BIOAMAZON NEWSLETTER

BIOAMAZON PROJECT

Conservation of species threatened by unsustainable trade

ACTO
Amazon Cooperation Treaty Organization

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Field study on the population status of freshwater stingrays in the Peruvian Amazon

Bioamazon Project carries out monitoring visit to Ecuador

This is the Bioamazon Project Newsletter, of the Amazon Cooperation Treaty Organization (ACTO). It is published every two months to disseminate the actions and results of the Project and its partners.

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Dear readers,

We present another edition of the Bioamazon Newsletter with news about ACTO's actions in the period of March and April. As we expected, activities were intense in these months.

The Bioamazon Project started its journey of visits to ACTO Member Countries in Ecuador. The main objective is to hold working, coordination and evaluation meetings with partner institutions within the scope of the effective implementation of the Bioamazon Project, of the Amazon Regional Observatory (ORA), and to report on the activities implemented by this Permanent Secretariat.

We invite you to read in the Amazon Countries section the technical articles on the population situation of the caiman (*Caiman yacare*) and the black caiman (*Melanosuchus niger*) in Bolivia and on the population situation of three species of freshwater rays *Potamotrygon motoro, P. orbignyi* and *P. falkneri* in the Peruvian Amazon. Likewise, we invite you to read the information about the training course on tropical timber identification methodologies that will be held from May 9th to 13th, at the facilities of the Amazon Regional Observatory, in Brasília, Brazil, and which will be attended by representatives of the eight ACTO Members Countries.

Finally, in the Agenda section, we share information about the side event that ACTO will held within the framework of the 17th Session of the United Nations Forum on Forests (UNFF), on May 11, 2022.

We take the opportunity to inform you that during this month of May we will have two virtual events organized by ACTO. The workshop on forest fire alerts will be held on the 20th and, on the 24th, we will have a workshop to strengthen the formulation of Non-detriment Findings (NDF) and Legal Acquisition Reports (LAR) aimed at Amazonian tree species. Both events are intended for representatives designated by ACTO Member Countries.

Good reading.

Alexandra Moreira

Secretary General
Permanent Secretariat / Amazon Cooperation Treaty Organization

Bioamazon Project carries out monitoring visit to Ecuador

The team will go to the eight ACTO Member Countries this first semester to hold workshops on the Project and the Amazon Regional Observatory, in addition to field visits.

Workshop on the Amazon Regional Observatory

Ecuador was the first Amazonian country to receive, in April, a visit from the Bioamazon Project team for work agendas and field visits with the objective of learning about activities supported by the Project. The first day was dedicated to the presentation of the Amazon Regional Observatory (ARO), held in the Los Próceres room of the Ministry of Foreign Affairs, in Quito, Ecuador.

The opening ceremony was attended by the Ministers of Foreign Affairs of Ecuador, Juan Carlos Holguín, Environment, Water and Ecological Transition, Oscar Rojas, the Head of Cooperation at the German Embassy in the country, Barbara Schulz-Hönerhoff, the Coordinator of the ARO and the Bioamazon Project, Mauro Ruffino, as well as representatives of diplomatic missions accredited in Ecuador. Then, technical workshops were held on the modules, available resources and the progress and status of data collection for the ARO, in addition to presenting the tools and procedures to integrate data into the Observatory.

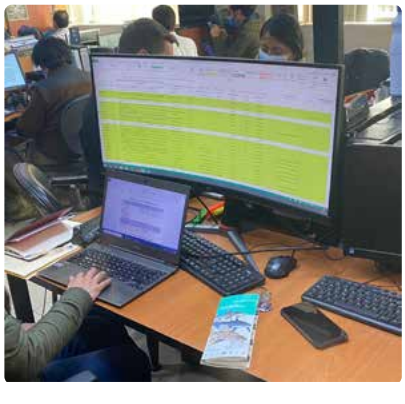
Juan Carlos Holguín, Minister of Foreign Affairs and Human Mobility, said that Ecuador "positively values the work of the Amazon Cooperation Treaty Organization, a fundamental space to promote cooperation, dialogue and programs of interest to the Amazon Region".

The Minister of the Environment, Water and Ecological Transition, Oscar Rojas, highlighted the responsibility of generating public policies that strengthen the management of wildlife and technological tools to facilitate its management, given that information on biodiversity is very important to take actions and decisions on conservation strategies, especially at a time when extinction rates are increasing dramatically.

"We know that the need for information on biodiversity is critical in megadiverse countries like Ecuador. In this sense, the Bioamazon Project promoted a conceptual and operational study for the development, improvement and strengthening of the information systems of the Member Countries and for management related to biodiversity and the International Convention on Trade in Endangered Species of Wild Fauna and Flora (CITES)", said Rojas.

Barbara Schulz, representing the German Embassy in Ecuador, mentioned that the Amazon Regional Observatory is a milestone in the history of the Amazon Cooperation Treaty Organization (ACTO). "Through the harmonization of databases and the possibilities of comparative data analysis, the Amazon Regional Observatory is an important instrument for the formulation, monitoring and evaluation of policies and will assist in the conservation of threatened species and will contribute to a better management of natural resources," Schulz said.

Equipment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Another activity in Quito was the formalization of the section for the use and donation of equipment to the Ministry of the Environment, Water and Ecological Transition of Ecuador (MAATE). Through the Bioamazon Project, equipment in the total amount of U$D 123,224.21 was acquired to improve the technological infrastructure of the ministry and its technical workshops, such as desktop and laptop computers, monitors, projectors, GPS, rechargeable batteries, among other items.

Orchid Route

MAATE, with the support of the Bioamazon Project, is developing a strategy to implement the Orchid Route to support the sustainable socioeconomic development of orchid-producing families in the Ecuadorian Amazon region.

The Bioamazon Project team had the opportunity to visit orchards that are part of this route. In the "Paraíso Escondido" nursery, in Checa, about 2400 plants belonging to 120 wild species of orchids are registered. Owner Juan Galarza, along with his

daughters, has been caring for orchids for over 20 years. The main objective of this nursery is *ex situ* conservation for scientific research purposes.

Three orchid nurseries were also visited in the province of Napo -Kinde del Barranco, Lluvia de Oro and Cuna de Venus, which have authorization for the management and conservation of orchids and which will be part of the Orchid Route.



In Gualaceo, the first company in Ecuador that obtained licenses for the export of plants under the CITES Convention was visited. Ecuagenera is a true sanctuary with 4,200 varieties of orchids, dedicated to the conservation and reproduction of these species since 1992. The experience of its owner, the investment in technology and infrastructure and the highly qualified team have positioned the company as the most successful experience in management and orchid reproduction in Ecuador and in the world, both in *ex situ* conservation and *in situ* conditions, also has the technical capacity to create new hybrid species, with greater commercialization possibilities.

In Tena, the delegation from the Bioamazon Project/ACTO and MAATE was received by the community of Kallari, which is dedicated to the cultivation and management of an orchid species that produces vanilla. Here, the cultivation and use of added value is carried out by the community as a whole (300 families) and organized by the Kallari Association, exporting various by-products to Germany and Switzerland.



Laboratory of Ecuagenera in the process of *in situ* reproduction of orchid species.

In the Province of Napo, canton of Chaco, the Botanical Garden "La Hormiga", by Edwin Ango, and the orchidarium "Paraíso de las Orquídeas" owned by Marco Chuquimarca were visited.

Likewise, the Botanical Garden "Quinde del Barranco", by Ruth Hidalgo, was visited. A tour of the natural trails was made where wild orchids can be observed, the same that were cataloged and inventoried by their custodian Mrs. Ruth.

The Ruth Hidalgo Botanical Garden carries out conservation activities for orchid species typical of the region, the plants that are kept in these places were collected from anthropic activities, today they are kept in these collections that serve as a repository of genetic material of endemic species of the place.

In the "Las Palmas" Botanical Garden, located in the Canton Cosanga, in this environment of *ex situ* conservation and management, hybrid orchid species are protected and have the proper evidence that allows identifying the traceability of the species from its origin to its destination, in this case, the Botanical Garden.

Finally, we visited Kallary, a community company formed by several Quichua families, the same ones responsible for and involved in the sustainable use and exploitation of vanilla (*Vainilla sp.*). This species is cultivated on farms in the region through a systematic process that involves from stratification, fertilization and harvesting of vanilla pods.

Subsequently, post-harvest activities are carried out at the treatment station where the pods undergo a process of dehydration, fermentation, and quality control of the pods. After rigorous quality control, the product is packaged for national and international distribution.

Vainilla sp, cultivated and processed by several Quichua families.

Mauro Ruffino, coordinator of the Bioamazon Project, positively evaluates the work agenda in Ecuador. "In those days, it was possible to observe three scales of bioeconomy undertakings associated with orchid conservation. From management and conservation initiatives by individual small-scale orchids that will be part of the Orchids Route associated with tourism, as well as a system of association of management and community production of species that give rise to vanilla that after processing is exported, to the Company Ecuagenera with 30 years of experience in the production of orchids on an industrial scale for export and which also associate ecotourism ventures", he concluded.

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Indigenous peoples share their knowledge and experience to support the assessment of Amazon biodiversity and ecosystem services

ACTO brought together indigenous representatives, experts, and decision-makers to address the inclusion of traditional knowledge in the Rapid Assessment of Biodiversity and Ecosystem Services in the Amazon Region, which is being prepared.

Representatives of indigenous peoples presented their views on threats and opportunities experienced in their daily lives, to support the **Rapid Assessment of Biodiversity and Ecosystem Services in the Amazon Region**, which is being drafted by the Amazon Cooperation Treaty Organization (ACTO), with the technical support of the Alexander von Humboldt Research Institute of Biological Resources, from Colombia. With the aim of promoting an instrument that incorporates traditional knowledge into chapters of the Assessment, the international meeting "**Indigenous knowledge for the proper management of biological diversity and quality of life in the Amazon Region**," held in Santa Cruz de la Sierra (Bolivia), on April 4-6, provided

a dialogue and "active listening" opportunity to improve the understanding of the reality of traditional peoples in the Amazon region. The event brought together specialists in biological diversity, authors of the assessment, decision-makers, experts and possessors of traditional knowledge.

"We are people from different areas, such as scientists, possessors of indigenous knowledge, specialists, civil servants, political decision-makers, among others, but there is something that unites everyone: the responsibility for our common home, mother earth, and the urgency of working in concrete actions to preserve it and to try to make a more intelligent and respectful use of our planet. In this case, we are talking specifically about the Amazon region," said the Madam Secretary General of the ACTO, Alexandra Moreira, during the meeting's opening remarks.

During the three days of the event, dialogues between different participants allowed the sharing of information on the knowledge of indigenous peoples, the nature-society relationship, and the regulatory framework for governance in the Amazon, which should provide inputs, in particular, to Chapter 4 (Indigenous peoples and traditional knowledge) of the Assessment. Experts in charge of the study, including authors, chapter coordinators and co-chairs, consulted with participants about what traditional knowledge information the Assessment should contain and which messages to decision-makers should be included in the study.

"The final balance is very positive," evaluated the co-chair of the Rapid Assessment of Biodiversity and Ecosystem Services in the Amazon Region, Alfredo Portilla. In his opinion, the meeting promoted a deep understanding about part of current situation in the Amazon with respect to the management of biodiversity and ecosystems. "By bringing together indigenous peoples and the authors of the Assessment, the meeting shed new light on investigations. In the event, indigenous leaders expressed their concerns and interests towards the organizations involved, which must work together on common points," said Mr. Portilla, who also serves as head of the Environmental Dispute Settlement Court of the Ministry of the Environment of Peru.

As a result of the meeting, Mr. Portilla also highlighted the experts' greater understanding of the experience of indigenous peoples in managing natural resources in their territories. "Case studies were presented on the management and uses of biodiversity. Such activities count with the direct participation of communities in partnership with local governments, including some actions with the private sector. This is something that will enhance the role of traditional peoples in the integral management of the Amazon Basin and its ecosystems," said the co-chair.

The participating indigenous peoples also considered the event a great success. The representative of the Yanesha ethnic group (Peru), Teresita Antazú Lopéz, said: "I learned a lot, especially because it's an event about us. As we come from the communities, we know the problems we have and what we are facing. It is important that they listen to our voices, observe us more closely and think about us, as they wish to have more data on peoples and territories. We hope that these data will serve to support and help the countries in some way."

Traditional knowledge – Key actors at the meeting, the possessors of traditional knowledge, were designated by the Fund for the Development of the Indigenous Peoples of Latin America and the Caribbean (FILAC) and the Coordinator of Indige-

nous Organizations of the Amazon Basin (COICA), co-organizers of the event, which brought together representatives of nine ethnicities, present in seven Amazonian countries. During the activity, the participating peoples organized conversation tables to present and share their experiences about the state of biodiversity and its role in preserving the environment, in addition to evaluating the effectiveness in the enforcement of state mechanisms for the protection of territories and traditional knowledge.

