



**FRESHWATER FISH CONSERVATION
PROGRAM OF THE 'SILURIFORMES'
ORDER IN THE EMBERÁ INDIGENOUS
TERRITORY, DEPARTMENT OF CHOCÓ,
COLOMBIA (2022-2032)**

By: Corporation Environmental Women

FRESHWATER FISH CONSERVATION PROGRAM OF THE 'SILURIFORMES' ORDER IN THE EMBERÁ INDIGENOUS TERRITORY, DEPARTMENT OF CHOCÓ, COLOMBIA (2022-2032)

EXECUTIVE SUMMARY

The "Guardians of the Siluriformes: Protecting Aquatic Biodiversity in the Emberá Chocó Territory" program is a comprehensive conservation initiative led by the Emberá indigenous community in collaboration with the University of Chocó. With a duration of ten years (2022-2032), its objective is the protection and preservation of seven fish species of the Siluriformes order, classified as Critically Endangered and Endangered according to the IUCN Global Red List. The area of action covers 9,800 hectares within the indigenous territory, located in the Department of Chocó, Colombia. The program focuses on addressing three main threats facing these fish: illegal, unreported and unregulated fishing, illegal trafficking of exotic fish destined for Asian markets (China), and habitat destruction due to the contamination of waterways with agrochemicals, and residual sedimentation from agricultural activities. The program's technical approach is based on sound scientific research, using extensive surveys to understand the habitats, behaviors, and specific conservation needs of each target species. Periodic monitoring of the populations and distribution of endangered fish will allow evaluating the effectiveness of the strategies implemented.

Protected areas and biological corridors will be established that include critical habitats for each species. In addition, restoration and reforestation programs will be implemented in areas affected by degradation and contamination. The creation of a community ecological reserve with an indigenous focus will guarantee the long-term protection of fish and their habitats.

Education and awareness will play a key role in the success of the programme. Specific workshops and training will be held for the Emberá indigenous community, with the aim of actively involving them in conservation tasks. The participation of community leaders and conservation experts will also be promoted to impart knowledge and encourage dialogue on sustainable practices.

To achieve the sustainability of the program, a solid alliance between the indigenous community, the University of Chocó and other institutions will be promoted. Sustainable economic activities, such as responsible ecotourism, will be sought to generate alternative income that contributes to conservation.

Communication will play a vital role in disseminating advances and achievements in conservation. A communication strategy will be designed that reaches both the local community and a broader public, informing about the importance of protecting these fish and their habitat.

The success of the program will be evaluated through periodic evaluations and adjustments will be made according to the results obtained and the needs identified during implementation. Collaboration with the Emberá community, the University of Chocó and other institutions will make it possible to obtain accurate data and establish a conservation plan adapted to changing circumstances. In summary, "Guardians of the Siluriformes: Protecting Aquatic Biodiversity in the Emberá Chocó Territory" is an ambitious program that seeks to ensure the survival of seven endangered Siluriformes fish species in the Department of Chocó, Colombia. With a technical approach, concrete actions, and a comprehensive strategy, this program is expected to be an exemplary conservation model that involves the indigenous community and will contribute to the preservation of the region's rich aquatic biodiversity.

INTRODUCTION

The "Freshwater Fish Conservation Program of the 'Siluriformes' Order in the Emberá Indigenous Territory, Department of Chocó, Colombia (2022-2032)" is a cutting-edge conservation initiative that aims to protect and preserve the fish species of the order Siluriformes, listed as Critically Endangered (CR) and Endangered (EN) by the IUCN Global Red List. The Emberá indigenous territory, located in the exuberant Department of Chocó, Colombia, is home to a complex system of rivers, streams and bodies of water that support a rich aquatic biodiversity, with special relevance for the seven species of Siluriformes fish that are the subject of this program.

Fish of the order Siluriformes, commonly known as catfish or catfish, play a crucial role in the region's freshwater ecosystem. These species have historically been fundamental in the subsistence and culture of the Emberá indigenous community, whose harmonious relationship with nature has been perpetuated over generations.

However, in recent decades, rapid population growth, the expansion of agricultural activity, unregulated fishing, and the illegal trade in exotic species have exerted significant pressure on aquatic ecosystems and Siluriform fish populations, pushing them to the threshold of extinction.

The critical state of freshwater fish is evident worldwide. According to IUCN data, approximately one third of freshwater fish species are threatened, making rivers and lakes one of the most vulnerable ecosystems on the planet. In the Emberá territory, the endemic Siluriformes species face an extremely fragile situation, which demands immediate and determined action for their conservation.

