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The Field Museum

The Field Museum is a collections-based research and educational institution devoted to natural and cultural diversity. Combining the fields of Anthropology, Botany, Geology, Zoology, and Conservation Biology, museum scientists research issues in evolution, environmental biology, and cultural anthropology. One division of the Museum—Environment, Culture, and Conservation (ECCo)—is dedicated to translating science into action that creates and supports lasting conservation of biological and cultural diversity. ECCo works closely with local communities to ensure their involvement in conservation through their existing cultural values and organizational strengths. With losses of natural diversity accelerating worldwide, ECCo's mission is to direct the museum's resources—scientific expertise, worldwide collections, innovative education programs—to the immediate needs of conservation at local, national, and international levels.

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Programa de Conservación, Gestión y Uso Sostenible de la Diversidad Biológica, Gobierno Regional de Loreto

The Gobierno Regional de Loreto (GOREL) is a legal entity, with political, economic, and administrative autonomy in regional issues under its authority. Its goal is to promote integrated, sustainable, regional development (encouraging responsible public and private investment) and employment (guaranteeing equal opportunity for residents, and respect of their rights), in accordance with national and regional plans and programs.

The Programa de Conservación, Gestión y Uso Sostenible de la Diversidad Biológica (PROCREL) is a technical entity of GOREL, associated with its regional management group, that contributes to sustainable development in the Loreto region through public policies and development strategies for Áreas de Conservación Regional and the environmental benefits they offer, such as ecological and evolutionary processes of value for conservation and sustainable use of regional biological diversity, resulting in a reduction of poverty in Loreto's human population. GOREL, through PROCREL, is responsible for the administration of the Áreas de Conservación Regional and promotes informed and responsible participation of residents through co-administration of these protected areas with local communities and other parties involved in their management.

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Proyecto Apoyo al PROCREL

The Proyecto Apoyo al PROCREL (PAP) is administered through an inter-institutional consortium by the Gobierno Regional de Loreto (GOREL), the non-governmental organization Naturaleza y Cultura Internacional (NCI), and the Instituto de Investigaciones de la Amazonía Peruana (IIAP), in strategic alliance with the Sociedad Peruana de Derecho Ambiental and the Universidad Nacional de la Amazonía Peruana. PAP was established in 2006 to work closely with PROCREL (the division charged by GOREL with biodiversity management) and increase conservation areas within the Áreas de Conservación Regional (ACR) system. The ACR initiative seeks to empower local communities so that they take play a leadership role in protecting and managing their natural resources. PAP project also has developed technical and legal proposals aimed at maintaining ecological processes essential for the vitality of Amazonian ecosystems in Loreto.

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Federación de Comunidades Nativas Maijuna

The Federación de Comunidades Nativas Maijuna (FECONAMAI) is a Peruvian non-profit organization established by the Maijuna in 2004 and registered in 2007 in the Oficina Registral in Iquitos, Peru. FECONAMAI officially represents all four Maijuna communities located in the Peruvian Amazon: Puerto Huamán and Nueva Vida along the Yanayacu River, San Pablo de Totoya (Totolla) along the Algodón River, and Sucusari along the Sucusari River. The federation's mission is to (1) conserve the Maijuna culture, (2) conserve the environment, and (3) improve Maijuna community organization. FECONAMAI has promoted and collaborated on a wide variety of biocultural conservation and sustainable development projects within Maijuna lands. The federation is currently petitioning for the creation of an Área de Conservación Regional (ACR), that would legally and formally protect Maijuna ancestral lands, as the Maijuna strongly feel that the survival of their people and the survival and maintenance of their cultural practices, unique traditions, and traditional subsistence strategies depend on a healthy, intact, and protected ecosystem.

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Instituto de Investigaciones de la Amazonía Peruana

The Instituto de Investigaciones de la Amazonía Peruana (IIAP) is a public institution devoted to research and technical development in Amazonia. Its objectives include research, sustainable resource use, and conservation of biodiversity while promoting the development of human populations in Amazonia. Its headquarters are in Iquitos, with other offices in six Amazonian regions. In addition to investigating possible uses of promising species and developing methods for the cultivation, management, and development of biodiversity resources, IIAP is actively promoting activities aimed at the management and conservation of species and ecosystems, including the creation of protected areas; it also participates in the studies necessary for supporting the creation of these areas. IIAP has six research programs, which are focused on aquatic ecosystems and resources, terrestrial ecosystems and resources, ecological-economic zoning and environmental planning, Amazonian biodiversity, human diversity in the Amazon, and information resources about biodiversity.

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Herbario Amazonense de la Universidad Nacional de la Amazonía Peruana

The Herbario Amazonense (AMAZ) is situated in Iquitos, Peru, and forms part of the Universidad Nacional de la Amazonía Peruana (UNAP). It was founded in 1972 as an educational and research institution focused on the flora of the Peruvian Amazon. In addition to housing collections from several countries, the bulk of the collections showcase representative specimens of the Amazonian flora of Peru, considered one of the most diverse floras on the planet. These collections serve as a valuable resource for understanding the classification, distribution, phenology, and habitat preferences of plants in the Pteridophyta, Gymnospermae, and Angiospermae. Local and international students, docents, and researchers use these collections to teach, study, identify, and research the flora, and in this way the Herbario Amazonense contributes to the conservation of the diverse Amazonian flora.

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**Museo de Historia Natural de la Universidad Nacional
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Founded in 1918, the Museo de Historia Natural is the principal source of information on the Peruvian flora and fauna. Its permanent exhibits are visited each year by 50,000 students, while its scientific collections—housing a million and a half plant, bird, mammal, fish, amphibian, reptile, fossil, and mineral specimens—are an invaluable resource for hundreds of Peruvian and foreign researchers. The museum's mission is to be a center of conservation, education, and research on Peru's biodiversity, highlighting the fact that Peru is one of the most biologically diverse countries on the planet, and that its economic progress depends on the conservation and sustainable use of its natural riches. The museum is part of the Universidad Nacional Mayor de San Marcos, founded in 1551.