"I believe that there were several important outcomes of the meeting. First, our follow-up in three days of work, alongside the experts who are helping to draft the different chapters of the Assessment. Then, the exchange of experiences and perspectives that will bring new proposals, to be widely shared, especially about the negotiation process of the great post-2020 global biodiversity framework," said FILAC's technical secretary, Gabriel Muyuy Jacanamejoy. He stated that indigenous peoples hope "to be able to remain firm in this purpose and undertake actions with greater impact to guarantee the rights of indigenous peoples, especially in the Amazon Basin, which is a very complex region, with many difficulties, but also with a lot of resources and potential."

COICA's general coordinator, José Gregorio Díaz Mirabal, also considered the event a necessary space to improve dialogue and articulation between governments and Amazonian indigenous peoples, which had not happened on-site for a long time. "Validating the relationship between academic science and the wisdom of the Amazonian indigenous peoples in a respectful framework so that they are part of a specific document from the Amazon and South America was another positive result of the meeting. I believe that we have taken a new step towards starting the implementation of a work plan on issues of Amazonian biodiversity and indigenous peoples," said Mirabal, stating that the event was also an opportunity for COICA to take a new political space, in the short or medium term, participating at the negotiations within the scope of the ACTO.

During the event, the Regional Platform of Indigenous Peoples of the Amazon was also presented. A new ACTO project, with the support of Euroclima+, which aims to improve decision-makers' understanding of the effective role of traditional knowledge and practices in relation to climate change. The platform hopes to be a space to reinforce the dialogue among different knowledge systems, so that they can be considered in the design of public policies, CNDs (National Determined Contribution), activities and projects related to the mitigation and adaptation to climate change.

"We indigenous people are certain that we are the real players here and we must always be included. As an organization, as a people and as a community, we brought our knowledge to the table. The coordination of the event was magnificent, we hope that this is not the first, nor the last time, as it is very nice that they have included us in all these activities, so we can contribute more with the document and its objectives", said Bernice Serataya, a representative of the Chiquitano, an indigenous group of Bolivia. She emphasized that "it is very good for everyone to hear from the people who live in the territories."

Amazon under analysis – The Rapid Assessment of Biodiversity and Ecosystem Services in the Amazon is one of the components **of ACTO's Regional Program of**

Biological Diversity for the Amazon Basin/Region. Using the methodology of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), the analysis aims to identify trends and causes of the loss of biological diversity and the deterioration of the benefits of environmental services provided by the Amazon. The goal is to improve decision-making and to guide a more effective and science-based development of public policies, strategies, plans, programs, and projects on biological diversity in Amazonian countries.

The incorporation of traditional knowledge is a way of making the results of the Assessment more comprehensive, ensuring representation to indigenous peoples. "Many of the assessment's processes, even though conducted by consultants and specialists of all kinds, end up showing only part of the reality. Native peoples bring different views. This representation generates information that strengthens the document. These are strong elements, which perhaps can make a difference. For me, being able to get to know other types of nations and understand other ways of facing problems is extremely enriching," said Hugo Aranibar Rojas, executive director of the National Museum of Natural History of Bolivia, one of the decision-makers attending the meeting.

The result of the Assessment will be a quality report with a high level of knowledge, which will provide governments, the private sector and civil society with an up-to--date, independent, and reliable assessment from the point of view of experts, scientists, and possessors of traditional knowledge. "I only recently learned about ACTO. It's something new for me, but it seems they've been working for years. I think if there's something good about these institutions for communities, then it's important for those communities to feel that the organizations are really working for them. And that you can get something out of them. The work should produce good outcomes. And the product of that work should be shared with us", said Teresita Antazú Lopéz, representative of the Yanesha ethnic group (Peru).

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According to the Secretary General of ACTO, although there has been a significant increase in the understanding of biodiversity and ecosystems and their importance for the quality of life for all, the Assessment can improve the understanding of which policies, practices, technologies, and behaviors can bring more benefits to the conservation and sustainable use of biodiversity. This is achieved by analyzing different information, in search of answers to the gaps identified by the different reports. It also assists in the achievement of many of the international commitments, such as the Sustainable Development Goals (SDG), the Aichi Biodiversity Targets and the Paris Agreement on climate change. "The Assessment is crucial because there is a body of evidence that tells us that multiple threats to biological diversity have increased. The most recent reports point out, for example, that the sustainable use of natural resources is essential for adapting to dangerous human interference with the climate system, as well as for achieving many of our most important development goals. However, biodiversity is still being lost, ecosystems continue to be degraded and many of nature's contributions to people are at risk," declared the Secretary.

An ACTO Biomaz project, in partnership with FILAC and COICA, the international meeting "**Indigenous knowledge for the proper management of biodiversity and quality of life in the Amazon Region** " was supported by the Agencia Española de Cooperación Internacional para el Desarrollo (AECID) and the Federal Ministry for Economic Cooperation and Development (BMZ) of Germany, through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

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A meeting of actors for the protection of the health of indigenous people was held with a territorial base across borders Peru-Brazil-Colombia

Under the auspices of the National University of Colombia, technicians from ACTO and PAHO articulate actions to protect the health of indigenous peoples on the border between Peru, Colombia and Brazil.

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The Amazon Cooperation Treaty Organization (ACTO) and the Pan American Health Organization (PAHO), under the auspices of the Universidad Nacional de Colombia Sede Amazônia, met on March 15 and 16 at the university's headquarters in Leticia, Colombia.

With the welcoming words of the director of the National University of Colombia, Dr. German Ochoa, the trinational meeting on the main actors in protecting the health of highly vulnerable indigenous peoples and those in initial contact began.

This meeting was held in person and virtual mode and aimed to present the work carried out at the triple border for the protection of the health of indigenous peoples, developed in the areas of the projects: "Contingency Plan for the protection of the health of highly vulnerable indigenous peoples and in initial contact (ACTO/PAHO/IDB)" and "Support for the Vaccination of Indigenous Peoples of the Amazon in border areas of Andean countries (PAHO/ORAS-CONHU/CAN)", in particular on the preparations for the Analysis of Health (ASIS) of the Tikuna people who live in the three countries in the border region.

The two-day event discussed strategies to combat Covid-19 among indigenous peoples and vaccination initiatives in the tri-border regions of Peru, Colombia and Brazil.

The institutions presented their initiatives with the aim of articulating actions to strengthen the expected results in protecting the health of people living in these regions.

In the same way, professors from the Universidad Nacional de Colombia Sede Amazonia, presented the research project "A Unique Amazon in the Context of a Unique Health (UMA SAÚDE)", whose research axis is focused on ecosystem health relationships and responses of forms of knowledge. The project also offers training activities for health agents, epidemiological monitoring and platforms for dialogue between people and government institutions.

On the other hand, the ACTO consultant, Lyli Chindoy, with the support of the collaborator Roberta Cerri, briefly presented the Situational Health Study based on the Territorial Base of the Putumayo/Içа River, which has direct links in the region of the Triple Border Peru, Colombia and Brazil .

Likewise, the indigenous leaders of Colombia, Darío Silva do Povo Cubeo, representative of the Association of Traditional Indigenous Authorities (AATI); Rosendo Awe of the Tikuna people of the Municipality of Puerto Nariño, representative of the National Indigenous Organization of Colombia (ONIC) and Albert Pérez of the AATI Indigenous Health Commission, at the Department of Health of Amazonas, commented on the importance of articulating all initiatives with the Indigenous Health System and highlighted the importance of the intercultural character of the actions foreseen in the projects and programs, and of the traditional medicine of indigenous peoples as a basis for strategies to combat Covid-19 and other infectious diseases.

Representatives of public health services, invited experts, academics and representatives of civil society and indigenous peoples from the three countries participated in the meeting, who analyzed the proposals considering the urgency of implementing actions that contribute to the awareness of indigenous and riverside communities that inhabit the rivers. Of region.

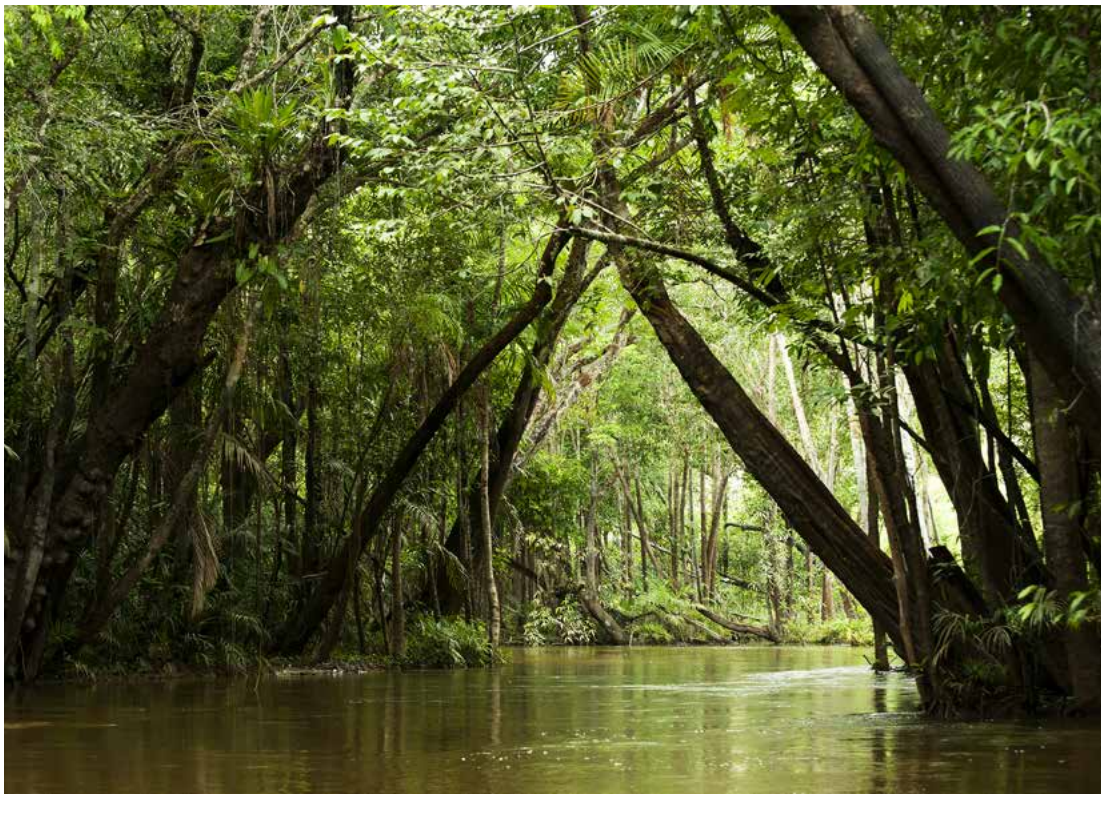
Among them, representatives of Peru from the Regional Directorate of Health of Loreto (DIRESA); from Brazil, the Ministry of Health (SESAI), the Alto Solimões Sanitary District and the National Indian Foundation (Funai); in addition to the Ministry of Health of the Department of Amazonas in Colombia and the organizations ACT (Colombia) and CTI (Brazil).

ACTO

Within the scope of Protection of Peoples in Isolation and Initial Contact in the Amazon Region, ACTO has carried out activities to protect the health of Indigenous Peoples in Isolation and Initial Contact (PIACI). This resulted in a proposal for regional guidelines for the protection of the Amazon by PIACI, a regional health care strategy, a guide for health surveillance of Indigenous Peoples of the Amazon Region, among other products. The actions implemented laid the foundations for promoting a regional framework for border cooperation between Amazonian countries on health issues and Indigenous Peoples, with an emphasis on PIACI, which will make it possible to face threats and epidemics in the region, including the COVID-19 pandemic and other emerging and endemic tropical diseases that affect these populations, based on an attitude of respect for the concepts of proper and traditional medicine.

PAHO/WHO

The Project to Support the Vaccination of Amazon Indigenous Peoples in Border Areas of Andean Countries, financed by the Colombian Presidential Cooperation Agency and executed by PAHO/WHO, works with the Ministries of Health to control the pandemic by vaccinating Amazonian indigenous peoples who inhabit territories cross-border. This project works together with ACTO, SG CAN and ORAS CONHU for the health of these historically relegated populations.



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Articulation for the expansion of the binational agreement between bordering national parks between Bolivia-Peru

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The second coordination meeting for the elaboration of the Health component of the Binational Agreement between the Madidi Parks, in Bolivia, and Bahuajá Sonene, in Peru, was held on April 8, in the city of La Paz, promoted by the Ministry of Foreign Affairs of the Plurinational State of Bolivia.

