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Centro de Ornitología y Biodiversidad (CORBIDI)

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Perú: Tapiche-Blanco

Book chapter:

Perú: Tapiche-Blanco

Nigel Pitman, Corine Vriesendorp, Lelis Rivera Chávez, Tyana Wachter, Diana Alvira Reyes, Álvaro del Campo, Giuseppe Gagliardi-Urrutia, David Rivera González, Luis Trevejo, Dani Rivera González y Sebastián Heilpern

Octubre/October 2015

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Fotos e ilustraciones/Photos and illustrations
Carátula/Cover: Los bosques entre los ríos Tapiche y Blanco albergan unas 17 especies de primates, incluyendo poblaciones grandes del huapo rojo, Cacajao calvus ssp. ucaulii, considerado Vulnerable en el ámbito mundial. Foto de Álvaro del Campo./The forests of Peru’s Tapiche-Blanco region harbor some 17 species of primates, including large populations of the globally Vulnerable red uakari, Cacajao calvus ssp. ucaulii. Photo by Álvaro del Campo.

Carátula interior/Inner cover: Un mosaico de bosques de arena blanca, bosques de altura y vastos humedales estacionalmente inundables hace del interfluvio de Tapiche-Blanco una prioridad para la conservación en el Perú. Foto de Álvaro del Campo./With its striking mosaic of white-sand forests, upland forests, and vast seasonally flooded wetlands, the Tapiche-Blanco region is a leading conservation priority for Peru. Photo by Álvaro del Campo.

Láminas a color/Color plates: Figs. 10Q–S, P. Álvarez-Loayza; Fig. 12F, D. Alvira Reyes; Fig. 10H, R. Aquino; Figs. 7A–U, M.I. Corahua; Figs. 4D, 5C, T. Crouch; Figs. 1, 3D–F, 6L, 8B, 9A, 9G–H, 10A, 10C, 10G, 10J, 10K, 10M, 100, 11B, 12A (inset), 13A–C, Á. del Campo; Figs. 10B, 10D–F, 10L, 10P, M. Escobedo; Figs. 8A, 8G, 8J–M, 8O–P, G. Gagliardi-Urrutia; Figs. 7V, 8E, 9J, 11A, 11F, 12E, J. J. Inga Pinedo; Fig. 5A, M. K. Johnston; Figs. 2A–B, 3A–C, J. A. Markel; Fig. 5E, T. McNamara; Figs. 5G, 6A, 6C, 6D, 6G, 6J–K, T. J. Mori Vargas; Fig. 11E, C. Núñez Pérez; Fig. 8Q, M. Odicio Iglesias; Figs. 10N, B. J. O’Shea; Fig. 7W, E. Pacaya; Figs. 11C–D, 12A–D, M. Pariona; Figs. 4B–C, N. Pitman; Figs. 9B–F, 9K, P. Saboya del Castillo; Fig. 4A, R. F. Stallard; Figs. 6B, 6F, L. A. Torres Montenegro; Figs. 8C–D, 8F, 8H, 8N, P. Venegas Ibáñez; Figs. 4E, 5B, 5D, 5F, 6E, 6H, C. Vriesendorp.

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**DATE OF FIELDWORK**
9–26 October 2014

**Key**
- Biological inventory site
- Social inventory site
- Tapiche-Blanco
- Protected area

**REPORT AT A GLANCE**

- **Matsés National Reserve**
- **Reservoir Zone**
- **Nueva Esperanza**
- **Lobo Santa Rocino**
- **Blanco River**
- **Palmera del Tapiche**
- **Wicungo**
- **Frontera**

**DIMENSIONS**
594.0x774.0
**Region**

The Tapiche River is an east-bank tributary of the Ucayali that drains a large expanse of lowland Amazonian forest in Peru’s southern Loreto Region. During the rapid inventory we visited seven sites in a ~310,000-ha area between the Tapiche and its largest tributary, the Blanco. Part of the ancestral territory of the Capanahua and Matsés indigenous peoples, this is roadless wilderness that acts as a forest corridor between two adjacent protected areas (see map). However, years of logging, hunting, and oil exploration have left a conspicuous legacy of logging trails, scattered tree stumps, and seismic lines. Active logging and hydrocarbon concessions occupy much of the study area. There are currently 23 campesino communities, indigenous communities, and other settlements along the Tapiche and Blanco rivers, with a total population of ~2,900 mestizo, Capanahua, and Kichwa residents.