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Centro de Ornitología y Biodiversidad

The Centro de Ornitología y Biodiversidad (CORBIDI) was created in Lima in 2006 to develop the natural sciences in Peru. As an institution, it promotes research and training, and creates conditions that enable other institutions and individuals to carry out studies of Peruvian biodiversity. CORBIDI's mission is to encourage responsible conservation that helps guarantee the maintenance of the extraordinary natural diversity of Peru. It also trains and helps Peruvians develop their skills and knowledge of natural sciences. Likewise, CORBIDI advises other institutions (including governmental) in policies related to the understanding, conservation, and use of biodiversity in Peru. At present, the institution has three divisions: ornithology, mammology, and hepetology.

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In July of 2009, The Field Museum was invited to the fourth annual Maijuna Congress, a yearly meeting of the Maijuna communities. Over the course of three days, we heard not only Maijuna songs and stories, but also deep discussions of a looming threat: a proposed road that would bisect the lands where the Maijuna live, fish, hunt, and gather. We described The Field Museum's Rapid Inventories program, and how we pull together museum science and traditional knowledge to make a case for the biological and cultural importance of an area. Together, these shared stories and experiences were the catalyst for the rapid inventory of the Maijuna lands four months later. Never before have we assembled an inventory so quickly.

First and foremost, we would like to extend our gratitude to the Maijuna people, especially the Federación de Comunidades Nativas Maijuna (FECONAMAI), all of our Maijuna guides and counterparts, and the Maijuna communities of Puerto Huamán and Nueva Vida (Yanayacu River), Sucusari (Sucusari River), and San Pablo de Totolla (Algodón River).

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Logistics are always an intense and tricky phase of the inventories. This particular inventory was no exception, and demanded substantial reconnaissance given that transport was entirely by boat and foot. Without the critical participation of certain individuals before, during, and after the inventory, the entire endeavor would have been impossible. Álvaro del Campo would like to express his sincere gratitude to Italo Mesones and Guillermo Knell, who as usual skillfully led the advance teams in Curupa and Piedras, as well as the stopover point in Quebrada Chino. Gonzalo Bullard and Pepe Rojas provided logistical support during the different reconnaissance phases of the inventory; Pepe also contributed important bird sightings to the final list.

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Jonathan Markel prepared excellent maps, for the advance team, inventory team, and for the final report. In addition, his general help was fabulous during the writing and presentation process. As always, Tyana Wachter's role in the inventory was critical, always solving problems from Chicago, Lima, and Iquitos. Tyana and Doug Stotz carefully proofread parts of the manuscript and detected numerous errors unseen by us. Rob McMillan and Dawn Martin were wonderful in solving problems from Chicago.

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The goal of rapid inventories—biological and social—is to catalyze effective action for conservation in threatened regions of high biological diversity and uniqueness.

Approach

During rapid biological inventories, scientific teams focus primarily on groups of organisms that indicate habitat type and condition and that can be surveyed quickly and accurately. These inventories do not attempt to produce an exhaustive list of species or higher taxa. Rather, the rapid surveys (1) identify the important biological communities in the site or region of interest, and (2) determine whether these communities are of outstanding quality and significance in a regional or global context.

During social asset inventories, scientists and local communities collaborate to identify patterns of social organization and opportunities for capacity building. The teams use participant observation and semi-structured interviews to evaluate quickly the assets of these communities that can serve as points of engagement for long-term participation in conservation.

In-country scientists are central to the field teams. The experience of local experts is crucial for understanding areas with little or no history of scientific exploration. After the inventories, protection of natural communities and engagement of social networks rely on initiatives from host-country scientists and conservationists.

Once these rapid inventories have been completed (typically within a month), the teams relay the survey information to local and international decisionmakers who set priorities and guide conservation action in the host country.

REPORT AT A GLANCE

Dates of field work	<p>Biological team: 14–31 October 2009 Socio-economic team: 11–24 July 2009</p> <p>Additionally, in the technical report we present data compiled over the last ten years by M. Gilmore in his ethnobiological work with the Maijuna.</p>
Region	<p>Part of the ancestral territory of the Maijuna indigenous people in northeastern Peru: Amazonian forest in the Napo-Algodón interfluvium, where the four Maijuna communities and their federation have requested that 336,089 hectares be declared a regional conservation area, the Área de Conservación Regional (ACR) Maijuna. This proposed ACR is 60 kilometers north of Iquitos. It borders the proposed ACR Ampiyacu-Apayacu to the east, communities living along the Napo River to the south and west, and the Algodón River to the north (Fig. 2A).</p>
Inventory sites	<p>The biological team visited two sites: Curupa, along the Yanayacu River in the Napo basin, and Piedras, along the Algodoncillo River in the Algodón basin. The biologists also spent two nights in ExplorNapo Lodge on the Sucusari River, one of the most well-studied areas in the Peruvian Amazon, and adjacent to the proposed ACR Maijuna.</p> <p>Curupa, 15–19 October 2009 Piedras, 20–27 October 2009 Sucusari (ExplorNapo) 29–31 October, 2009</p> <p>The socio-economic team surveyed 24 communities from 11 to 24 July 2009, all in the Napo drainage except for San Pablo de Totolla, which is on the Algodón River in the Putumayo drainage:</p> <p style="padding-left: 40px;">Copalillo, Cruz de Plata, Huamán Urco, Morón Isla, Nueva Argelia, Nueva Floresta, Nueva Florida, Nueva Libertad, Nueva Unión, Nueva Vida, Nuevo Leguizamo, Nuevo Oriente, Nuevo San Antonio de Lancha Poza, Nuevo San Juan, Nuevo San Román, Nuevo San Roque, Puerto Arica, Puerto Huamán, San Francisco de Buen Paso, San Francisco de Pinsha, San Pablo de Totolla, Sucusari, Tutapishco, and Vencedores de Zapote.</p> <p>In addition, the social team participated in the fourth Maijuna Congress in Sucusari, the annual three-day meeting of the four Maijuna communities (Sucusari, Nueva Vida, Puerto Huamán, and San Pablo de Totolla).</p>
Biological survey	Vegetation, plants, fishes, amphibians, reptiles, birds, medium to large mammals, and bats
Social survey	Infrastructure, demography, traditional practices, resource use, and management
Principal biological results	Strong biological gradients characterize the proposed ACR Maijuna. To the south, in the Yanayacu drainage, low hills with soils of intermediate fertility show clear, recent evidence of intensive hunting and selective logging. In the north, in the Algodoncillo drainage, high, flat terraces with low-fertility soils harbor an intact assemblage of flora