Along with representatives of the Mother Earth and Water Sector of the Ministry of Foreign Affairs of Bolivia, the Directorate of Traditional Medicine of the Ministry of Health, representatives of the Madidi Natural Park and the Director of the San Buenaventura Hospital were present. On behalf of Peru, the technical teams of the Ministry of Health, the Ministry of Culture, the Subregional Program for South America (PAHO/WHO), in addition to the technical team of the Amazon Cooperation Treaty Organization (OTCA), consultants and collaborators, who for the first time were part of the articulation work in this area.

The objectives of the meeting were to coordinate actions and establish guidelines for the development of a bilateral agreement that allows working on topics such as the health of indigenous peoples and pollution of nature. These are urgent action steps in a complex context. In this sense, there was a consensus on the importance

of promoting traditional medicine practiced by the indigenous population that lives in this cross-border region, expanding the territorial area of influence of the existing agreement and also the inclusion of other State Institutions, which are directly linked to possible activities to be implemented as products of this new agreement still in the elaboration phase.

Likewise, it was agreed that the next articulation activities will be carried out in the territory during the second half of 2022, and which will include visits and coordination with indigenous communities in the development of strategies to prevent and combat infectious, contagious, respiratory diseases, and all those resulting from territorial actions that have a polluting effect on nature, but specifically, due to mining activities that contaminate waters with mercury.

As a consequence of the new productive activities, one of the findings is the change in the productive matrix, which, in turn, has effects on the change in the diet that affects mainly women and children, as malnutrition problems often arise. On a regional scale, the food sovereignty of indigenous families is relatively affected, causing new diseases and pathologies, including zoonotic ones, and their dissemination in indigenous and local communities, caused by deforestation and land use change in the region of intervention of the Bolivia-Peru bilateral agreement.

Finally, it is expected that the Ministries of Health of Bolivia and Peru will move forward with a proposal for a bilateral agreement, which includes these issues, with a comprehensive view of the context, and that addresses the needs and problems of indigenous peoples in health. . , and the environment in particular.

ACTO, within the scope of the Contingency Plan for the Protection of Health in Highly Vulnerable Peoples and Peoples in Initial Contact project, implemented jointly with PAHO and with the support of the IDB, will facilitate the actions planned to materialize the health component in the agreement between the Madidi and Bahuajá Sonene parks, including the Tambopata National Reserve.

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Agenda

17th Session of the United Nations Forum on Forests

ACTO´s Side Event

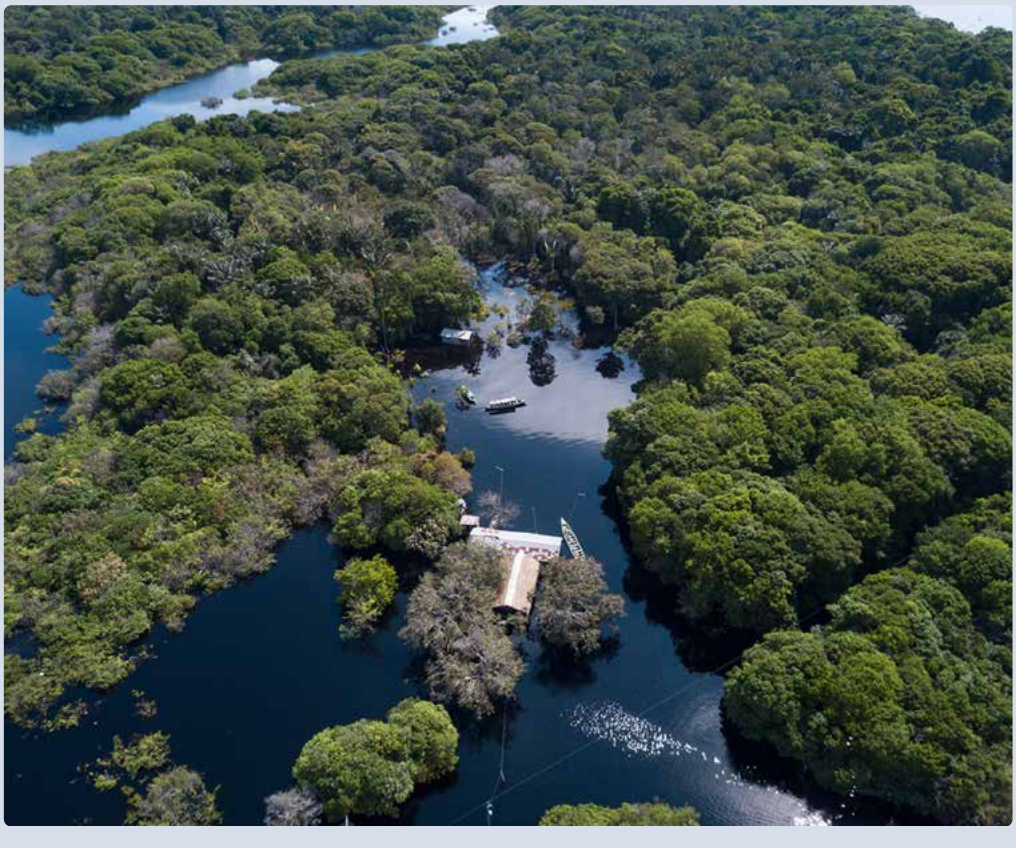
Amazon Regional Forest Cooperation and its Contribution to the Implementation of the United Nations Strategic Plan for Forests 2017-2030 and the Global Forest Goals and Goals

Date: Wednesday, May 11, 2022

Time: 1: 30p.m. – 2: 45p.m. (New York)/ 2:30p.m. – 3: 45p.m. (Brasilia)

Registration here

https://us02web.zoom.us/webinar/register/WN_w_xIC8JtQlG9hQmm9lripw



Bolivia

Study on the population status of the yacare (*Caiman yacare*) and the black caiman (*Melanosuchus niger*) in their natural distribution areas in Bolivia

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SUMMARY: Under the Regional Project for the Management, Monitoring and Control of Species of Wild Fauna and Flora Threatened by Trade (Bioamazon Project), the population status of the yacare (*Caiman yacare*) and the black caiman (*Melanosuchus niger*) was studied in their natural distribution areas, in Bolivia, during the dry seasons of years 2020 and 2021. This study was supervised by the Dirección General de Biodiversidad y Áreas Protegidas (Directorate of Biodivrsity and Protected Areas DGBAP) of the Vice Ministry of the Environment, Biodiversity,

Climate Change and Forest Management and Development (VMABCCGDF). Population assessments were conducted, and yacare hunters and breeders were interviewed in different localities of La Paz and Santa Cruz. The information collected was analyzed and systematized with information provided by the DGBAP as results from assessments carried out in the preparation of alligator management plans to update the models for determining yacare harvest quotas at the national level. Likewise, priority sites were defined for the implementation of actions to strengthen the wild populations of black caiman.

KEYWORDS: yacare, black caiman, commercial use, conservation, Bolivia.

Introduction

The exploitation of wildlife in the Bolivian Amazon is an ancient practice; It is presumed that it began in the 1940s with the migration of foreigners associated with international fur markets, providing economic benefits for residents, companies, and the Bolivian state, documented since 1938 (CLAURE 1986). For many years, the main reason for extraction of wild species was the prices and demands of the international markets of destination, at the expense of devastation of the wild fauna, and the exploitation of the native inhabitants of the Amazon region. According to Claure (1986), the yacare (*Caiman yacare*) and black caiman (*Melanosuchus niger*) were the species most affected by this practice; As a consequence, since 1960, the Bolivian state has taken moderately successful measures to regulate its hunting and commercialization.

In 1997, the first Regulation for the Conservation and Use of the Yacare (DS 22641) was enacted. The Indefinite General Ban established for the alligator since 1990 by Supreme Decree 24774 was lifted, based on the population assessments, from 1995 and 1996, driven by King and Godshalk from the IUCN-SSC Crocodile Specialist Group (CSG) (APARICIO & RÍOS 2004). Later, in 2002, the National Program for the Conservation and Sustainable Use of the Yacare was established, which enabled the yacare's legal use at the national level. The Program mainly sought to promote and regulate the conservation and sustainable use of the species and its habitat, as well as to generate social and economic benefits for local residents. The Program is currently being executed in three

departments and it benefits families from TIOCs (*Territorio Indígenas Originarios Campesinos*), and Indigenous and peasant communities. The program has two rules: Regulation for the Conservation and Sustainable Exploitation of the Yacare (R.M 147/2002) and the Regulation for Shared Management of the Yacare (R.A. 023/2011); In both regulations, it is stablished that the use of alligator be authorized by the National Competent Environmental Authority according to the management plans and/or studies that allow the allocation of harvest quotas under sustainability criteria (D.S 3048 of CITES).

On the other hand, for years the local authorities and residents have shown interest in the management of the black caiman population; however, there are no specific studies about the conservation status of this species in their habitats, threats, and the local social management capacity. In 2008, according to Ten et al. (2010), the studies conducted in the department of Beni, showed that even though the black

caiman populations were recovering with greater predominance of adult individuals, the species was still not abundant throughout its distribution range, as it was locally. Apparently, populations were scattered throughout the floodplain, but not abundant, except for certain localities, and varied according to their habitat.

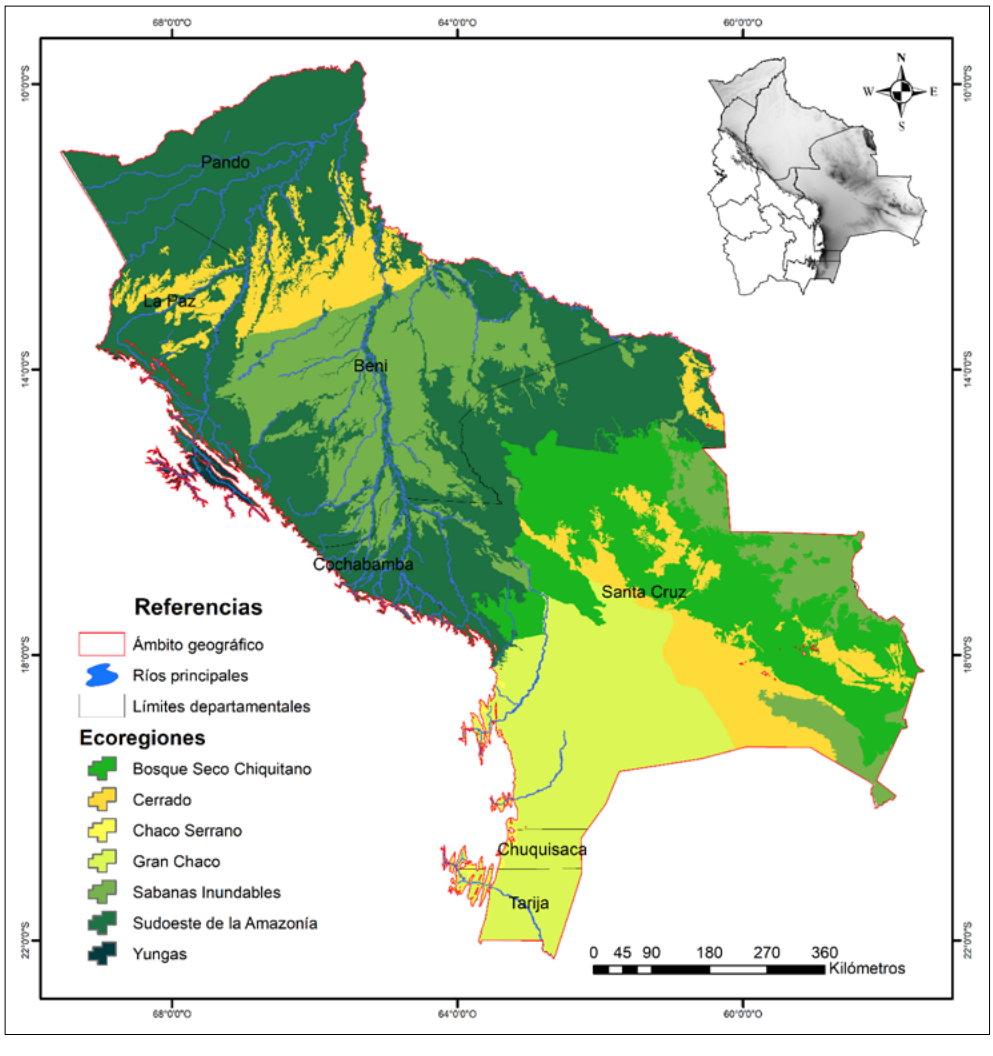
In this context, the present study aims to carry out population studies of yacare and black caiman in their natural distribution areas and formulate models and criteria to estimate populations susceptible to exploitation.

Methodology

Study area

The geographical scope of the study included the entire national territory below 850 masl, which, as proposed in Rodriguez-Cordero *et al.* (2019) is the limit of recorded presence of this species in Bolivia. Therefore, the study area encompasses the lowlands of the departments of Pando, La Paz, Beni, Cochabamba, Santa Cruz, Chuquisaca, and Tarija, which comprises mainly seven ecoregions (IBISCH & MÉRIDA 2003, Figure 1).