**Sites visited**

<table>
<thead>
<tr>
<th>Campsites visited by the biological team:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blanco watershed</strong></td>
<td></td>
</tr>
<tr>
<td>Wiswincho (Quebrada Yanayacu/Blanco)</td>
<td>9–14 October 2014</td>
</tr>
<tr>
<td>Quebrada Pobreza</td>
<td>20–26 October 2014</td>
</tr>
<tr>
<td><strong>Tapiche watershed</strong></td>
<td></td>
</tr>
<tr>
<td>Anguila (Quebrada Yanayacu/Tapiche)</td>
<td>14–20 October 2014</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sites visited by the social team:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blanco watershed</strong></td>
<td>Comunidad Nativa Lobo Santa Rocino</td>
</tr>
<tr>
<td>Comunidad Nativa Frontera</td>
<td>20–25 October 2014</td>
</tr>
<tr>
<td><strong>Tapiche watershed</strong></td>
<td>Comunidad Nativa Wicungo</td>
</tr>
<tr>
<td>Comunidad Nativa Palmera del Tapiche</td>
<td>17–20 October 2014</td>
</tr>
</tbody>
</table>

During the inventory the social team also met with residents of several other communities: España, Nuestra Señora de Fátima, Monte Alegre, Morales Bermúdez, Pacasmayo, Puerto Ángel, San Antonio de Fortaleza, San Pedro, and Yarina Frontera Topal.

The day after fieldwork concluded, on 26 October 2014, the social and biological teams met in the community of Nueva Esperanza to share preliminary results of the inventory with authorities and residents of the Blanco and Tapiche watersheds. On 28–29 October, both teams held a workshop in Iquitos to identify the main threats, assets, and opportunities in the region and to draft conservation recommendations.

**Biological and geological inventory focus**

Geomorphology, stratigraphy, hydrology, and soils; vegetation and flora; fishes; amphibians and reptiles; birds; large and medium-sized mammals; bats
Social inventory focus

Social and cultural assets; ethnohistory; demography, economics, and natural resource management systems; ethnobotany

Principal biological results

The Tapiche-Blanco region epitomizes Loreto’s extraordinary landscape diversity. It harbors large expanses of wetlands and peatland forests, white-sand forests, and hyperdiverse upland forests, and these are drained by a variety of black, white, and clearwater streams. Located within the global epicenter of amphibian, mammal, and bird diversity, and highlighted by recent maps as possessing the largest aboveground carbon stocks in Peru, the region has maintained continuous forest and a high conservation value despite a long history of unregulated logging, hunting, and fishing. The region has long been a conservation priority of the national and regional governments, and the high plant and animal diversity we recorded during the inventory make it clear that it deserves the designation.

We recorded 962 plant species and 741 vertebrate species during the inventory. Dozens of the species we recorded are distributed patchily in Amazonian Peru because they specialize on ‘islands’ of poor-soil vegetation. Based on our fieldwork and on maps of diversity in these groups, we estimate that the total number of vascular plant and vertebrate species in the Tapiche-Blanco region is 3,878–4,478.

<table>
<thead>
<tr>
<th></th>
<th>Species recorded during the inventory</th>
<th>Species estimated for the region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vascular plants</td>
<td>962</td>
<td>2,500–3,000</td>
</tr>
<tr>
<td>Fishes</td>
<td>180</td>
<td>400–500</td>
</tr>
<tr>
<td>Amphibians</td>
<td>65</td>
<td>124</td>
</tr>
<tr>
<td>Reptiles</td>
<td>48</td>
<td>100</td>
</tr>
<tr>
<td>Birds</td>
<td>394</td>
<td>550</td>
</tr>
<tr>
<td>Large and medium-sized mammals</td>
<td>42</td>
<td>101</td>
</tr>
<tr>
<td>Bats</td>
<td>12</td>
<td>103</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,703</strong></td>
<td><strong>3,878–4,478</strong></td>
</tr>
</tbody>
</table>
Although tremendously complex at small scales, the landscape is composed of three main elements. In the north, where the Tapiche and Blanco rivers meet, a mostly flooded expanse in the Ucamara Depression harbors large wetlands (~100 m above sea level). In the east, a strip of white-sand soils and associated stunted forest (varillales and chamizales) borders the Blanco River (100–125 masl). The remainder of the region is dominated by upland hills and terraces (125–180 masl).