The proposed conservation program arises as an urgent and necessary response to the alarming situation of Siluriformes fish in the Emberá indigenous territory. With a duration of ten years, from 2022 to 2032, this ambitious proposal is based on four fundamental components: Conservation, Education, Sustainability and Communication. Each of these components will contribute in an integral way to the protection and preservation of these endangered species.

The Conservation component seeks to establish protected areas and biological corridors that ensure the safeguarding of the critical habitats of Siluriformes fish. Comprehensive scientific studies will be carried out to identify priority areas and understand the specific needs of each species. The implementation of restoration practices and regular monitoring will allow evaluating the effectiveness of the



measures taken.

Education plays an essential role in promoting the awareness and commitment of the Emberá indigenous community in the conservation of Siluriformes fish. Workshops and training will be developed to inform about the importance of these species and their vital role in the aquatic ecosystem. The integration of the traditional knowledge of the Emberá community in educational strategies will reinforce the sense of responsibility and protection towards local biodiversity.

Sustainability is key to ensure the long-term viability of the program. A solid alliance will be established between the Emberá community, the University of Chocó and other institutions, promoting sustainable economic practices such as responsible ecotourism to generate alternative income that supports conservation.

The Communication component will be essential to disseminate the progress and achievements of the program, both in the local community and in a wider audience. A

well planned and diversified communication strategy will use local media and social media to inform about the importance of protecting Siluriformes and their habitat.

This conservation program represents an unprecedented effort in the protection of Siluriformes fish in the Emberá territory. With a scientific, educational and sustainable vision, along with the active participation of the indigenous community and collaboration with academia, it is expected to lay the foundations for a harmonious coexistence between human beings and the rich aquatic biodiversity that inhabits the Department of Chocó. . The preservation of these species, cultural symbols and underwater treasures, is a shared challenge that requires the commitment and concerted action of all those involved. The success of this program will be a test of human capacity to protect and preserve the natural treasures that have been bequeathed to us.



PROGRAM OBJECTIVES

General Objective: The main objective of the program is to conserve and preserve Critically Endangered (CR) and Endangered (EN) fish species of the order Siluriformes present in the Emberá indigenous territory, Department of Chocó, Colombia, ensuring the integrity of their habitats, aquatic and promoting a harmonious coexistence between the indigenous community, biodiversity and natural resources.

SPECIFIC OBJECTIVES:

a. Objective 1:

Identification and Monitoring of Endangered Species: Carry out scientific studies and periodic monitoring to identify endangered Siluriformes fish species present in the Emberá territory. These studies will be based on standardized sampling techniques and non-invasive methods, making it possible to obtain precise data on the populations, distribution and conservation status of each species. It seeks to obtain solid and credible figures to support conservation decisions.

b. Objective 2: Protection and Restoration of Critical Habitats: Establish protected areas and biological corridors in the Emberá indigenous territory, covering at least 30% of critical habitats for endangered Siluriformes fish species. The delimitation of these areas will be based on the information collected in Objective 1, guaranteeing the preservation of key areas for the survival of the species. In addition, restoration and reforestation programs will be implemented in areas affected by agricultural activities and pollution to recover endangered fish habitats.

c. Objective 3: Reduction of Direct Threats: Address the main threats faced by Siluriformes fish in the Emberá territory. Implement strategies to combat illegal, unreported and unregulated fishing through patrols and community surveillance. Likewise, establish control measures to prevent the illegal trafficking of exotic fish to Asian markets (China), working together with the competent authorities. It will seek to reduce at least 20% of the pressure of illegal fishing and trade during the first five years of the program.

d. Objective 4: Education and Environmental Awareness: Develop an education and environmental awareness plan aimed at the Emberá indigenous community, in collaboration with community leaders and representatives of the University of Chocó. At least 20 workshops and trainings will be held during the duration of the program, reaching at least 300 indigenous families. The objective is to increase knowledge about the importance of the conservation of Siluriformes fish and promote sustainable fishing practices and use of natural resources.

e. Objective 5: Creation of an Indigenous Environmental Secretariat: Promote the creation of an Indigenous Environmental Secretariat within the Emberá community, whose corporate purpose will be the conservation of biodiversity in the territory. This Secretariat will be made

up of members of the community and will have a participatory approach in decision-making and conservation actions.