Figure 1. Territorial extension, geopolitical and biogeographic division of the study area. Its position with respect to Bolivia and details about its elevation (<850 masl) are indicated in the enclave. (PINTO VIVEROS 2021).



Population assessments

The following criteria defined the areas for population assessments, in order of importance: a) areas subject to management and exploitation of the yacare; b) areas with previous but outdated information on both species (at least 10 years); and c) areas under management without prior information.

Seven assessment teams composed by one biologist and two or three local inhabitants (hunters) were arranged, to collaborate in the definition of the water bodies to be evaluated, along with the displacement and the counts. During the dry season of 2020 and 2021, night counts were made using the method described by Chabreck (1966), which consists of the direct observation of individuals during night boat trips, using light sources to identify the species and to estimate the size of all crocodilians found along each trip.

The yacare's population structure (*Caiman yacare*) was classified categorizing individuals according to four sizes considered for this species in the current national regulations, in terms of total length (TL):

- Class I (CI); Individuals less than 50 cm TL. Most of these specimens are juveniles in their first year of life (newborns).
- Class II (CII): Individuals between 51 to 120 cm TL. Sub- adult males and females.
- Class III (CIII): Individuals between 51 to 180 cm TL. Adult males and females.
- Class IV (CIV): Individuals bigger than 180 cm TL. Mostly male adults.

The studies of the black caiman (*Melanosuchus niger*) reviewed to date informed that the size ranges used vary

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from author to author and there are no standard size classes for this species in Bolivia. In order to use all the available data on this species in the country, the following temporary size classification was proposed based on the work carried out by Barreto et al. (2010) and Silva et al. (2010) on sexual maturation of M. Niger in Brazil:

- Class I (CI); Individuals less than 80 cm TL. Most of these specimens are juveniles in their first year of life (newborns).
- Class II (CII): Individuals between 51 to 180 cm TL. Male and female sub-adult individuals.
- Class III (CIII): Individuals bigger than 181 cm TL. Adult males and females.

Class I individuals, or neonates of both species, are not included in the analyzes of abundance or population structure, since, at this stage of life, the estimated survival rate is close to or less than 20%.

The water bodies visited were evaluated only once. For each sampling site, at least one body of water was defined. Repeated counts enabled to calculate the visual fraction using the King and Messel method (in ESCOBEDO- GALVÁN 2003).

Predictive models

Ecological niche modeling was applied to determine the potential distribution of the two species under study. Subsequently, from the potential distribution modeling for the yacare, a model for determining harvest quotas was developed, which in turn considered the model of the Noel Kempff Mercado Natural History Museum (MHNNKM 2010). In the case of the black caiman, harvest quotas could not be determined considering the results of the population evaluations obtained; however, the population information and niche modeling developed were fundamental to define geographic groups based on ecological niche values and priority areas throughout their natural distribution. The implementation of a population strengthening program with components of research, management and environmental education is recommended. This allows the Bolivian state to justify and/or support before CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) the change of Appendix of this species in the medium to long term (PINTO VIVEROS 2021).

For a detailed review of the developed models visit http://otca.org/wp-content/uploads/2021/06/2022_OTCA_Bioamazonia_BOLETIN-012-ESP.pdf

Interviews with the community

During the field work, informal interviews were conducted with hunters and community members from the assessed areas. Topics were addressed such as the perception of the yacare and the black caiman, and the benefits of exploiting the yacare, its products and by-products, and the capacities techniques developed for management were addressed. These interviews were conducted with hunters in the areas under management (harvesting) where population evaluations were carried out, and with those responsible for communal alligator farms (ranching) in the communities of Beremos, San Lorenzo de Moxos, San Pablo de Chontal and Pariagua.

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Outputs

During 2020 and 2021, different basins in the department of Beni and Santa Cruz were assessed, giving priority to unregistered yacare farms or those with information that was more than ten years old, with the purpose of complementing information from the National Competent Environmental Authority.

Table 1. Farms evaluated for crocodilian populations between 2020 and 2021

Territorial Entity	No. of Water Bodies Evaluated	Travel in Km
ANMI San Matías	16	3.29
Municipality of Loreto	47	112.16
PD-ANMI Iténez	26	102.45
RB-EB of Beni	15	40.26
TIOC Baures	20	71.33
TIOC Cavineño	38	76.39
TIOC Tsimane	5	11.06
TIPNIS	25	105.25
OVERALL TOTAL	**192**	**522.19**

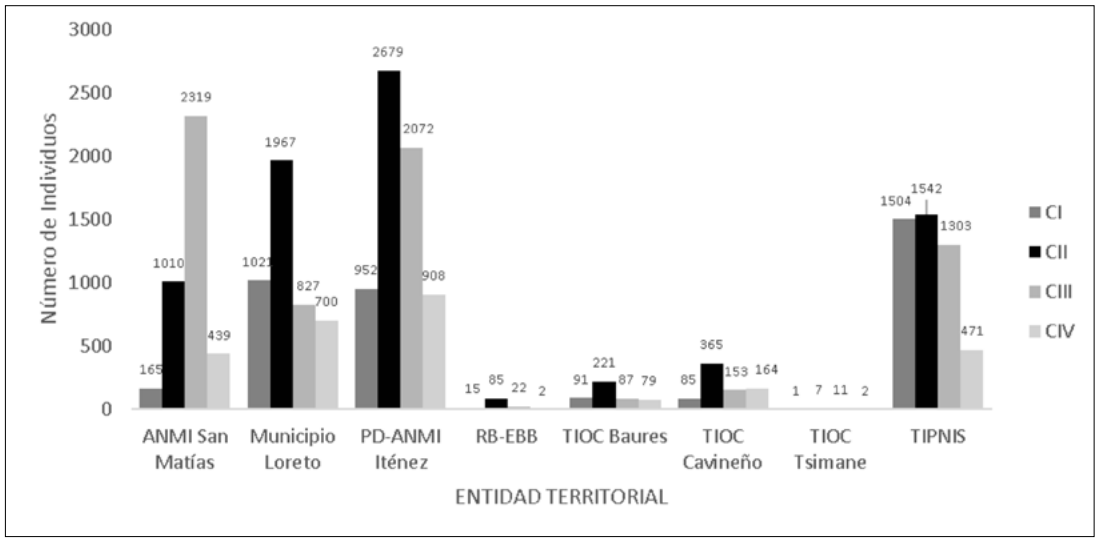
Integrated Management Natural Area (ANMI); Integrated Management Natural Area and Departmental Park (PD-ANMI); Biological Station Biosphere Reserve (RB-EB); Indigenous Native Peasant. Territories (Territorios Indigena Originario Campesino TIOC); Isiboro Sécure National Park and Indigenous Territory (TIPNIS).

During the crocodilian population counts, three species were recorded: yacare (*Caiman yacare*) black caiman (*Melanosuchus niger*) and crocodile (*Paleosuchus palpebrosus*).

Yacare (*Caiman yacare*)

The population structure of the yacare was dominated mainly by juvenile and sub-adult individuals (Figure 2).

Figure 2. Histogram of yacare populations sizes in different locations evaluated in the department of Beni



The yacare population of the ANMI San Matías has been affected by fires occurred in recent years, for which a significant decrease in population abundance was observed compared to data from evaluations of previous years.

According to current national regulations, if the individuals of the CIV exceed 15% of the total formed by the groups of the CII, CIII and CIV, the population is considered to be in a good state of conservation and can be used sustainably (harvesting). Yacare populations in a good state of conservation were found in the municipality of Loreto, PD-ANMI Itenez, TIOCs Baures and Cavineño.

Table 2. Size structure of the yacare in different farms, between 2020 and 2021

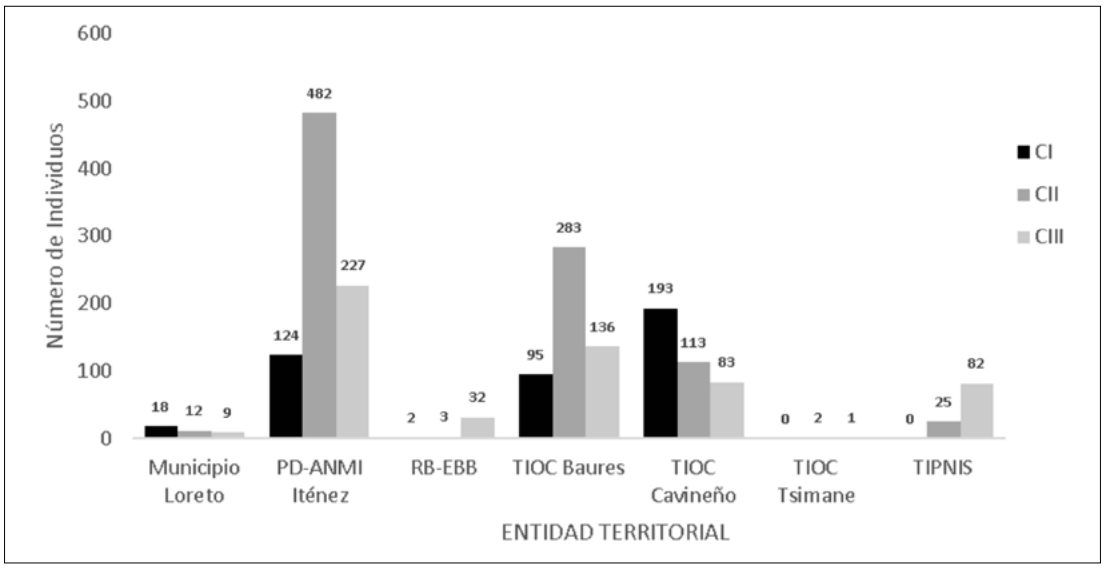
UNIDADE TERRITORIAL	ΣCII - CIV	CIV	%CIV
ANMI San Matías	3,768	439	11.65
Município Loreto	3,494	700	20.03
PD-ANMI Iténez	5,659	908	16.05
RB-EB de Beni	109	2	1.83
TIOC Baures	387	79	20.41
TIOC Cavineño	682	164	24.05
TIOC Tsimane	20	2	10.00
TIPNIS	3,316	471	14.20

Populations in which the sums of CII, CIII and CIV do not exceed 15%, cannot benefit from hunting permits because they are not in a position to support extraction.

Black Cayman (*Melanosuchus niger*)

The populations of black caiman found in the properties evaluated were scarce in general. The black caiman is present, sporadically, in bodies of water. Abundant populations are rare and isolated and generally restricted to certain bodies of water.

Figure 3. Histogram of black caiman populations sizes in different locations evaluated in the department of Beni



The black caiman populations in the water bodies in the evaluated territories are mainly composed of subadult individuals, followed by juvenile individuals, while adults are a minority class.

The results of the present study largely coincide with those reported by Ten et al. (2010). (2010). In 2017, the CIRA also found this pattern (Rivas et al. in prep). In the aforementioned studies also being developed in the department of Beni, the most abundant populations have been found in localities of the Itenez river basin. Considering the results of the studies, the lack of long- term monitoring, in addition to the scarce knowledge about the biological and environmental aspects that are currently determining the dynamics of their populations, it is not possible, for the moment, to propose any exploitation initiative, especially based on the extraction of adults. In this sense, it is recommended that the General Directorate of Biodiversity, in coordination with the Departmental Government of Beni, manage a black caiman conservation and protection program to strengthen populations and define actions to manage human-crocodile conflicts. This program would avoid the unnecessary killing of adults of this species that take between 10 and 15 years to reach reproductive size to contribute to wild populations (Barreto et al 2010, Silva et al. 2010). Once an effective recovery of the black caiman populations is demonstrated, the Bolivian state, through the National Competent Environmental Authority, will be able to manage with CITES the change of appendix for the design of harvesting programs, based on the actions implemented within the framework of this program. Given

the characteristics and low recovery potential of this species, they should be based on the *ranching* modality.

Predictive models

Yacare: Based on the habitat suitability analysis (Pinto Viveros 2021), the model for determining yacare harvest quotas at the national level, proposed by the MHNNKM, was updated, and adjusted. This model should preferably be applied using up- to-date data on the population status of the species; however, historical data can be used that considers typical densities of usable individuals according to habitat and geographic group identified. Likewise, when working with historical data, it is advisable to apply a precautionary index (Caughley & Sinclair 1994) considering the high levels of uncertainty about the conservation status of the populations due to dynamics in the habitat of these species in recent years (fires and extreme droughts mainly).

The model is a valuable technical-administrative tool for the National Competent Environmental Authority that will allow managing the alligator in a more responsible and efficient way while contributing to guarantee the conservation of this resource at the national level.