**Geology, hydrology, and soils**

The Blanco and Tapiche are low-conductivity nutrient-poor whitewater rivers. The geological formations they drain correspond broadly to the three main landscape elements described above. Recent alluvial sediments and peats underlie the flooded areas, which are located within the same slowly subsiding Ucamara Depression as the vast Pacaya-Samiria wetlands farther north. Plio-Pleistocene quartz sand deposits (~2 million years old) underlie the stunted varillales and chamizales. Finally, the slightly older Ipururo Formation (2–5 million years old) occupies most of the uplands.

Soils derived from all three geological formations tend to be sandy, nutrient-poor, and covered with a dense root mat whose thickness ranges from 5–15 cm on the slightly richer upland soils to 10–30 cm on the poorer white sands and peat. The yellow-brown loamy sand and sandy loam upland soils of the Ipururo Formation are drained by clearwater...
streams with very low conductivities (<10 µS/cm) and a slightly acidic pH. The white quartz-sand soils in the varillales and chamizales are drained by blackwater, higher-conductivity (30–50 µS/cm) and acidic (pH <4.5) streams. Water bodies in the flooded areas are a mix of white, black, and clearwater. Salt licks (collpas) are relatively rare in the region, but are important attractions for terrestrial mammals and hunters. A parrot collpa of a type rarely recorded in Loreto was observed on a cliff along the Blanco River.

This is one of the most geologically active regions of the Loreto lowlands, crisscrossed by deep and shallow faults. The most notable is the Bolognesi Fault, whose role in elevating the uplands above the white-sand forests west of the Blanco River makes it conspicuous on satellite images. The Blanco River itself appears to be developed along a zone of secondary faulting, which likely led to the Blanco’s geologically recent ‘capture’ of headwaters that previously belonged to the Gálvez River.

The region’s sandy, low-nutrient soils make it especially vulnerable to large-scale extractive activities. The root mats that currently protect the soil are easily destroyed by road-building, deforestation, and intensive forestry. Loss of these root mats would result in excessive upland erosion and the subsequent burial of important wetland environments and low-lying varillales and chamizales. While the three oil wells drilled to date in the region were dry, exploration is ongoing and constitutes a grave risk. Drilling in the Tapiche-Blanco region could cause spills of salty formation waters or oil that could pollute surface waters and aquatic ecosystems, an especially grave concern given the exceedingly low levels of salts in the landscape.

Vegetation

Three large blocks of vegetation dominate the landscape: wetlands, white-sand forests, and upland forests (see map above). Within these blocks we recorded a complex mosaic of at least five vegetation types (and eight sub-types), many of them growing on nutrient-poor soils and featuring plant species that are poor-soil specialists.

Some poor-soil forests in the region grow on white sands and others grow on peat deposits. The varillal and chamizal forests on white sand are very similar in structure and composition to those in the Matsés and Allpahuayo-Mishana National Reserves, but are dominated by different species. We also found forests that strongly resemble varillales and that harbor a number of species typically associated with that forest type (Pachira brevipes, Macrolobium microcalyx, Pagamea, Platycarpum sp. nov.), but that grow on peat. These vegetation types, which we are calling peatland varillales and chamizales, are similar to Loreto’s iconic white-sand forests, but their canopies are overtopped by scattered emergent Mauritia flexuosa and Mauritiella armata palms.

We also found a third vegetation type on peat that was open, dominated by knee-high sedges, and resembled a savanna. Known from very few other sites in Loreto, peatland savannas like this occupy tiny patches on the Tapiche-Blanco landscape but likely harbor...
### Vegetation (continued)

The highest elevations on the landscape are occupied by majestic, closed-canopy upland forests with hyperdiverse tree communities that are compositionally similar to those in Jenaro Herrera, the Matsés National Reserve, and the Yavari watershed. These upland forests were the most heavily disturbed vegetation type. We saw a large number of cut stumps and timber extraction trails left by illegal loggers, and the forest was also crisscrossed by recently cut seismic lines.