and fauna. This variation is pronounced at very small scales of the landscape. Less than 20 kilometers separate the two inventory sites and less than 120 meters separate the highest and lowest points in the landscape. Nevertheless, the contrast is marked, with topographic variation and gradients in soil fertility creating favorable conditions for high diversity in all groups sampled.

	Species registered during the inventory			Species estimated to occur in the ACR Maijuna
	Curupa	Piedras	Total	
Plants	~500	~530	~800	2,500
Fishes	85	73	132*	240
Amphibians	40	55	66*	80
Reptiles	28	23	42*	80
Birds	270	267	364	500
Medium and large mammals	22	28	32	59**

* Includes records from a single day of surveys at ExplorNapó Lodge on the Sucusari River.

** Does not include 10 species of bats registered during the inventory.

Vegetation

We identified five vegetation types: (1) streamside forests, (2) swampy bottomlands, (3) palm swamps, (4) low hill forests, and (5) forests on high, flat terraces (Fig. 2B). Low hill forest was the most extensive vegetation type. Our most unexpected finding was the high terraces in the Putumayo drainage, a vegetation type that none of the botanists had seen previously. At their most extreme, the soils of these forests had a root mat (a “cushion” of organic matter and roots) about 10 centimeters thick. The flora of the high terraces was substantially different from the other vegetation types that we sampled during the inventory and appears to harbor several species new to science. Some terraces were dominated by *Clathrotropis macrocarpa* (Fabaceae, Fig. 3C), a species known from the Caquetá drainage in Colombia. The other dominant families—Chrysobalanaceae, Sapotaceae, and Lecythydaceae—are typical of low-fertility soils, like those found in Alto Nanay, Jenaro Herrera, and Sierra del Divisor. Our working hypothesis is that these high terraces are associated with the uplift known as the Iquitos Arch and occur as an archipelago from Güeppí to Ampiyacu. Towards the southeast (in the Napo drainage), we found a forest of approximately 1,500 hectares dominated by the pioneer *Cecropia sciadophylla* (Cecropiaceae), a near uniform regeneration after a massive blowdown 20–30 years ago (Fig. 3B).

Flora

The botanists registered approximately 800 species and estimate that 2,500 occur in the area. Edaphic and topographic variation creates conditions favoring distinct floras, with less than 40% of species shared among inventory sites. We found dozens of new records for Peru and three species almost certainly new to science: (1) *Eugenia* (Myrtaceae, Fig. 4H), a treelet with distinctive bracts, (2) *Calycorectes*

REPORT AT A GLANCE

Vegetation (continued)

(Myrtaceae, Fig. 4N), a tree with large white flowers and hairy calices, and (3) *Dilkea* (Passifloraceae, Fig. 4B), an unbranched treelet with red bracts. The area harbors a strong soil-fertility gradient, from the poor soils of the high terraces in the north—with healthy populations of two important timber species, *tornillo* (*Cedrelinga cateniformis*) and *marupá* (*Simarouba amara*)—to low hills with more fertile clay soils in the south, where selective logging has removed vast numbers of *cedro* (*Cedrela odorata*), *cumala* (*Virola pavonis*, *V. elongata*, *Otoba glyxicarpa*, *O. parvifolia*), and *lupuna* (*Ceiba pentandra*).

Fishes

The ichthyologists recorded 132 species and estimate approximately 240 for the area. Most species registered (60%–80%) live almost exclusively in source or headwater areas and their reduced size is probably an adaptation to these habitats: almost every species is less than 10 centimeters long as an adult. These species depend heavily on forest resources for their diet—seeds, fruits, terrestrial arthropods, other plant tissues—making the fish community very sensitive to changes in forest cover. We found catfish (Heptapteridae), which are strong indicators of good water quality, living in the headwaters. We also found a potentially new species of banjo catfish (*Bunocephalus*, Fig. 5E) and an undescribed species of *Pseudocetopsorhamdia*. Three species are new records for Peru (Figs. 5G–J), of which two represent substantial range extensions, and 53 have potential ornamental value. Important game species (*sábalos*, *lisas*) were relatively abundant in the north of the area, probably reflecting food resources and important reproductive sites. The two drainages we sampled (Napo and Algodón/Putumayo) had only 27% of their species in common.