For a detailed review of the developed models visit http://otca.org/wp-content/uploads/2021/06/2022_OTCA_Bioamazonia_BOLETIN-012-ESP.pdf

Black Caiman: Based on the results of the habitat suitability study (Pinto Viveros 2021) and the results from field evaluations, large lagoons with low anthropic influence of the Itenez and Mamoré river basins were recommended as priority areas for implementation of a pilot black caiman conservation program, which should have an awareness and environmental education component to address the conflict between humans and the black caiman.

Interviews with the community

***Harvesting Yacare*:** Nearly fifty community members were interviewed during the fieldwork. The interviewees dedicated to hunting activities expressed their concern about various issues related to the yacare exploitation, especially with local prices, access to international markets and illegal trafficking, especially of yacare meat.

Ranching Yacare: Regarding the yacare exploitation projects in four Indigenous territories of the department of Beni, under the ranching modality, interviews and visits were conducted with residents, technicians, and communal authorities of Beremos, San Lorenzo de Moxos, San Pablo de Chontal and Pariagua for its sale to a private farm in Santa Cruz de la Sierra. Several problems were evidenced that indicated low social and biological impact in the execution of the projects and consequently their failure. The main problems included the lack of technical assistance, lack of training in the location and collection of nests, poor management of food and water sources for hatchling pools, low prices, and the responsible company did not buy the production of all the established hatcheries. In some communities, internal conflicts arose due to poor organization of the initiative.

The analysis and evaluation of the experiences during the execution of this project are the basis for the design and organization of future crocodilian ranching programs in the country.

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Conclusions

Population assessments of the yacare and black caiman were carried out in different locations within the natural distribution area of this species in Bolivia. The yacare populations subject to harvest showed a good state of conservation (CIV› 15% of the sum of the CII, CIII and CIV), although in some areas it was recommended that hunting authorizations be suspended, in application of current regulations, as some populations are naturally scarce, and others have been seriously affected by the fires in recent years. The black caiman populations did not show abundances or population structures that would allow a harvest quota to be proposed, instead, priority areas were identified for the implementation of a pilot conservation program to strengthen the populations.

The model proposed by the MHNNKM for the determination of yacare harvest quotas at the national level was updated and adjusted using the systematization and analysis of information from population assessments within the yacare Management Plans and field evaluations carried out within the framework of this project. This technical-administrative tool must be periodically reviewed and updated by the National Competent Environmental Authority.

It is urgent to work on a technical- administrative document for the standardization of evaluation methods in the field, and the systematization and analysis of information for crocodilians in the country; To date, there are no technical guidelines to generate population information on the yacare and black caiman that can be comparable and useful for a monitoring system at the national level.

Acknowledgements

This proposal was prepared thanks to the Regional Project for the Management, Monitoring and Control of Wild Fauna and Flora Species Threatened by Trade (Bioamazon Project), as a compromise between the Amazon Cooperation Treaty Organization (ACTO), and the German Government through non-reimbursable financial cooperation channeled by the German Development Bank (KfW). Supervision was carried out by the Directorate of Biodiversity and Protected Areas of the Vice Ministry of the Environment, Climate Change and Forest Management and Development (VMABCCGDF).

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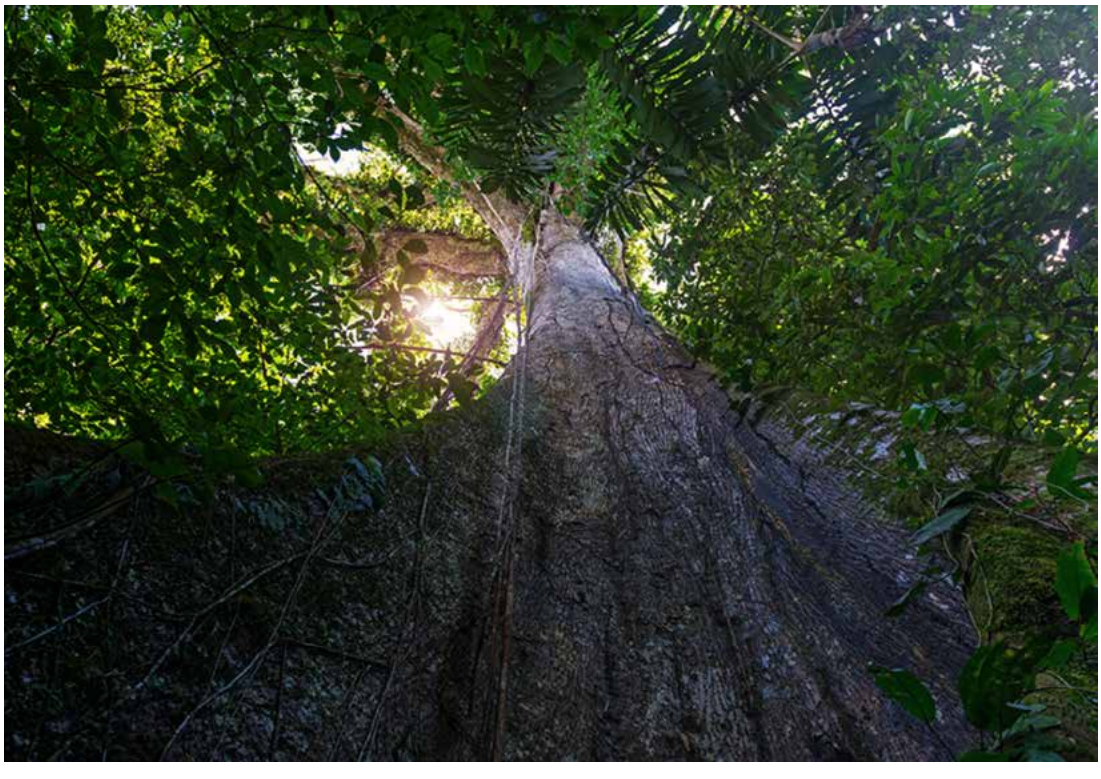
Brazil

Training course on Tropical Timber Identification Methodologies

Technical representatives from the ACTO Member Countries will be participating in the training course to be held on May, in Brasilia.



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The Bioamazon Project, in partnership with the Brazilian Forest Service (SFB) and the Forest Products Laboratory (LPF) will conduct the course "Tropical Timber Identification Methodologies", on May 09 to 13, 2022, at the Amazon Regional Observatory the facilities.

It is intended to sponsor professionals who require technical information for the identification of wood-producing species, by providing useful knowledge in different areas such as environmental, as well as in the wood sector related to inspection, export, forest management, authorization of forest resources and others.

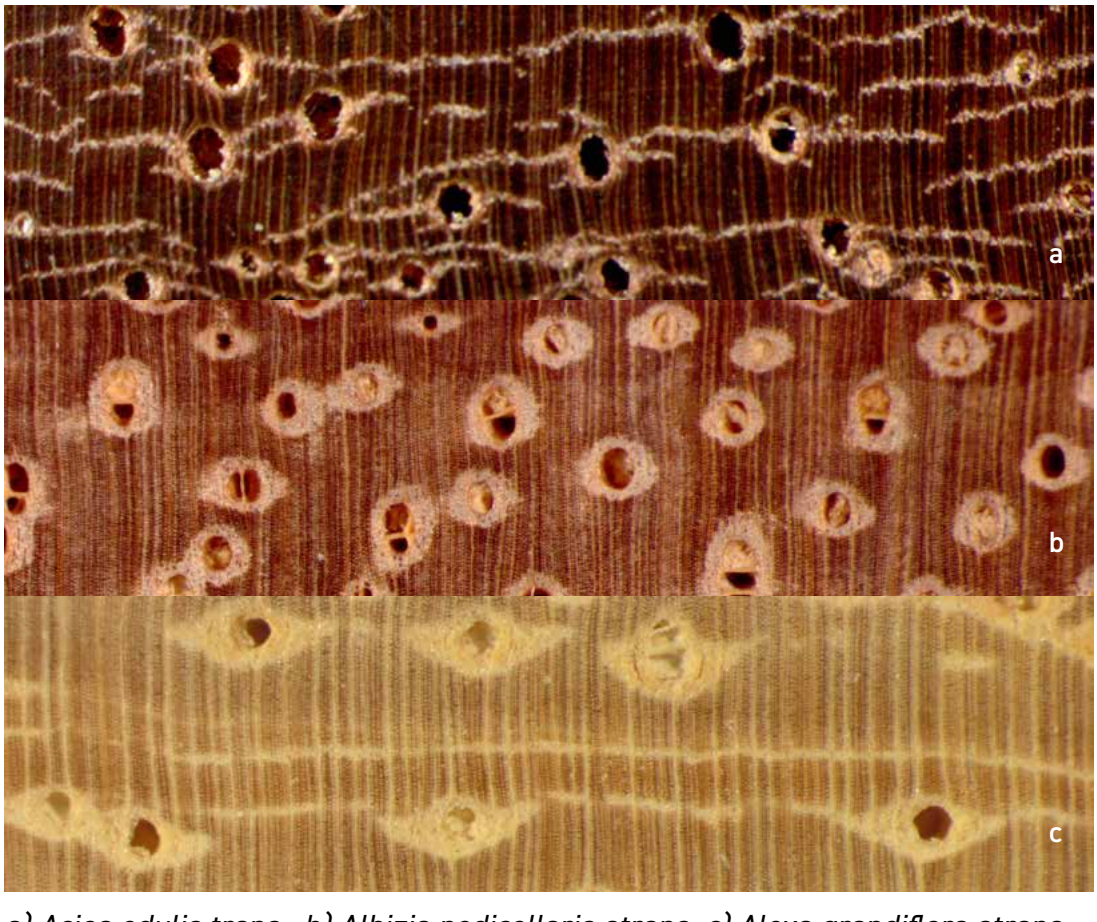
Nowadays, one of the main challenges for the preservation of forests in South America is the ability to control the exploitation, transport and trade of tropical timber species. The growing demand for wood has intensified the pressure on key species, significantly impacting on forests structure, especially in the Amazon region. In this sense, it is extremely important to develop new techniques and tools to carry out this control to achieve the necessary sustainability.

Target audience

Thirty participants will attend the face-to-face course in Brasilia, Brazil, of which sixteen are technical representatives of ACTO Member Countries. Technicians from the Brazilian Institute of the Environment and Renewable Natural Resources (Ibama), the Forest Products Laboratory (LPF), the Federal Police and the University of Brasilia, Brazil, as well as technicians from ACTO will also participate.

This training course is taught within the actions of the Bioamazon Project to strengthen the tools developed by the Forest Products Laboratory of the Brazilian Forest Service (LPF/SFB) for the control and identification of timber species. It will also offer an opportunity to share experiences and strengthen partnerships among governments and investigation and control agencies in the Member Countries of the Amazon Cooperation Treaty Organization.

The course will include theoretical and practical activities; It will be given by technicians from the LPF, along with the contributions of guest speakers. In addition to acquiring knowledge about the anatomical identification of wood, the electronic key for the identification of timber species, and the application technique of NIRS (near infrared spectroscopy) technology and equipment, the attendees will visit the facilities of the Forest Products Laboratory.



a) Acioa edulis trans. b) Albizia pedicellaris atrans c) Alexa grandiflora atrans

Peru

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Field study on the population status of three species of freshwater stingrays *Potamotrygon motoro, P. orbignyi, P. falkneri* (Elasmobranchii: Potamotrygonidae) in the Peruvian Amazon, taking into consideration the stakeholders' perceptions in relation to the value chain

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Abstract: The Ministry of Production (PRODUCE) of the Republic of Peru, identified and entrusted the Bioamazon Project the conduction a field study, under Component 3, on the state of exploitation of three species of freshwater rays (*Potamotrygon motoro, P. orbignyi, P. falkneri*) in the Peruvian Amazon, used as ornamental fish. This paper is part of the field trip report in March 2022, to the city of Iquitos, Department of Loreto, through river crossings on the Nanay, Ucayali, and Amazon rivers. The trip aimed to collect data to support population studies of the species in its main capture areas, as well as to learn about the appreciation of various stakeholders in relation to the production chain of these stingray species.

Key words: Amazon, freshwater stingrays, ornamental fishery, Iquitos, Peru

Antecedentes

The Regional management, monitoring, and control of species of wild fauna and flora threatened by trade (Bioamazon Project), managed by the Amazon Cooperation Treaty Organization (ACTO), with the financial support of the German Government through the German Development Bank (KfW) has the purpose to contribute to the conservation of the Amazonian biodiversity.