### Flora

The botanists collected 1,069 vascular plant specimens and identified but did not collect another ~200 species in the field, for a total of 962 species recorded during the inventory. We believe the regional flora contains 2,500–3,000 vascular plant species.

The palm community was especially diverse. We recorded 19 genera and 36 species, including some that are rarely sighted in Loreto, such as *Oenocarpus balickii* and *Syagrus smithii*. We also found an undescribed species of *Platycarpum*, as well as four new records for Peru (the herb *Monotagma densiflorum*, the orchids *Palmorchis sobralioides* and *Galeandra stylomisantha*, and the treelet *Retiniphyllum chloranthum*).

The results of our tree inventories are similar to those of recent forestry surveys in the region. Six families—Fabaceae, Arecaceae, Sapotaceae, Chrysobalanaceae, Lauraceae, and Myristicaceae—account for more than half of all stems and contribute the largest number of species and all of the most common species. In the 70 km of trails we explored and the ~1,800 trees we inventoried we found none of the highest-value timber species, tropical cedar (*Cedrela odorata*), or mahogany (*Swietenia macrophylla*). We only found three *Cedrelinga cateniformis* trees (a second-tier high-value species), and all of them had been cut down.

### Fishes

Fish communities in the aquatic habitats of the Tapiche and Blanco watersheds are very diverse. During the 14-day inventory we recorded 180 species in 22 sampling stations, and the social team recorded another 30 in their visits to communities. Most sampling stations were blackwater streams and most of the species we recorded are adapted to those nutrient-poor habitats. We estimate that the Tapiche and Blanco watersheds harbor a fish fauna of 400–500 species—roughly 40% of all freshwater fish known from Peru.

Among the species recorded during the inventory are four that appear to be new to Peru or new to science (species in the genera *Hemigrammus*, *Tyttocharax*, *Characidium*, and *Bunocephalus*).

A quarter of the species we recorded were also recorded during the rapid inventory of the Sierra del Divisor Reserved Zone; comparable numbers for the lower Tapiche River and the Matsés National Reserve are 22% and 7%. Half of the species in our list were not recorded in those three earlier inventories.
Roughly half of the fish species we recorded are used in some way by local residents. Many are ornamental taxa that are sold to collectors in Peru and around the world (Osteoglossum bicirrhosum, Hyphessobrycon spp., Hemigrammus spp., Corydoras spp., Apistogramma spp., and Gymnotus spp.), and Peruvian fishing statistics show the Tapiche and Blanco watersheds to be important areas for ornamental fish (DIREPRO 2013). Other species are fished and eaten by local communities, especially migratory taxa like sábalos (Brycon, Salminius), sardinas (Triportheus), lisas (Leporinus, Schizodon), boquichicos (Prochilodus, Semaprochilodus), and large catfishes (Pseudoplatystoma, Brachyplatystoma). The Amazon’s largest food fish, arapaima (Arapaima spp.), is also reported to be present.

**Amphibians and reptiles**

The herpetologists sampled terrestrial and aquatic habitats in upland, flooded, and white-sand forests, and found well-preserved amphibian and reptile communities. We recorded 113 species (65 amphibians and 48 reptiles) during the inventory and estimate that the region has a herpetofauna of at least 124 amphibians and 100 reptiles. These are astronomical but not unexpected numbers, given that the region lies within the global epicenter of amphibian diversity.

Notable records include the poison dart frog Ranitomeya cyanovittata, which is restricted to southern Loreto. Four frog species we found in the inventory may be new to science: Hypsiboas aff. cinerascens, Osteocephalus aff. planiceps, Chiasmocleis sp. nov., and Pristimantis aff. lacrimosus. We also recorded two globally Vulnerable species: yellow-footed tortoise (Chelonoidis denticulata) and yellow-spotted river turtle (Podocnemis unifilis, also considered Vulnerable in Peru).