Amphibians and reptiles

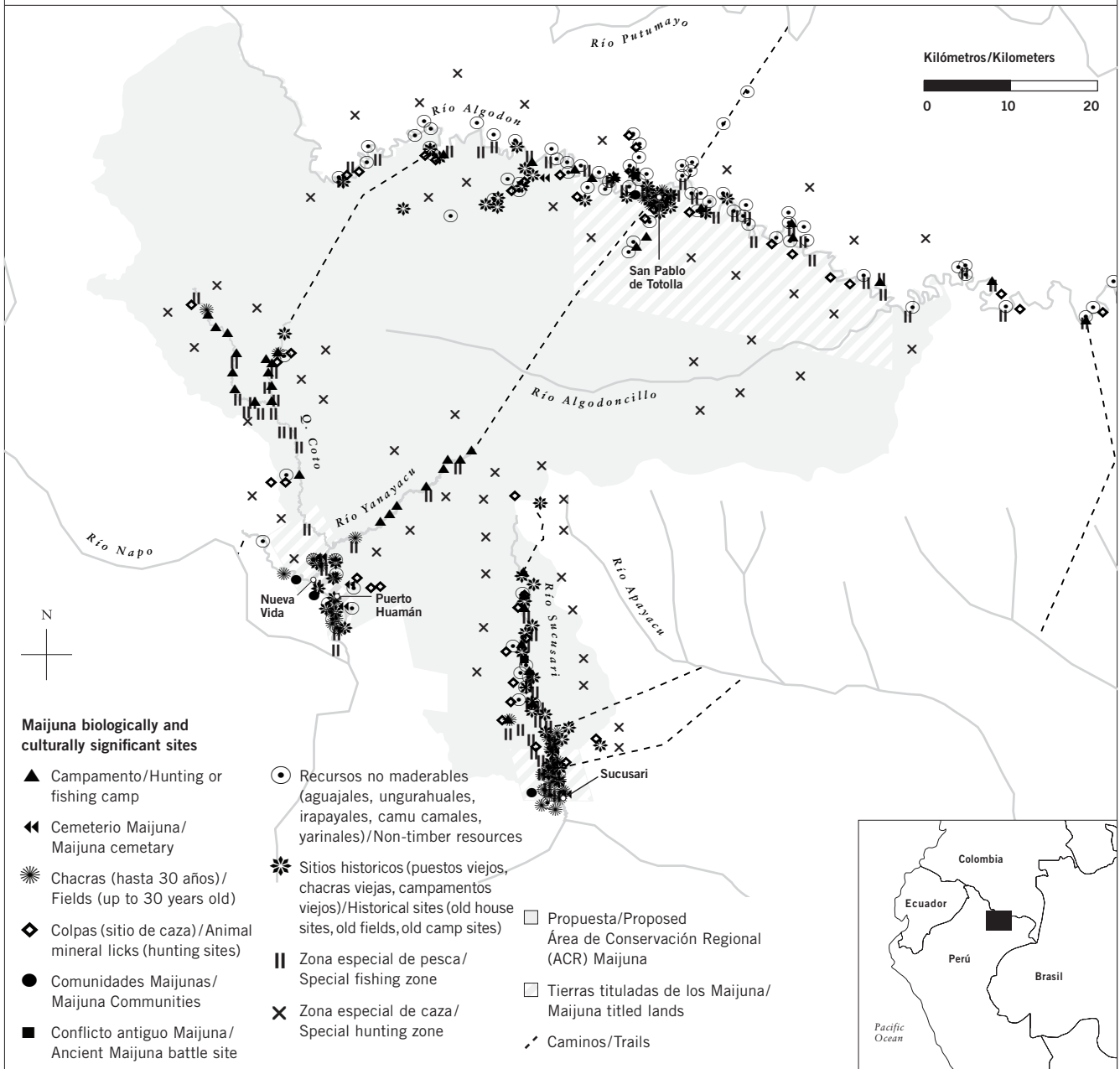
The herpetologists registered 108 species—66 amphibians and 42 reptiles—and estimate 160 species (80 amphibians and 80 reptiles) in the region. Of the species encountered, 28 (21 amphibians and 7 reptiles) are restricted to the northwestern Amazon, an area that includes Loreto in Peru, Ecuador, southern Colombia, and extreme northwestern Brazil. We registered two species considered Vulnerable by the IUCN, harlequin frog (*Atelopus spumarius*, Fig. 6D) and yellow-footed tortoise (*Chelonoidis denticulata*, Fig. 6N). We also recorded dwarf caiman (*Paleosuchus trigonatus*, Fig. 6M), considered “Near Threatened” under Peruvian law. Other important findings include a species of *Pristimantis* frog that is likely new to science and the second record for Peru of the arboreal frog *Osteocephalus fuscifascies*, (Fig. 6L, extending its known distribution 300 kilometers to the south). In less disturbed areas closer to headwater streams, we found greater amphibian diversity, including species that reproduce in clear-water streams with sandy bottoms (e.g., harlequin frog, *Atelopus spumarius*, and glass frog, *Cochranella midas*). Protecting these areas not only conserves amphibians but also ensures water quality in the drainages.