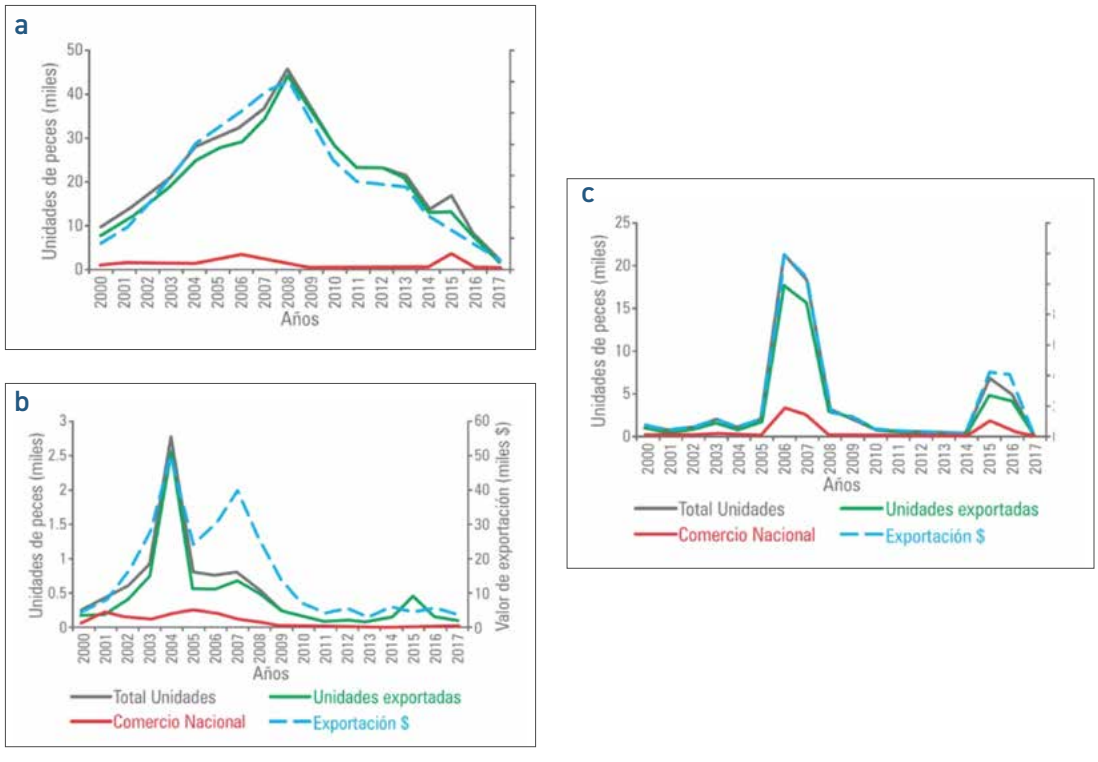
Some species of the wide ichthyological richness of the neotropical region are included in some category of risk of extinction. Among the threatened species are the freshwater rays of the Potamotrygonidae family, which are used as ornamental fish, and are included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The Ministry of Production of Peru (PRODUCE) considered it was essential to study the population status of three species of freshwater rays from the Peruvian Amazon (*P.motoro, P.orbignyi* and *P.falkneri*), used as fish ornamental. The Bioamazon Project was requested to carry out the study within the framework of Component 3, in order to strengthen sustainable management initiatives and traceability mechanisms for species threatened by trade.

The current Peruvian legislation that regulates the capture, transport, commercialization, and export of freshwater stingrays for the ornamental market, is governed by the current legal framework, made up of Decree Law 25977-1992 of the General Fishing Law; the Regulation of the General Fishing Law (Supreme Decree No. 012-2001-PE); and the Peruvian Amazon Fisheries Management Regulation (Ministerial Resolution No. 147-2001-PE). According to Araújo (1998), owing to the peculiarities of their reproductive cycle, the export quotas for freshwater stingrays of the Potamotrygonidae family must be reviewed every two years.

The data available from CITES (2020) and from the Ministry of Production of Peru (PRODUCE) show that, within a time horizon 2000 to 2021, the volumes of exports of the species (*P.motoro, P.orbignyi* and *P.falkneri*) with origin in the Department of Loreto have shown a continuous decline since 2010 (Figure 1), and until the most recent records (2017);

Figure 1. Production trends in population, monetary, and commercial terms (national and international market) of the species: *P. motoro* (a); *P. orbignyi* (b); *P. falkneri* (c), in the period (2000-2017). Source: GARCÍA et al. (2021).



and the trends until 2021 have maintained little variation with the reported volumes. In this sense, a field trip to the Peruvian Amazon (March 2022) had the objective of learning about the population status of these species and the causes of the decrease in catches, and about the current situation of the stingray trade in the region from the opinion of the several stakeholders in the value chain of its commercialization. Accordingly, updated data was collected in the region, for which the main capture areas (Momón and Itaya rivers) were visited, along with the collection centers for export (aquariums), in Iquitos; research centers (IIAP and UNA) and government agencies (DIREPRP-Loreto); and some fishing communities on the Nanay River (Santa Rosa) and on the Ucayali River (San Marcos).

The Amazon Basin

Upon arrival in Iquitos, it was observed that the lowland forests are the dominant landscape in the Department of Loreto, crossed by a hydrographic network formed basically by the Amazon basin, Ucayali, Nanay and Marañón (BRACK, 1997). The relief, in general, is plain, made up of terraces in the area near the city of Iquitos (Figure 2).

Figure 2. Satellite map of the Iquitos region and surrounding areas. (Source: Google earth)

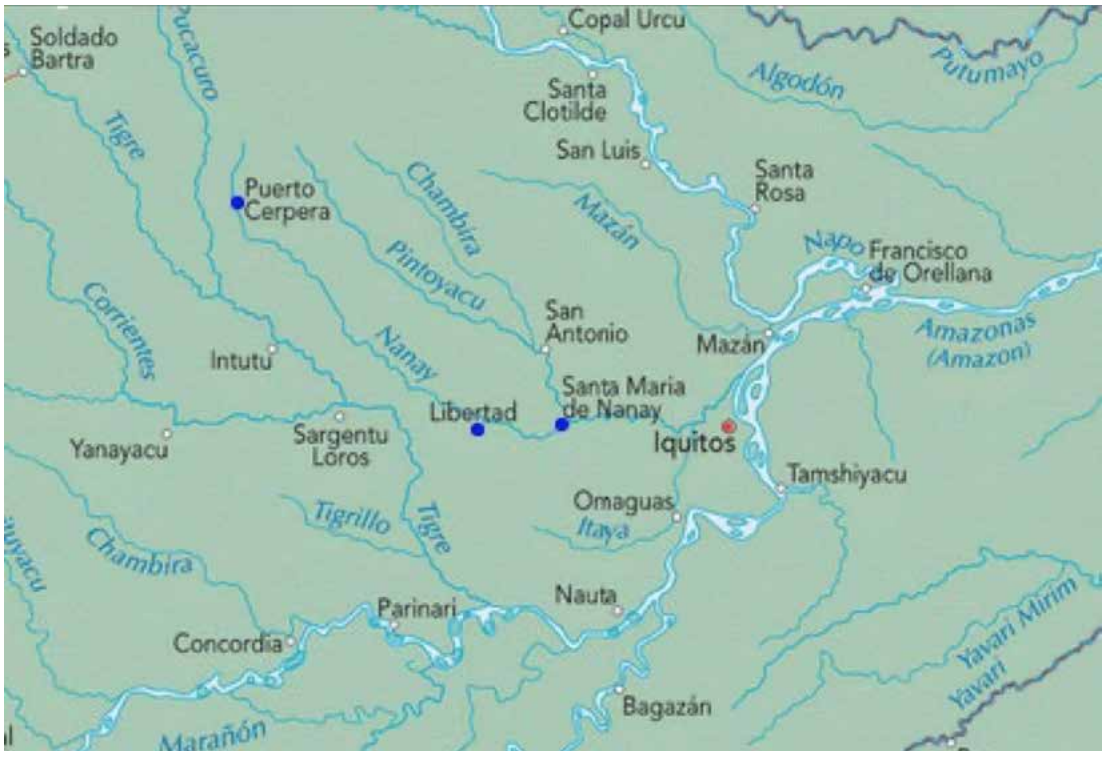
The river crossing

Upon arrival in the city of Iquitos, three river trips were organized along the Nanay, Ucayali and Amazon rivers, to observe the capture of fish in their natural environment in several locations considered as capture areas, to observe the methods of capture, as well as to interview the fishermen and the various actors involved in the commercialization chain of freshwater stingrays in the Peruvian Amazon.

Nanay river

The hydrographic basin of the Nanay River is located in the Department of Loreto, province of Maynas. It is a medium-sized basin in the Amazonian lowlands, and it is the only known river with blackwater-inundated habitats in Peru (Figure 3). It also houses the largest concentration of forests on white sand (varillales) in the country. It also contains terraced forests and low hills. In some lands, forestry, agriculture, and livestock are developed. The Nanay River is a tributary of the Amazon, whose area is 1,750,737 ha, and its length is 529 km, with a maximum width of 545 m. The average speed during floods is from 0.58 to 0.62 m/s, the waters are acidic, poor in nutrients, with a sandy bottom and an average temperature of around 25°C (IIAP, 1996; MARENGO, 1998).

Figure 3. Hydrographic map of the region near Iquitos, Peru, showing some of the most visited areas for the capture of ornamental fish.



The trip along the Nanay River started from the Santa Clara de Nanay community. First, they passed through the mouth of the Momón River (Figure 4b) and entered Padre Concha (shell = horseshoe-shaped lakes), then they went up the Nanay River to the Ninarumi community (Figure 4a). In that community we were received by Mr. Pedro, a fisherman with considerable experience in ornamental fish fishing. He introduced us to another group of fishermen of which half are called "rayeros" (named after stingray fishing). In the interview they explained in more detail the problem with the illegal gold mining dredgers that operate in the area of Santa María de Nanay, Libertad and Cerpera. They refused to take us to meet the community as they consider the people from those places (the miners) are dangerous and many of the fishermen have already been threatened by them. These circumstances forced us to return to Iquitos.

Figure 4. Landscape aspects of the Nanay (a) and Momón (b) rivers

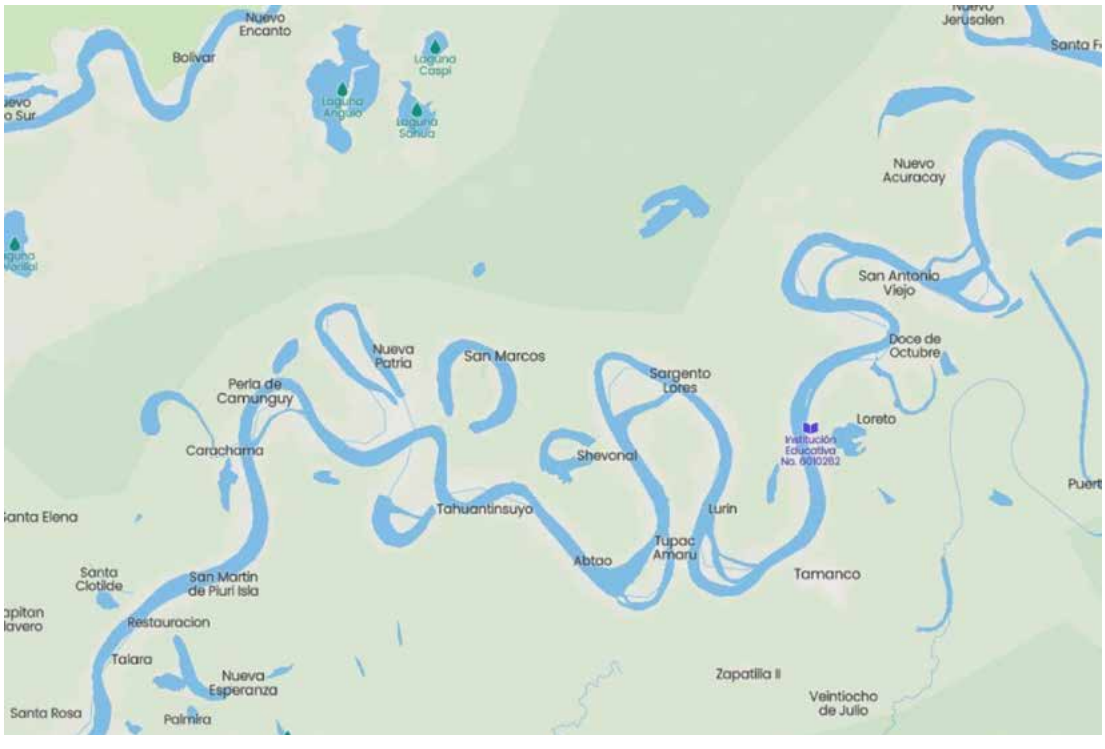
Ucayali river

The hydrographic basin of the Ucayali is made up of 502 rivers and tributaries up to the fifth order. The Ucayali River is of vital importance since it constitutes the main communication route in the region. According to the National Inventory of Surface Waters (ONERN, 1980), the Ucayali River basin amounts to 351,549 km^2, its total length is 2,238 km and the estimated average annual flow is 17,685.9 m^3/s. The Ucayali River (Figure 5), together with the Marañón River, forms the Amazon River. It is an abundant river, long and winding, with numerous islands and horseshoe (shell) lakes. The dry season occurs from May to October, while the rainy season occurs from November to April (INEI, 2001).