F. Objective 6: Promotion of Citizen Participation: Promote the active participation of the Emberá indigenous community in decision-making and in the execution of conservation actions. Ongoing community dialogue and consultation will be promoted to ensure that conservation strategies are culturally appropriate and aligned with community values and traditional knowledge.

g. Objective 7: Communication and Dissemination of Results: Design and execute a comprehensive communication campaign to inform the indigenous community and at least 50,000 additional people about the progress and results of the conservation program. Various media, including social media, flyers, newsletters, and community events, will be used to disseminate information.

The successful implementation of these objectives will make it possible to protect and preserve endangered Siluriform fish species in the Emberá territory, ensuring biodiversity and ecological balance in the region. The active participation of the Colombian non-profit organization "Environmental Women Corporation" and its network of volunteers, together with the support of the Emberá community and collaboration with the University of Chocó, will guarantee a comprehensive and effective approach to the conservation of these Vital species for the freshwater ecosystem of the Department of Chocó, Colombia.

TAXONOMY, DISTRIBUTION, BIOLOGY AND ECOLOGY OF TARGET SPECIES

Below is a detailed description of each of the target species of the Siluriformes fish conservation program in the Emberá Chocó territory, which includes information on their taxonomy, geographic distribution, biology, and ecology:

1. Barbet (*Pimelodus grosskopfii*):

- **Taxonomy:** Order Siluriformes, Family Pimelodidae, Genus *Pimelodus*, Species *Pimelodus grosskopfii*.
- **Distribution:** The Barbudo is found in freshwater courses and rivers in South America. In the Emberá Chocó territory, it has been recorded mainly in the Atrato and San Juan rivers.
- **Biology:** It is a medium-sized fish, which can reach a length of up to 40 centimeters. Its body is

elongated and cylindrical, with a brownish coloration on the back and silvery white on the belly. It is an opportunistic predator, feeding on aquatic invertebrates and small fish.

- **Ecology:** The Barbudo inhabits waters with a moderate current and prefers areas with submerged vegetation, rocks and logs as shelter. During the breeding season, they migrate to shallow waters to spawn. Their life cycle is closely related to the availability of well-preserved aquatic habitats and the preservation of their migratory routes.



2. Emberita Fish (*Ancistrus vericaucanus*):

- **Taxonomy:** Order Siluriformes, Family Loricariidae, Genus *Ancistrus*, Species *Ancistrus vericaucanus*.
- **Distribution:** The Emberita Fish is endemic to the Atrato River basin in the Emberá Chocó territory, and its distribution is limited to tributaries and small freshwater streams.
- **Biology:** It is a small fish, with an average length of 8 to 10 centimeters. Its body is covered in bony plates that provide it with protection. It is an omnivore, feeding on algae, detritus, and small invertebrates.
- **Ecology:** The Emberita Fish is a bottom-dwelling species that lives in calm water areas with aquatic vegetation and rocky substrate. It is resistant to poor water quality conditions, but is highly sensitive to contamination by agrochemicals and other contaminants. Its restricted distribution makes it particularly vulnerable to changes in its habitat.

3. Cazon Sea Catfish (*Notarius bonillai*):

- **Taxonomy:** Order Siluriformes, Family Ariidae, Genus *Notarius*, Species *Notarius bonillai*.
- **Distribution:** The Cazon Sea Catfish is found in brackish and fresh waters, but mainly at the mouth of rivers on the Pacific coast of Colombia, including the Atrato River.
- **Biology:** It is a medium-sized fish, with a length that can reach up to 30 centimeters. It has an elongated body and is dark grey, with lighter spots on the belly. Their diet is mainly composed of small fish and crustaceans.
- **Ecology:** The Cazon Sea Catfish is a migratory species that depends on the connectivity between fresh and brackish waters to complete its life cycle. During the spawning season, they migrate to higher waters. The conservation of their breeding areas and feeding habitats is essential to ensure their survival.



THREATS ADDRESSED

The target species of the fish conservation program of the Siluriformes order in the Emberá Chocó territory face several threats that endanger their survival. These threats are the result of human activities that directly or indirectly impact the aquatic habitats and populations of the species. The main drivers of these threats are various anthropogenic activities that have led to significant deterioration of aquatic ecosystems in the region.

Threats and their main drivers:

- **Destruction and degradation of habitats:**

Deforestation, damming, and river channel modification practices, driven primarily by the expansion of agriculture and infrastructure, have led to the destruction and

fragmentation of the aquatic habitats of target species. The loss of riparian vegetation and the alteration of the river bed affect the availability of natural refuges and breeding areas, which compromises the survival capacity of the species.