Birds	<p>The ornithologists recorded 364 of the 500 species they estimate for the region. The avifauna is diverse, typical of northwestern Amazonia, and similar to assemblages found in the neighboring drainages of Apayacu, Ampiyacu, and Yaguas. Notably, one group of birds was registered only on the high terraces in the Putumayo drainage: <i>Lophotriccus galeatus</i>, <i>Percnostola rufifrons</i>, <i>Neopipo cinnamomea</i>, and <i>Herpsilochmus</i> sp. The <i>Herpsilochmus</i> (cf. Fig. 7G), which we found on every hilltop on the high terraces, was only recently discovered in the Ampiyacu River and is in the process of being described as a new species. Our finding is only the second record for this species. The number of mixed species flocks in the understory was unusually low in the Yanayacu basin, probably reflecting structural changes created by intense, selective logging in the area. East of the Napo River we recorded two range extensions: <i>Neopipo cinnamomea</i> and <i>Platyrynchos platyrynchos</i>. We recorded several range-restricted species: 6 endemic to northwestern Amazonia and 12 that occur only north of the Amazon River in Peru. Game birds, especially guans (<i>Nothocrax urumutum</i> and <i>Mitu salvini</i>, Fig. 7H) and trumpeters (<i>Psophia crepitans</i>), are important conservation targets for the area, especially in the south.</p>
Medium to large mammals	<p>We recorded 32 of the 59 species we expect occur in the area. Abundances of game species were unexpectedly low in the south, reflecting intense hunting in the past. Woolly monkeys (<i>Lagothrix lagotricha</i>) are absent from areas sampled along the Yanayacu River, where hunting and fishing were intense during the last decade. Other primates, including the few groups of monk sakis (<i>Pithecia monachus</i>), were very wary of our presence. Contrary to expectation and likely related to hunting impacts, soil fertility does not predict mammal abundances: near the Algodoncillo River, in the poor-soil terraces and nearby areas, we found the highest abundances of large primates (<i>L. lagotricha</i> and <i>P. monachus</i>) and ungulates. Limited access to loggers and subsistence (rather than excessive) hunting have maintained more intact mammal populations in the north. We did observe top predators such as jaguars (<i>Panthera onca</i>), rare species such as short-eared dog (<i>Atelocynus microtis</i>) and giant anteater (<i>Myrmecophaga tridactyla</i>), and a single individual of grey dolphin (<i>Sotalia fluviatilis</i>) on the Algodoncillo River.</p>
Human Communities	<p>The four Maijuna native communities are driving the creation of a regional conservation area, ACR Maijuna, through FECONAMAI (the Federación de Comunidades Nativas Maijuna). The Maijuna connection to the area, part of their ancestral territory, is profound. Quechua, <i>campesino</i>, and <i>mestizo</i> settlements occupy the buffer zone of the proposed area. These settlements all have primary schools, and a few have high schools. The entire region has some access to health services. A well-managed ACR would guarantee that the Maijuna communities and the nearby settlements would have access to the natural resources that are fundamental to their well-being. The greatest strength of the proposal is that the four Maijuna communities put it forth themselves, recognizing that protecting these forests is critical for their cultural, economic, and long-term survival.</p>

REPORT AT A GLANCE

Participatory resource mapping

The four Maijuna communities, in collaboration with M. Gilmore, identified and mapped more than 900 sites of biological and/or cultural significance in the area. The resulting map (below) reflects the deep Maijuna understanding of the resources in their territory and demonstrates that the Maijuna rarely use areas in the central portion of the proposed ACR. This central portion, the heart of the ACR Maijuna, would protect the high, flat terraces and fragile headwater streams and serve as an important reservoir of reproduction and conservation of species that are ecologically, economically, and culturally important to the Maijuna.



Principal assets for conservation

Biological

- 01 The high terraces (Figs. 2B, 3C), a previously unknown habitat that harbors a unique flora, endemic species, species new to science, and new distribution records
- 02 Highly diverse and intact expanses of forest, with heterogeneous habitats and soils that encapsulate much of the diversity found in Loreto
- 03 Intact headwaters of seven rivers that supply two of the Amazon's largest tributaries, the Napo and Putumayo

Cultural

- 01 Maijuna ancestral territory and Maijuna traditional knowledge
- 02 Leadership demonstrated by the four Maijuna communities in their work to create the proposed Área de Conservación Regional (ACR) Maijuna
- 03 FECONAMA I and its objectives, which include maintaining the Maijuna cultural identity, conserving natural resources, and establishing strong links among the Maijuna communities to ensure a successful implementation of the ACR

Regional

- 01 A well-defined regional vision for conservation in Loreto and a regional ordinance that explicitly protects headwater streams
- 02 A successful participatory model for regional conservation areas and institutional support for implementing areas
- 03 Together with the proposed ACR Ampiyacu-Apayacu, the proposed ACR Maijuna will form a forested corridor north of the Napo River.

Principal conservation targets

- 01 High-terrace habitats previously unknown in the Peruvian Amazon
- 02 Intact headwater streams and their connectivity with lower reaches of rivers (important for fish reproduction and watershed integrity)
- 03 Game species and other forest resources used by local people (*aguaje* palm fruits and other non-timber forest products, large mammals, birds, tortoises, *paiche* and *arahuana* fishes)
- 04 Populations of threatened species (listed by IUCN and INRENA)
- 05 Traditional ecological knowledge of the Maijuna, their cultural traditions and practices, their language, and their low-impact use of natural resources

REPORT AT A GLANCE

Principal conservation targets (continued)	06 Species (non-timber forest products, animals) and habitats (<i>irapayales</i> , <i>yarinales</i> , <i>aguajales</i>) traditionally important for the Maijuna
Principal threats	<p>01 Proposed road from Bellavista to El Estrecho, with a planned 10-km-wide swath of development (Fig. 11A)</p> <p>02 Illegal logging</p> <p>03 Oil concessions</p>
Principal recommendations	<p>01 Create the Área de Conservación Regional (ACR) Maijuna.</p> <ul style="list-style-type: none"> ▪ Act on the initiative of the Maijuna communities and the vision of GOREL to establish the ACR Maijuna (336,089 hectares), which will conserve part of the ancestral territory of the Maijuna and sustain its high cultural and biological value. <p>02 Halt the principal threats to the ACR Maijuna.</p> <ul style="list-style-type: none"> ▪ Given the important cultural and biological value of the area, the conservation vision of PROCREL, and the regional ordinance protecting headwater streams, reevaluate the Bellavista-Mazán-El Estrecho road project and search for viable alternatives. ▪ Eliminate illegal logging in the ACR Maijuna, strengthening and supporting the existing system developed by the Maijuna and FECONAMAI. ▪ Before allowing oil exploration or extraction in the ACR Maijuna, require that oil companies develop and implement practices that minimize environmental impacts, and mandate independent evaluation of these impacts. <p>03 Implement the ACR Maijuna.</p> <ul style="list-style-type: none"> ▪ Develop and implement a management plan that focuses principally on biological and cultural conservation targets (including refuges for species locally extinct in other parts of Loreto) and a monitoring plan that allows for adjustments and adaptations of the management strategy. ▪ Establish a participatory patrol system, focusing on the most vulnerable entry points. ▪ Determine a range of compatible uses of natural resources and develop a management plan for each of these natural resources. ▪ Promote strategic alliances for the long-term sustainability (biological, cultural, and financial) of the ACR. <p>04 Strengthen the capacity and cultural traditions of the Maijuna to promote a successful implementation of the ACR.</p>