Figure 5. Ucayali River, near the San Marcos shell

La Concha de San Marco is 48 hours upstream from Iquitos, on the Ucayali River. (Figure 6). We visited a community dedicated to fishing for stingrays, mainly *Potamotrygon motoro* and *Paratrygon aiereba*. The fishermen were kind and willing to answer all questions about the situation of the stingray fishery. Their general appreciation was similar to the opinion of people in Nanay River, that is, low prices and low demand from exporters. Very few referred to the decrease of stingrays' stocks; however, many of them complained about the lack of basic needs (education, health, transportation), and technical assistance (fishing legislation, fishing technology and aquaculture) that should be provided by the government.

Figure 6. Location of the San Marcos shell, Ucayali River region, Peru.



Amazon River

We traveled up the Amazon River from Iquitos (Figure 7) to the Aucayo community. We observed several fishermen fishing for stingrays on the beaches recently flooded by the river, using trawl nets called "bolicheras" that are dragged for 15 minutes by two motorboats. At the time of the recovery of the nets, the boats get together with the flow and without slowing down. The fishermen stated that the best time for fishing stingrays in the Amazon River is the empty and dry season.

Figure 7. Aspects in the capture of ornamental fish in the Amazon River (rays)

The species

In the Peruvian Amazon there are 10 species of rays (*Potamotrygon motoro; P.orbignyi; P .falkneri; P .tigrina; P .constellata; Paratrygon aiereba; Plesiotrygon iwamae; P.nana; Heliotrygon gomesi; Heliotrygon rosai*), las especies más comunes son (*Potamotrygon motoro; P .orbignyi; P .constellata; Paratrygon aiereba; Plesiotrygon iwamae*) and those with the highest commercial value are (*Potamotrygon falkneri e Potamotrygon tigrina*). However, our work focused on three species (*Potamotrygon motoro; P.orbignyi; P.falkneri*), whose main characteristics are

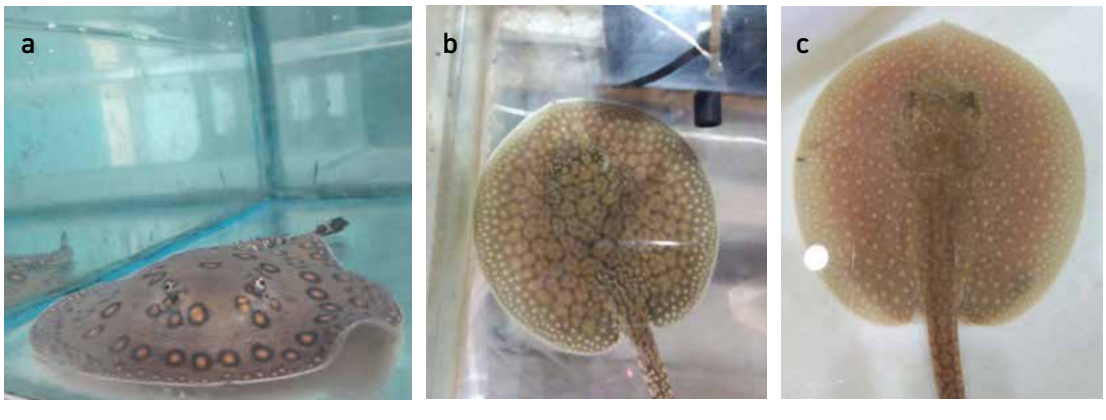
***Potamotrygon motoro* (motoro stingray)** Figure 8a

Diagnosis: The disk's dorsal surface is gray, brown, or beige. It has ocelli of variable sizes formed by three-colored rings (a yellow central spot, an orange intermediate ring and a black peripheral ring) distributed throughout the disc. The tail's length coincides with its body's length, and generally it has small circular spots and a series of short denticles that extend from the base to its middle part, from there a strong, long and saw-edged spine protrudes, which is replaced constantly.

Ecology and biology: Stingrays are carnivorous, fed mainly on molluscs, aquatic insects and small Characiformes, Siluriformes and Perciformes fish. It lives in clear and black water rivers, very occasionally in white waters, both in the bed of large rivers, lagoons, and pipes, as well as in flood zones.

Commerce: Approximately 93% of the total specimens captured were exported and only 5% was commercialized in the country. The largest exports occurred between 2005 and 2010, with numbers greater than 27,000 individuals per year. The year 2008 registered the highest peak of export (44,217 individuals). (ROSA, 1985; PASIAN *et al*., 2006; LASSO & SÁNCHEZ-DUARTE, 2012).

Figure 8. Picture of the three main species of stingrays commercialized in the Peruvian Amazon: *P. motoro* (a); *P. orbignyi* (b); *P. falkneri* (c).



***Potamotrygon orbigyni* (stingray motelo)** Figure 8b

Diagnosis: The disk's dorsal surface is dark brown to black. It has a beige, brown, and/or black reticulate pattern that forms large round or hexagonal spots, which are sometimes arranged randomly as rosettes. The tail is smaller than the length of the body, and its back has dark or black transverse vertical bands and white bellies.

Ecology and biology: Stingrays are carnivorous, fed almost exclusively on crustaceans and small fish. It lives in all kinds of environments, both lotic and lentic, and in clear, black and white waters. Geographic record: Wide distribution in South America (Bolivia, Peru, Brazil, Venezuela, French Guiana, Guyana, Suriname). There are registries of stingray in Peru, in the Nanay and Ucayali rivers (San Marcos shell) from where the individuals are extracted for export purposes.

Commerce: The commercialization presents two export peaks. The highest peak encompasses more than 59% of the exported units (33,448 units) and was registered between 2005 and 2008; the second encompasses 16% (8,993 individuals) and was registered between 2014 and 2016. (REIS *et a*l., 2003; SHIBUYA; et al., 2009; MORO *et al*., 2011; LASSO et al.,2013).

Potamotrygon falkneri **(otorongo stingray)** Figure 8c

Diagnosis: The disk's color is dark brown on its dorsal area, with ocelli or light or orange spots of various shapes (circular, oval, vermicular and/or in rosettes), which are equal to or smaller in size than its ocular diameter.

Ecology and biology: Stingrays are fed mostly on molluscs, aquatic insects and fish. They inhabit blackwater riverbeds.

Commerce: Catches and exports of this species do not exceed 1,000 units, except for the numbers of 2004 (2,789 and 2,567 units, respectively), (REIS *et al*., 2003; SILVA & CARVALHO, 2011).

Ornamental fishing in Iquitos

According to Garcia et al. (2021), the export of ornamental fish dates to the 1950s and reached its peak between the 1960s and 1970s. At this time up to 5000 people became involved in the activity. The exporters transported their merchandise directly to Miami on charter flights. Controls and regulations were minimal, and thus thousands of fingerlings from Paiche and Arahuana were shipped to the United States as ornamental fish (MONTREUIL, 1989; TELLO & CÁNEPA, 1991). At that time 10 species of fish dominated exports. In 1978 Peru alone exported 19,581,539 specimens of ornamental fish. In 1988, export volumes decreased to 5,939,771 units. Exports were operated by 30 companies in Iquitos, which sent 88.5% of the shipments to the United States, and the remaining 13% was sent to Lima to cover the national market and supply Europe, Asia (SOREGUI & MONTREUIL, 198; TELLO & CANEPA, 1991). Until 1988, ornamental fish were extracted from nine basins Napo, Mazán, Tacshacuraray, Curaray, Tamboryacu, Tigre, Ucayali, Amazonas and Nanay (TELLO & CANÉPA, 1991). Later (year 2000), the number of basins used for the extraction of ornamental fish increased, but with very low contributions. Between 2000 – 2017, more than 120 million specimens were captured, of which more than 80% were destined for export.

Currently (2022), 24 companies operate in Iquitos, six of which are dedicated to the trade of stingrays and other species, one works exclusively with Osteoglosidos, three with Siluriformes, two with Chelonios and aquatic Macrophytes and eleven are generic exporters (they work with all the species in the region), and one went out of operation due to the death of the owner (covid-19).

Different views on the status of stingray populations

Fishermen's view

In the conversations held with the fishermen in the community of Santa

Rosa and Belén (Figure 9), few fishermen are dedicated to the ornamental fishing of stingrays comparing to 10 years ago. At that time, the fishermen were specialized in some taxonomic groups (catfishers, arowaneros and rayeros). During the stingray boom (2004-2009), its demand was so great that a specimen of P.falkneri (20 AD cm) cost 1,200 soles (USD 326.30), and today it hardly reaches 100 soles (USD 27.20); it was a bonanza that many fishermen were not aware of.

Figure 9. Typical house of a fishing family (a); A fisherwoman starting the fishing tasks (b).

According to the fishermen, the low commercialization of these species is due to the low prices of the stingrays, and to the extreme care in the selection of the specimens (they cannot have wounds, bites, scars, amputations, injuries, etc.); for this reason, it is no longer a sought-after species, and only today, they are occasionally transported and marketed when they are captured by fishing gear. The fishermen consider that there is no overexploitation of the stingrays since the fishing pressure has dropped considerably in the last 10 years due to their low demand in the international market. And even at the time of the stingray boom, they failed to see or notice a drop in catch rates. However, many expressed concerns about the recent illegal gold mining activity in the middle and upper part of the Nanay River (since 2015), which could lead, in the near future, to a situation similar to the environmental problem of mining in the Madre de Dios River (DEZA, 1996). According to the fishermen, they are obliged to fish in the Momon, Tigre and Pintuyaculas rivers since mining companies forbid them to go to the middle and upper part of the river. Consequently, the fish (stingrays) they capture in the lower Nanay die within a few hours of being captured, and they attribute this phenomenon to the activity of illegal miners.

The stingray fishermen of the Ucayali River have another vision, and they have observed a decrease in the abundance of stingrays, mainly *P.motoro*. In their opinion, there are still many easy to catch stingrays,

however, they are not as abundant as 15 years ago. The fishermen of the Amazon River admitted not having observed any trend of decrease in stingrays, but they did observe a decrease in their economic income due to the reduction in international demand for the commercialization of freshwater stingrays.

Intermediaries' view

This group of actors, located in district Belén (Figure 10), who intervene in the ornamental fish value chain, normally have a more "holistic" view of the situation, since they work with fishermen in the region in different hydrographic systems (Cashew, Ucayali, Nanay, Napo, Putumayo). These people consider that 15-20 years ago, there could have been overexploitation of this resource, but that is no longer the case owing to the low demand for stingrays in the international market, and few fishermen (rayeros) are still encouraged to exclusively fish stingrays.

Figure 10. Housing and facilities of an ornamental fish intermediary in District Belén, Iquitos.

Exporters' view

According to the opinion of exporters dedicated to the trade of stingrays who were interviewed (Figure 11), all have mentioned that the reduction in exports is a commercial concern rather than the availability of specimens in the natural environment. They admitted that over a decade ago, Asian importers began breeding stingrays, and by 2010 they were trading captive-produced stingrays on a commercial scale.

In the final report of the South American Freshwater Ray Workshop (2009) (CITES, AC24 Doc. 14.2) it was already clear that the species were being reproduced and bred in captivity, in Asian countries, to be marketed both for domestic markets and for export to other parts of the world.