**Birds**

We observed 394 bird species in the campsites we visited. This number is intermediate between those recorded in the rapid inventories of the Matsés National Reserve (416) and the Sierra del Divisor Reserved Zone (365). When records from previous expeditions to the Tapiche and Blanco watersheds are included, the total number of bird species recorded to date in these watersheds is 501. We estimate a regional avifauna of 550 species.

The most striking records are the 23 birds that are specialists on poor-soil forests. These include Notharchus ordii, Hemitriccus minimus, and Myrmotherula cherriei. We made a concerted search for the three poor-soil specialists that are endemic to Loreto or to Peru (Percnostola arenarum, Polioptila clementsii, and Zimmerius villarejoi), but none were recorded during the inventory.

More than 15 of the species we recorded represent range extensions. While some of these reflect the lack of previous bird studies in the region, most are birds whose restricted or disjunct distributions are associated with patches of poor-soil forests. Four examples are Nyctibius leucopterus (previously known only from a few localities north of the Ucayali-Marañón confluence; Fig. 9A), Myrmotherula cherriei (known only from
Birds (continued)

- the lower Tigre River, Loreto; Fig. 9F), *Xenopipo atronitens* (known from the middle Marañón, Loreto, and the Pampas del Heath, Madre de Dios; Fig. 9B), and *Polytmus theresiae* (known from Morona, Jeberos, and the Pampas del Heath). Other range extensions are of species that are associated with floodplains along large rivers, such as *Capito aurovirens* and *Myrmoborus melanurus*.

Game bird populations were modest and mostly represented by a few sightings of *Penelope jacquacu*, *Mitu tuberosum*, and *Psophia leucoptera*. It is possible that these populations are depressed by hunting, but it is also possible that they reflect the poor soils and low-productivity habitats that dominate the region. The Tapiche-Blanco region harbors at least 70 bird species that deserve special conservation attention: three globally Vulnerable species, two species that are considered Vulnerable in Peru, and a large number of species listed in CITES appendices.

Mammals

- We censused mammals during the inventory by walking transects (large and medium-sized mammals) and setting mist nets (bats). Of the 204 mammals estimated to occur in the region (101 large and medium-sized mammals and 103 bats) we recorded 54 (42 and 12). Maps of global mammal diversity show the Tapiche-Blanco to be part of the world’s most diverse region.

Primates were especially diverse. The 13 species we recorded during the inventory and the 4 additional species that are expected for the region or that have been recorded on previous work represent more than half of all primate species in Loreto. In Peru, the saddleback tamarin (*Saguinus fuscicollis*) is only found between the Tapiche and Blanco rivers. At our Blanco River campsites we found healthy populations of the globally Vulnerable red uakari (*Cacajao calvus*). At the Anguila campsite we sighted an unidentified *Callicebus* that may prove to be an undescribed species. Overall we recorded 15 globally or nationally threatened mammal species.

Ungulate populations were low at the sites we visited, and this was especially true of white-lipped peccary (*Tayassu pecari*). This may reflect the impacts of hunting around logging camps. However, we also heard reports of healthy animal populations near some communities, where residents hunt for food and occasionally to sell bushmeat. This uncertainty regarding the populations of game mammals in the region makes it a high priority to establish agreements between communities and loggers regarding the monitoring and sustainable management of game.

Human communities

- The Tapiche and Blanco watersheds are home to roughly 2,900 people in 22 settlements — indigenous communities, *campesino* communities, and other settlements — most of which are currently seeking official recognition and land titles. These are mostly *mestizo* communities settled by immigrants from cities like Requena and Iquitos, neighboring watersheds like the Ucayali, Tigre, and Marañón, and other regions of Peru like San Martín.
The region forms part of the ancestral territory of the Capanahua indigenous group. The Remo (another group in the Pano linguistic family) and the Matsés also used these watersheds historically. The arrival of outside colonists began during the rubber boom (ca. 1900), after which the Capanahua were gradually pushed south, towards the upper Tapiche, and the Matsés pushed east, to the Yaquerana and Gálvez watersheds.