Why the ACR Maijuna?

Straddling the watersheds of the Napo and Putumayo—two of the Peruvian Amazon’s largest rivers—a vast wilderness harbors a full sample of the megadiversity typical of western Amazonia and serves as a vital source of flora and fauna for the Maijuna people. To the north and south are four Maijuna communities whose residents live, hunt, fish, and gather in this 336,089-hectare block of forest.

This is part of the ancestral territory of the Maijuna; the fate of this forest and of the Maijuna are strongly linked. To ensure long-term protection of both biological diversity and their cultural traditions, the Maijuna propose an *Área de Conservación Regional*. A successful conservation model in Loreto, the regional conservation areas emphasize participatory management, conservation-compatible economic uses, and adaptive management.

This proposed conservation area will protect a new jewel in Loreto: a complex of Amazonian high terraces—a habitat unknown until our inventory—that shelters a flora and fauna with a number of new, rare, and specialized species. These terraces and the adjacent lowlands forests are underlain by diverse soil types and give rise to seven local drainages, whose waters support the flora and fauna of the area, as well as its human residents.

The most imminent threat is a proposed road that would sever this area in two, ripping its ecological and cultural fabric. Historically, most roads in Amazonia have not been financially viable. And the destruction of habitats—by the direct effects of highway construction and by associated impacts from an influx of human colonists and subsequent deforestation—would be irreversible. In stark contrast, formal protection of this forested landscape as the *Área de Conservación Regional Maijuna* will ensure the integrity of the watersheds, clean water, and the continuity of ecological and evolutionary processes for the long term. The new conservation area also will secure the basis of life and culture for the Maijuna and other residents in the Napo and Putumayo drainages.

Conservation in the ACR Maijuna

CONSERVATION TARGETS

	<p>Cultural</p> <ul style="list-style-type: none"> ▪ Traditional ecological knowledge held by the Maijuna, and Maijuna cultural practices that are compatible with the conservation of natural resources ▪ Species (of non-timber forest products and animals) and habitats (e.g., palm forests such as <i>agualajes</i> and <i>irapayales</i>) traditionally important—economically and culturally—for the Maijuna ▪ The Maijuna language
	<p>Biological</p> <ul style="list-style-type: none"> ▪ The high terraces, unique and previously unknown habitats growing on poor soils and sheltering a flora full of new and rare species (Figs. 2B, 3C) ▪ Intact headwaters and their connection with lower parts of rivers (which are critical areas for fish reproduction and the health of the watersheds) ▪ Plants and animals used or consumed by residents of the region (e.g., <i>aguaje</i> palms (<i>Mauritia flexuosa</i>), large mammals, birds, yellow-footed tortoise (<i>Chelonoidis denticulata</i>, Fig. 6N), and <i>paiche</i> and <i>arahuana</i> fishes (<i>Arapaima gigas</i> and <i>Osteoglossum bicirrhosum</i>, respectively), among others ▪ Populations of threatened species (according to IUCN and SERNANP)* <p>* The International Union for the Conservation of Nature, and the Servicio Nacional de Áreas Naturales Protegidas por el Estado, respectively.</p>

THREATS

01 The proposed road from Bellavista to El Estrecho, with a 5-km-wide swath of development on either side of it.

The proposed Área de Conservación Regional (ACR) Maijuna includes highly fragile areas that will be destroyed by this road (Fig. 11A), including:

- Headwaters exceptionally susceptible to erosion (Fig. 11B)
- Periodically flooded areas (*tahuampas*, *pantanos*, and *aguajales*) important for plant and animal species
- Areas with great cultural value for the Maijuna (Fig. 9D)
- Maijuna hunting, fishing, and gathering areas (Fig. 9D)
- High terraces (Figs. 2B, 3C), a rare and previously undescribed habitat with associated unique plants and animals

The topography and extensive inundated areas in the proposed ACR Maijuna make a road impractical. Both the construction and the maintenance will be prohibitively expensive, and the proposed swath of development on either side of the road would be on infertile soils, inappropriate for agriculture. Furthermore, this road will have other, significant, primary and secondary effects, including:

- The destruction of over 130,000 ha of forest by the 130-km-long road and its 10-km-wide swath of development
- Disorganized colonization along the road, with subsequent deforestation and degradation
- Indiscriminate, unsustainable hunting because of easy access to previously remote areas, which will bring populations of vulnerable species to local extirpation
- Contamination of waters by erosion and sedimentation in the headwaters during construction and colonization, with downstream impacts
- Trafficking in lands
- Destruction of the quality of life and biocultural resources of the Maijuna