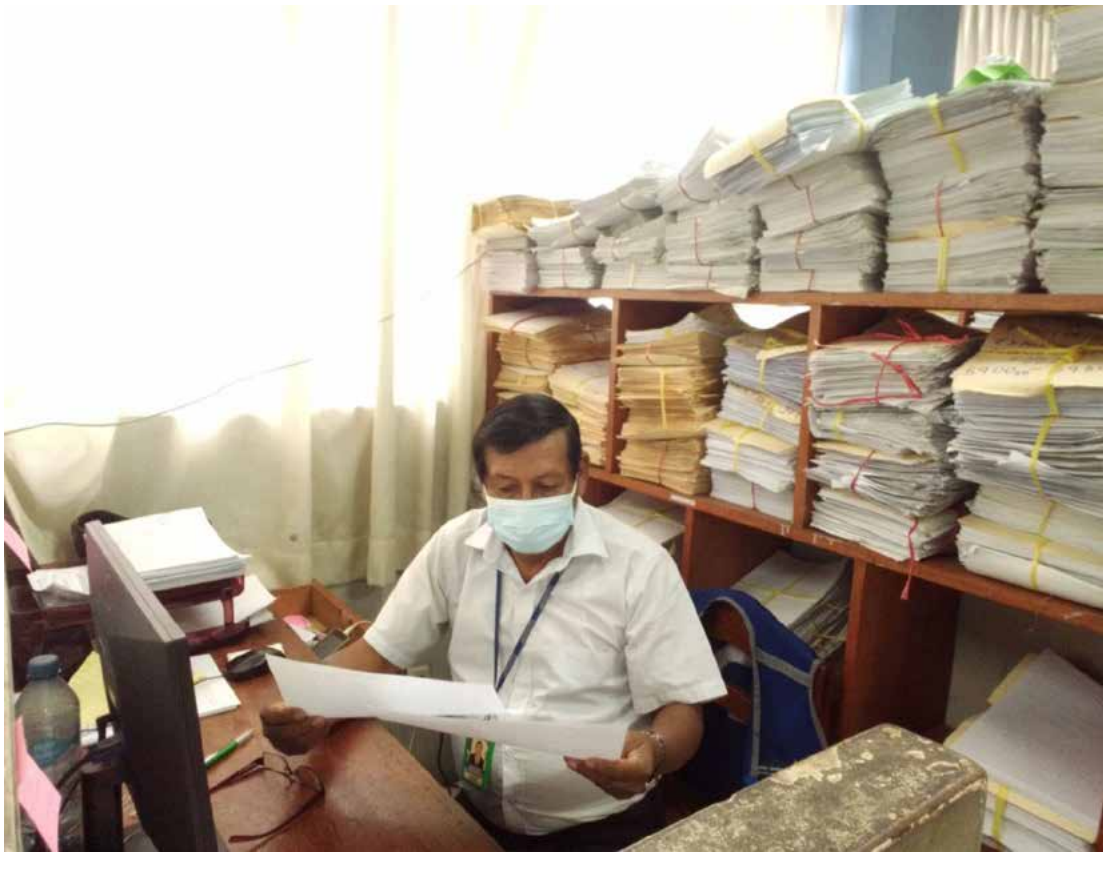
Possibly, the costs of international transport for its commercialization are lower from major Asian centers than from remote areas of South America, and captive breeding now offers a wider range of color patterns. The report also notes that freshwater stingray farming operations were underway in Asia prior to the adoption of a moratorium on the export of stingrays from Brazil and have continued to expand significantly. Wingerter (2012) notes that as breeders continue to increase production, they could flood the market with captive-bred products and neutralize the export of river stingrays from their areas of origin in the very near future.

Figure 11. Interviews with managers and owners of ornamental fish exporting companies (aquariums) in Iquitos, Peru.

Resource managers' view

Government officials in the fishing sector (Figure 12) consider that all stingray species are overexploited, as well as the rest of the fish resources that are commercialized (for human consumption or ornamental interest). Likewise, they think that this situation is generated by the lack of access to basic public services (health, education, transportation, security) and the absence of formal jobs in the region that would allow them to improve their quality of life. This causes riverside communities to sustain their daily way of life through fishing.

Figure 12. Public servant of the fisheries statistics section of DIREPRO-L, in Iquitos, Peru.



Researchers' view

Apparently, there is no consensus among researchers on the status of stingray populations in the Peruvian Amazon (Figure 13). Some consider that there is an overexploitation of the resource in general, because the fishing pressure is real, and the trend is that it will continue to increase due to the natural growth of the human population in the region, and to the lack of employment opportunities other than fishing; However, they recognize that there is a high natural variability in the interannual fluctuations in the abundance of stingrays, so that, without a population monitoring study, it is very difficult to establish reliable projections on the state of exploitation. In addition, this resource is not always accessible or available for fishing owing to the region's hydroclimatic conditions along with the flood pulse (JUNK, 1997) and the high spatial heterogeneity of the different Amazonian biotopes, not to mention the high operational and logistical costs of the fishing campaigns.

Figure 13. Researchers and facilities of the Research Institute of the Peruvian Amazon (IIAP).

Other researchers consider it audacious to think that there is overexploitation of the resource, without having periodic, continuous and reliable fishing statistics. On the other hand, they consider that it is unlikely that the resource is currently under overexploitation. Firstly, due to the drastic decrease in the demand for stingrays in the international market, in the last 10 years, owing to the development of techniques for their reproduction in captive conditions, in the countries of Southeast Asia. Secondly, because the fishing of stingrays is a very selective activity (the rays must be without deformations, without injuries, without mistreatment, without bites on the edges of the fins, without amputation of the caudal spines, etc.) so most stingrays are returned to the water alive, and this activity also requires care in the maintenance and transport of the specimens to minimize mortality, and therefore economic losses.

Conclusions

Based on the analysis of the different views on the state of exploitation of stingrays in the Peruvian Amazon by the different actors involved in the commercialization chain of freshwater stingrays, the following conclusions were reached.

- The lack of basic information on the stingray fisheries in the region is overwhelming, considering their economic importance to the region.
- Gold mining in the Nanay River, oil exploitation in the Napo River, and contamination by sewage in the Amazon River are threats that increase progressively, daily, and without the application of mitigating measures.
- Despite the existence of different versions among the actors involved in the ornamental fish marketing chain about the state of exploitation of stingrays in the Peruvian Amazon, the annotations indicate that, apparently, the stingrays are not in a state of overexploitation.
- Most fishermen live in very deplorable conditions below the minimum desirable conditions for a citizen, so this must be considered primarily for any fisheries management initiative based on this resource.
- DIREPRO-L needs to update its information technology infrastructure to generate reliable information for decision-making for the management of fishery resources.
- Exporters need clear rules for the sustainable use of ornamental fish, including stingrays.
- Scientific research centers in the region need to do less science to promote the academic excellence of researchers and more applied science in solving biological, ecological and environmental problems in the region.

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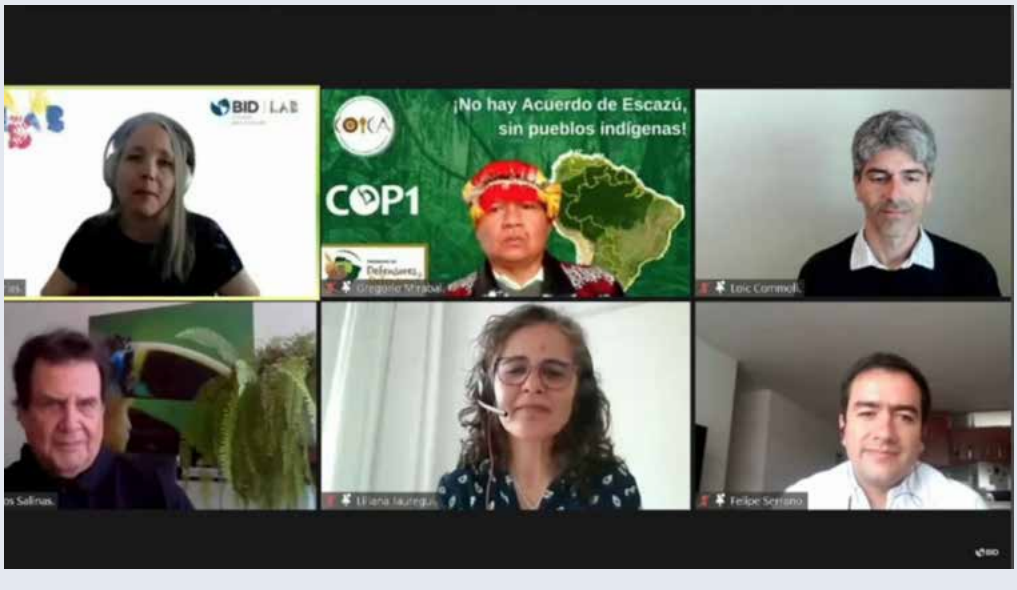
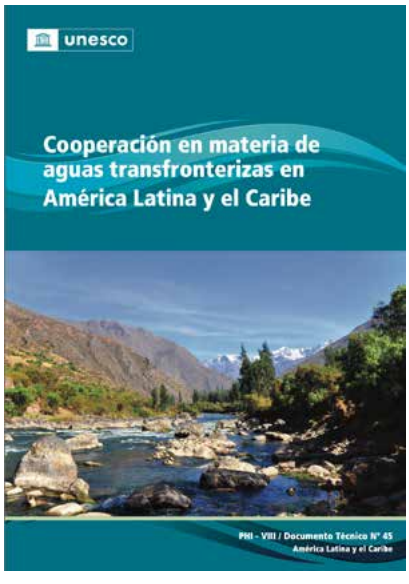


Publications



The United Nations Educational, Scientific and Cultural Organization (Unesco) has launched the publication "Cooperation on transboundary waters in Latin America and the Caribbean".

The Amazon Cooperation Treaty Organization (ACTO) collaborated preparing the Amazon Basin chapter.

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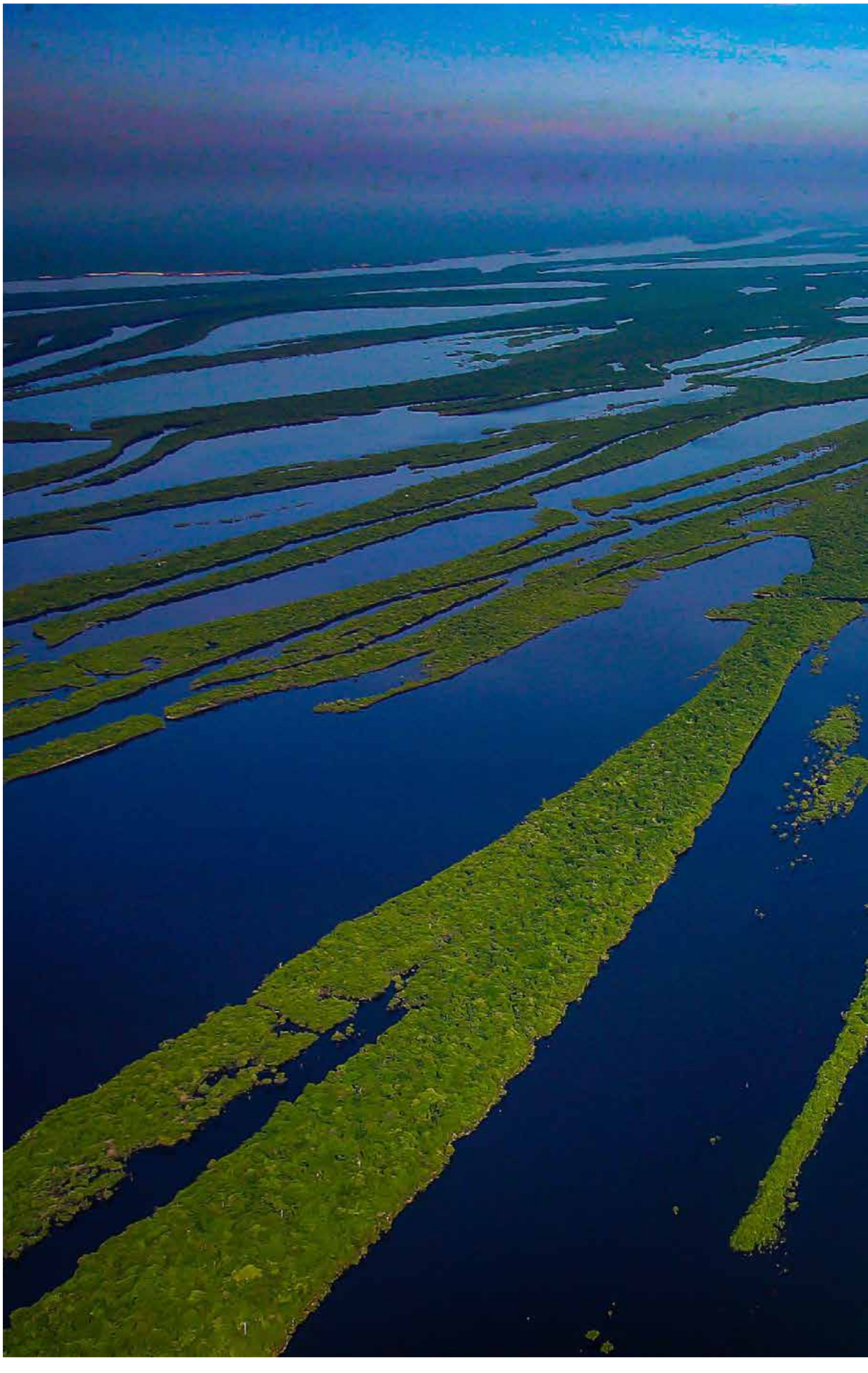

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About the Bioamazon Project

Bioamazon is a **regional project in the ACTO´s framework** that contributes to the conservation of **Amazon Biodiversity**, especially the species included in the CITES Convention.

To this end, it seeks **to increase the efficiency and effectiveness of the management, monitoring and control of species of wild fauna and flora threatened by trade** in ACTO member countries: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela.

It is part of a Cooperation Agreement between the Federal Government of Germany and ACTO with implementation through the KfW.

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Conservation of species threatened by unsustainable trade

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