The regional economy is diversified and dynamic and has strong connections to markets. The primary economic activities are logging, ornamental fish collection, fishing, hunting, subsistence agriculture, and the sale of plantains and manioc byproducts (fariña and tapioca) in the nearby towns of Requena, Curinga, and Santa Elena. These economic activities have driven settlement patterns and created most communities in the region. This work requires a deep knowledge of the regional ecology, natural resources, and seasonal patterns, and has forged strong connections between local residents and their natural surroundings.

Logging is carried out under a number of different methods—including community forests (bosques locales), forestry permits (permisos forestales), concessions, and illegal logging in unauthorized areas—and it involves a large array of local and external actors. Debt peonage remains common, and has left many local residents and communities in debt and subject to abusive working conditions. Residents who fish for a living are somewhat freer from these pressures but also dependent to the same degree on the market.

Across this social landscape new leaders have begun to emerge and an increasing number of municipal posts are occupied by local residents. Community assemblies are increasingly used as places to develop agreements between communities regarding how communities work, organize themselves, and harvest natural resources. Relationships between communities are good, and this represents an important foundation for sustainable management of the region. The presence of government agencies like the park service (SERNANP), which has staff in the region managing the Matsés National Reserve and the Sierra del Divisor Reserved Zone; the Tapiche Reserve, an ecotourism lodge and private conservation initiative; and NGOs like the Centro para el Desarrollo del Indígena Amazónico (CEDIA) are important potential players in helping strengthen local initiatives to replace the current model of natural resource use with new systems that are fairer and more sustainable.

**Current status**

The Tapiche-Blanco region is designated as a conservation priority in the master plan of the Peruvian park system (SERNANP 2009), which shows the region as a key link in a corridor connecting Sierra del Divisor Reserved Zone with Matsés National Reserve. The Tapiche-Blanco interfluve is also considered a conservation priority by the Loreto regional government (PROCREL 2009). Part of the area has also been proposed as the Yavarí-Tapiche Territorial Reserve, intended to protect uncontacted indigenous peoples. However,
the only conservation area established in the region to date is a small private initiative near the confluence of the Blanco and Tapiche rivers: the Tapiche Reserve (1,500 ha).

Most of the region has been designated for forestry (as Bosque de Producción Permanente)—including large expanses of stunted white-sand forest that has no potential for forestry—but the highest-value timber species have already been removed. There are several forestry concessions in the region, but many of these have been cancelled in recent years. Forestry operations inside communities are also active, and illegal and informal logging remains common throughout the region.

There are three oil and gas concessions in the region. Over the last two years the Pacific Rubiales company has opened dozens of seismic lines in the southern portion of the study area.

<table>
<thead>
<tr>
<th>Conservation targets</th>
<th>01</th>
<th>The largest patch of white-sand vegetation in Peru (~18,000 ha), as well as savannas that are poorly known and exceedingly rare within Loreto</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>02</td>
<td>Upland forests estimated to contain the highest carbon stocks in Peru</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>Fragile soils and blackwater aquatic communities that would be destroyed by deforestation and road-building</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>Hyperdiverse plant and animal communities, including globally and nationally threatened species and species with restricted ranges</td>
</tr>
<tr>
<td></td>
<td>05</td>
<td>A primate community with up to 17 species—more than half of all primate species in Loreto</td>
</tr>
<tr>
<td></td>
<td>06</td>
<td>Fish species that are economically important for local communities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Principal assets for conservation</th>
<th>01</th>
<th>Forests and rivers that have maintained their high conservation value despite years of high-grading, and that still constitute important corridors between adjacent protected areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>02</td>
<td>Tools for community management of the landscape, including life plans (planes de vida) being developed by most communities in the region</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>Strong interest among local residents in fair and environmentally sensitive work, such as sustainable fishing</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>The presence in the area of several stakeholders with experience in conservation and the sustainable use of natural resources (SERNANP, CEDIA, Tapiche Reserve)</td>
</tr>
<tr>
<td></td>
<td>05</td>
<td>Peru’s new forestry law, which offers the government an opportunity to address the most problematic aspects of Amazonian timber production</td>
</tr>
</tbody>
</table>
Main threats