02 Illegal logging

- Loss of flora and fauna (due to overhunting, fishing with poisons such as *barbasco*, and changes in forest structure)
- Local extinctions of economically and ecologically valuable timber species
- Impoverishment of the quality of life of the Maijuna, and of other communities neighboring the proposed ACR Maijuna

03 Petroleum concessions (Area XXVI and Area XXIX, under technical review)

- Represent a potential obstacle for the declaration of the ACR Maijuna
- Contamination of waters
- Erosion of vulnerable soils
- Reduction of local well-being
- Degradation of Maijuna ancestral territory

04 Conflict among neighboring communities over the use of natural resources within Maijuna ancestral territory

05 Easy access of the area by the Napo River and possible access via the Algodón River

06 Lack of legal titling in areas surrounding the proposed ACR Maijuna, increasing pressure on the forest

07 Hundreds of years of strong pressures that have eroded the cultural identity, knowledge, and values of the Maijuna

08 Absence of efficient communication mechanisms among Maijuna communities and other parties in Loreto

09 Emigration of Maijuna youth

STRENGTHS

01 Cultural

- Ancestral Maijuna territory
- Maijuna traditional knowledge of the forest and recognition, by the Maijuna and some neighboring communities, of the value of the forest, of the benefits it provides, and of the necessity of managing natural resources
- Initiative and leadership by FECONAMAI and the Maijuna communities to create an Área de Conservación Regional (ACR)
- FECONAMAI and its goals to maintain cultural identity, conserve natural resources, and strengthen ties among Maijuna communities that will ensure successful implementation of the ACR
- Existing, successful means of control of logging and overexploitation of other natural resources (e.g., *paiche* fishes and *aguaje* palms) by the Maijuna
- Kin-relationships among the Maijuna communities
- Traditional subsistence economy, which is compatible with forest conservation

02 Biological

- High terraces, a previously undescribed habitat that to date is unique and found nowhere else in the Peruvian Amazon
- High biological diversity in all groups inventoried
- Intact headwaters of seven rivers, which form part of two large Amazonian watersheds
- Large expanses of still-intact forest
- Heterogeneity of habitats and soils concentrated in a relatively small area, comprising a large portion of the diversity of Loreto

03 Political

- Conservation vision at the regional level within Loreto
- Regional laws that protect headwater areas

-
- A successful, participatory model for regional conservation areas in Loreto, and institutional capacity to promote these areas
 - Initial steps to form a consensus for management in the future buffer zone (*Zona de Amortiguamiento*) of the proposed ACR Maijuna

RECOMMENDATIONS

Below we list our principal recommendations for conserving the proposed ACR Maijuna in the face of several looming threats. We begin with recommendations for protection and management, followed by suggestions for future research, inventories, monitoring, and surveillance.

Protection and management

01 Create the Área de Conservación Regional (ACR) Maijuna.

- Take advantage of the initiative of the Maijuna communities and of the conservation vision of GOREL, and create the ACR Maijuna to protect the ancestral territory of the Maijuna and its biological and cultural riches.

02 Block principal threats to the ACR Maijuna.

- Given the biological and cultural values of the area, the conservation vision already put forward by PROCREL, and regional laws governing the protection of headwaters, challenge the Bellavista-Mazán-El Estrecho road project (with its 5 km of development on either side of the roadway) and find economic, biological, and cultural alternatives that are more viable and sustainable.
- Stop illegal logging in the proposed ACR Maijuna, strengthening and supporting the successful system developed by the Maijuna via FECONAMAI.
- Before allowing hydrocarbon exploration or extraction from the ACR Maijuna, demand that the companies (1) develop and implement practices that minimize negative impacts, both biological and cultural, and (2) permit independent monitoring of these impacts.

03 Implement the ACR Maijuna.

- Develop and implement a management plan for the ACR Maijuna that focuses first and foremost on the biological and cultural conservation targets (including refuges for species already locally extirpated in other parts of Loreto).
- Implement the ACR Maijuna with a system of participatory management and vigilance.
- Determine a range of compatible uses of natural resources and develop management plans for each resource.
- Choose an adaptive monitoring system that will help (1) evaluate results of management and (2) adjust or change management strategies if it becomes necessary.
- Promote strategic alliances for the biological, cultural, and financial sustainability of this ACR for the long-term.
- Define the buffer zone (*Zona de Amortiguamiento*) for this ACR and form a committee for its participatory development.
- Promote legal titling of lands in the buffer zone to stabilize the use of these lands and their resources, thus reducing pressure on the ACR Maijuna.

- Integrate communities in the buffer zone into participatory management of the ACR Maijuna, strengthen existing alliances and agreements, and provide training to all about the benefits of natural resources management.
- Together with the Maijuna, devise a system of control that focuses on areas of easy access to the ACR and form alliances with national armed forces to facilitate the vigilance and control of areas bordering Colombia.
- Disseminate to everyone in the buffer zone, via FECONAMAI, existing information about (1) impacts of extractive activities in Amazonia and (2) better practices for extraction.
- Implement an efficient system of communication in the ACR with the necessary equipment, and provide adequate training and maintenance.

04 Strengthen the capacity and traditional culture of the Maijuna for successful implementation of the ACR.

- With the help of FECONAMAI, validate and reinforce Maijuna values and traditions that will strengthen the management of the ACR Maijuna (including traditional stories and songs, traditional ecological knowledge, and traditional resource-use and management practices).
- Strengthen efforts to conserve the Maijuna language, including training of bilingual teachers, use of the language in everyday life, and development of a formal language revitalization program.
- Improve the educational system in the communities and train young Maijuna leaders via FECONAMAI.

