotton plantations and corn production. Agriculture was the main activity throughout the republican times until unprecedented urbanization started during 1970s and continues strong in the present. However, the Chillo's corn continues to be one of the most valuable heirloom varieties available in the market. Because of the strong urban sprawl and the conversion of agricultural lands to either pasture or suburban/urban land uses, diminishing populations of many animals are described. No sightings of *huirac-churo* have been reported in the last five years. Some argue that it has already disappeared from the valley. Paradoxically, remnant populations of this species subsist only in steep slopes and rocky outcrops and in the montane sites of the Andean blanks. Those areas are utilized for neither agriculture nor livestock.

4. Discussion and conclusion

The literature has used avian indicators to pinpoint environmental problems such as air pollution and canaries, or seabirds and oil spills. There are other avian indicators to pinpoint the ecosystem health with populations such as owls and rodents. Avian indicators are also used in epidemic or epizoonotic diseases, such as the Asian flu or the Nile virus. We can use these

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four neotropical examples as suggested in this article to pinpoint strong human driven changes in Tropandean landscapes. Albeit recognized in scientific papers and registered even in literary circles, these birds collectively are indicators of the need to change our paradigm about nature and culture in the Andes.

A call to ponder on the role of humans in shaping the natural environment has been presented with examples of the diverse avifauna that enclose manifestation of the *colono* culture and traditional agriculture (SARMIENTO *et al.*, 2005). The current paradigm of nature versus culture (n≠c) has clearly driven policies that reflect a mistaken approach to develop protected areas as a response to the crisis (e. g., PUGH & SARMIENTO, 2004). Instead of a fixing solution of the n≠c approach, a comprehensive assessment of cultural and economical practices is needed. In every of the four case studies presented, the bird species were found only in remnant shreds of mountain forest, where neither livestock nor cropping was possible due to the relief. Pastures and agriculture have become ubiquitous in highland Ecuador, in lieu of the tropical montane cloud forest of the past. I think that curving the dairy production, reducing or eliminating the subsidy to milk and dairy products will do better to conserve biodiversity than creating a nature reserve or another protected area. Clearly, rescuing those small remnant shreds by restoration ecology effort and community participation, could become a priority for conservationist, NGOs and local governments in their quest for sustainability.

By incorporating approaches in line with the new paradigm of nature:culture (n:c) more attention will be placed to landscape stewardship, as developing conservation easements, community-based conservation initiatives, and cultural landscapes or sacred sites as a viable n:c tools for conservation.

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Pheucticus chrysogaster (Yellow Grosbeak).

Aulachrorynchus haematopygius (Toucanet).

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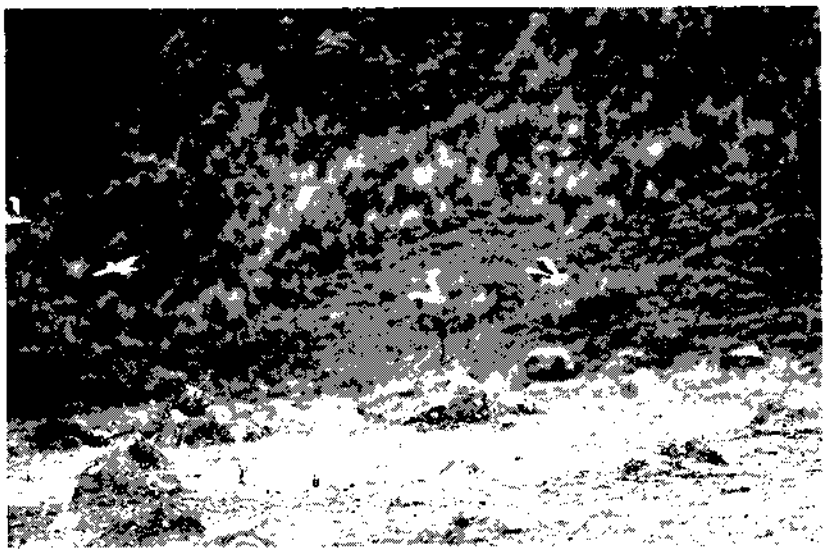
Bubulcus ibis (Cattle egret).



Vanellus resplendeus (Veraneros).

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