01 Logging operations that are illegal, informal, or leave lasting scars on social and biological communities

02 Existing and proposed roads for extracting timber

03 Little to no oversight of natural resource harvests by all actors on the landscape

04 A social landscape marked by unclear land tenure, corruption, and a negligible presence of public officials

05 Active hydrocarbon exploration in a tectonically active region where oil and gas production poses steep pollution risks

Principal recommendations

01 Complete the land titling process in all communities and settlements in the region

02 Create a 308,463-ha protected area between the Tapiche and Blanco rivers for conservation and sustainable natural resource use (Figs. 2A–B)

03 Redraw the boundaries of lands currently designated for forestry (Zone 1A) to eliminate overlap with the proposed conservation area, since the poor, fragile soils make sustainable, low-impact logging operations impossible

04 Work closely with communities and authorities to ensure effective participative management of community lands, neighboring protected areas, and other conservation initiatives

05 Take joint action between government authorities and local communities to eliminate illegal logging in the Tapiche and Blanco watersheds
<table>
<thead>
<tr>
<th>Location</th>
<th>Hectares</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Bolivia Telamonde</td>
<td>1,427,600</td>
<td>3,527,182</td>
</tr>
<tr>
<td>02 Peru Crediera Adol</td>
<td>1,393,190</td>
<td>3,434,805</td>
</tr>
<tr>
<td>03 Ecuador Colat-Barrigatoire</td>
<td>554,651</td>
<td>1,372,022</td>
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<tr>
<td>04 Bolivia Esteros Boreal</td>
<td>74,064</td>
<td>181,951</td>
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<td>11 Peru Tamshiyacu-Tahuayo</td>
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<td>798,098</td>
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<td>15 Peru Megentina</td>
<td>216,005</td>
<td>533,760</td>
</tr>
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<td>16 Peru Melila</td>
<td>210,635</td>
<td>513,412</td>
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<td>17 Peru Sierra del Divisor</td>
<td>137,331</td>
<td>335,886</td>
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<td>18 Peru Nana-Pintupac-Echambira</td>
<td>054,248</td>
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<tr>
<td>20 Peru Gisepi</td>
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<tr>
<td>21 Ecuador Terr. Arenales Colon</td>
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<td>21 Ecuador Cofan-Chingual</td>
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<td>22 Peru Margues</td>
<td>30,000</td>
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<tr>
<td>23 Peru Yagua</td>
<td>866,927</td>
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<tr>
<td>Total Protected/Protected</td>
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</tr>
<tr>
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<td>126,301</td>
</tr>
<tr>
<td>06 Bolivia Federico Huenan</td>
<td>202,342</td>
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<td>11 Peru Yaroc</td>
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<tr>
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<tr>
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<tr>
<td>26 Peru Eno-Campusa-Aquarapa</td>
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<td>27 Peru Taitoca-Blanco</td>
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<td>762,228</td>
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<tr>
<td>Total Proposed/Proposed</td>
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<td>04 China Yunnan</td>
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<td>07 Cuba Zapata</td>
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<td>08 Cuba Cuitait</td>
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<td>09 Cuba Rin Hayna</td>
<td>14,600</td>
<td>36,619</td>
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<td>10 Cuba Silvania-Jucuti</td>
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<td>13 Cuba Barquio</td>
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<td>54,653</td>
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<td>14 Cuba Humboldt</td>
<td>70,160</td>
<td>174,654</td>
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<tr>
<td>20 Ecuador Corobici</td>
<td>630,380</td>
<td>1,490,848</td>
</tr>
<tr>
<td>24 Peru Kamar Health</td>
<td>598,643</td>
<td>1,494,540</td>
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<tr>
<td>Total Fortaled/Reinforced</td>
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<tr>
<td>TOTAL HECTAREAS/ACRES</td>
<td>13,599,755</td>
<td>33,605,726</td>
</tr>
</tbody>
</table>
Instituciones participantes/
Participating institutions

The Field Museum
Centro para el Desarrollo del Indígena Amazónico (CEDIA)
Instituto de Investigaciones de la Amazonía Peruana (IIAP)
Servicio Nacional de Áreas Naturales Protegidas por el Estado (SERINAP)
Servicio Nacional Forestal y de Fauna Silvestre (SERFOR)
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