Additional inventories

01 Sample vegetation and soils not examined during this rapid inventory, and conduct a more in-depth investigation and evaluation of the high terraces:

- The high terraces (Figs. 2B, 3C) merit additional study to determine if they are connected, to the north and the east, with other patches of high terrace habitat. Further inventory of these terraces may add new records of plants to the known flora of Peru, as well as species new to science.
- Survey forests dominated by a single species of *Tachigali* (Fabaceae, Fig. 3A)—not observed by the botanical team in the field but seen by R. Foster during his overflight of the northeastern sector of the proposed ACR Maijuna—to document the flora of the area.
- The vegetation of five watersheds not visited during the rapid inventory, to determine whether or not the patterns we encountered are general, or exclusive to the areas we visited.

RECOMMENDATIONS

Additional inventories
(continued)

02 Inventory fishes in these areas:

- The five headwater zones not sampled inside the proposed ACR Maijuna, which likely will bolster the species list.
- Lentic bodies of water in the proposed ACR Maijuna, including *aguajales* (*Mauritia*-palm swamps) and *cochas* (oxbow lakes), which may be associated with new and/or endemic species.
- The Algodón River and associated lakes, including an estimate of the population sizes of *paiche* (*Arapaima gigas*) and *arauana* (*Osteoglossum bicirrhosum*).

03 Inventory amphibians and reptiles in more localities, vegetation types, soils, and in different seasons of the year to increase the number of species registered in the proposed ACR Maijuna.

04 Inventory birds in the following areas:

- The high terraces, because these formations may contain species that are poor-soil specialists, including the possibility of undescribed species (similar to Allpahuayo-Mishana).
- Seasonally inundated forests and aguajales along the principal tributaries of the Napo River (e.g., Quebrada Coto and the Yanajacu River), as well as the Algodón and Algodoncillo Rivers. It is possible that Wattled Curassow (*Crax globulosa*, an IUCN Vulnerable species) still occupies these habitats in the Putumayo watershed.
- Oxbow lakes in both the Napo and Putumayo watersheds.

Research

01 Study populations of trees used for timber, including their phenology, to implement reforestation programs in the buffer zone.

02 Study the dynamics of forest regeneration in the huge blowdown in the southeastern sector of the proposed ACR Maijuna (Figs. 2A, 3B). This information will help us understand how catastrophic events affect regional composition and diversity in Amazonia.

03 Undertake limnological studies to determine the quality of water bodies and corroborate the presence of biological indicators.

04 Carry out an evaluation of *paiche* (*Arapaima gigas*) and *arauana* (*Osteoglossum bicirrhosum*) populations in the watershed of the Algodón River, to determine their potential for sustainable harvest.

05 Study the feasibility of implementing pisciculture in Maijuna communities, utilizing native species with rapid growth and low cost as a source of animal protein and as part of a program to generate income.

- 06 **Study species of ornamental fish and evaluate their possible use in a program to generate income**, and establish safeguards to avoid overexploitation.
- 07 **Investigate the factors that affect the spatial and temporal distribution of amphibians and reptiles in the area**, to determine if there is a distinct community associated with the high terraces.
- 08 **Carry out a rapid study of the new species of *Herpsilochmus* (cf. Fig. 7G) in the area**, to determine its distribution and abundance.
- 09 **Carry out a comprehensive and systematic study of the Maijuna language that will facilitate production of language materials (e.g., a dictionary and primers) and implementation of a language-revitalization program**, in support of Maijuna desires to conserve their unique and endangered language.
- 10 **Undertake ethnobiological studies to investigate and document species of plants and animals that are economically and culturally important to the Maijuna**. This information will serve to help focus conservation efforts and management plans on these important species and their respective habitats.
- 11 **Investigate Maijuna cultural traditions and values (including traditional ecological knowledge, stories, songs, resource use, and management practices) and work with FECONAMAI to invigorate and reinforce those traditions and values**, which will strengthen the management and conservation of the proposed ACR Maijuna.

Monitoring and observation

- 01 **Implement a program of patrols around and within the proposed ACR Maijuna, concentrating on critical areas easily accessed from the outside**, to guarantee that the ACR maintains its wild condition and continues to function as a source area for renewal of populations of plant and animal species.
- 02 **Implement a program of reforestation of timber-yielding species that have disappeared in the southern sector of the proposed ACR Maijuna**, e.g., *lupuna* (*Ceiba pentandra*, Malvaceae), *cedro* (*Cedrela odorata*, Meliaceae), and the *cumalas* (*Virola pavonis*, *Otoba glycyarpa*, and *O. parvifolia*, Myristicaceae), focusing on small open patches in the forest resulting from past logging.
- 03 **Establish closed-season (*veda*) zones or zones of strict protection (i.e., no-season) in the proposed ACR Maijuna**, to permit the recuperation and maintenance of vertebrate populations used traditionally as food sources by local residents (including species with low reproductive rates like common woolly monkey (*Lagothrix lagothrica*), red howler monkey (*Alouatta seniculus*), and Brazilian tapir (*Tapirus terrestris*).

RECOMMENDATIONS

Monitoring and
observation
(continued)

- 04 **Implement a monitoring program for threatened species**, e.g., harlequin frog (*Atelopus spumarius*), yellow-footed tortoise (*Chelonoidis denticulata*), smooth-fronted caiman (*Paleosuchus trigonatus*), and common woolly monkey.
- 05 **Implement a monitoring program for populations of irapay-palm (*Lepidocaryum tenue*)**, a species that is used as roof thatch.
- 06 **Establish monitoring of the water levels, and water quality of the seven principal watersheds within the proposed ACR Maijuna.** Investigate the principal elements of pollution as soon as deterioration of water quality is seen, so as to respond with adequate measures to maintain healthy watersheds.
- 07 **Prohibit poisonous, non-selective fishing methods.**
- 08 **Establish a management plan for all culturally and economically important harvested species and implement plans with adaptive management.**