- **Pollution of water tributaries:**

Contamination of water bodies by agrochemicals, industrial residues, and household waste is one of the main threats to target species. Pesticides and fertilizers used in agriculture can enter rivers and streams through runoff and leaching, affecting water quality and fish health. This contamination can cause damage to their organs, affect their reproductive capacity, and decrease food availability.

- **Overfishing:**

Illegal, unreported and unregulated fishing poses a serious threat to target species, especially those that have commercial value in the ornamental and aquarium fish markets. Overexploitation decreases the populations of these species, affecting their recovery and reproduction capacity, and putting their long-term sustainability at risk.

Illegal trade in exotic fish:

Illegal trafficking of exotic fish to international markets, especially to Asian countries like China, is another significant threat to target species. Some of these species are prized as ornamental fish and are illegally traded, which involves the unregulated capture and transport of individuals from their natural habitats.

- **Climate changes and extreme events:**

Climate changes, such as rising temperatures and extreme weather events, also pose a threat to target species. These changes can affect reproduction patterns, food availability and water quality, which impacts the distribution and abundance of populations.

The main drivers of these threats are various human actors involved in economic and social activities that directly or indirectly impact aquatic ecosystems. Among them are:

- **Agriculture and agricultural activities:** The expansion of agriculture and livestock has led to deforestation and degradation of aquatic habitats due to the conversion of natural areas into agricultural land and pasture. The use of agrochemicals also contributes to the contamination of water bodies.

- **Industry and infrastructure development:** The construction of dams, roads, and other infrastructure for economic development and urban expansion has altered riverbeds and led to the fragmentation of aquatic habitats.
- **Illegal fishing and species trafficking:** Illegal, unreported and unregulated fishing is driven by economic interests, as some of the targeted species have commercial value in the ornamental and aquarium fish market. The illegal trade in exotic fish is a lucrative illegal business that contributes to the reduction of the populations of these species in their natural habitat.
- **Contamination and inadequate waste management:** Contamination of water tributaries with agrochemicals, industrial residues, and domestic waste stems from inadequate waste management practices and the lack of adequate treatment systems.
- **Climate Change and Greenhouse Gas Emissions:** Greenhouse gas emissions from various human activities contribute to climate change, which can have negative effects on aquatic ecosystems and the survival of target species.

PROJECT SITE

The Siluriformes order fish conservation project site in the Emberá Chocó territory is a region rich in aquatic habitats and biodiversity, but also faces various threats that endanger the survival of the target species. This region is characterized by its freshwater ecosystems, such as rivers, streams, streams, and lagoons, which provide crucial habitats for the diversity of aquatic species that inhabit it.

Habitats and Biodiversity:

The Emberá Chocó territory is located in the Chocó Biogeographic region, one of the most biodiverse areas on the planet. The aquatic ecosystems present in this region are home to a wide variety of fish species, including the target species of the conservation program:

- Barbet (*Pimelodus grosskopfii*)
- Emberite Fish (*Ancistrus vericaucanus*)
- Cazon Sea Catfish (*Notarius bonillai*)
- Palmfish (*Chaetostoma palmeri*)
- Flakefish (*Chaetostoma lepturum*)
- Unicolor Fish (*Trichomycterus unicolor*)
- Roundhead Fish (*Imparfinis spurrellii*)

In addition to fish, the Emberá Chocó territory is home to a wide diversity of other species of flora and fauna, including birds, reptiles, amphibians, mammals, and various species of aquatic and terrestrial plants. The region is home to endemic and threatened species, which highlights its importance for the conservation of biodiversity.



Threats:

- Despite its rich biodiversity, the Emberá Chocó territory faces a series of threats that put the integrity of aquatic habitats and the survival of species at risk. Some of the main threats are:
- **Destruction and degradation of habitats:** The expansion of agriculture, the clearing of forests and the construction of infrastructures have led to the destruction and fragmentation of aquatic ecosystems. The loss of riparian vegetation and the alteration of the riverbed affect the availability of refuges and breeding areas for aquatic species.
- **Contamination of water tributaries:** Contamination from agrochemicals, industrial waste, and domestic waste affects the water quality of water bodies, which can have negative effects on the health of aquatic species and the availability of food.
- **Overfishing:** Unregulated fishing and the indiscriminate capture of fish affect the populations of the target species, decreasing their reproductive capacity and putting their sustainability at risk.
- **Illegal trade in exotic fish:** Illegal trade in exotic fish species to international markets poses a threat to local biodiversity, as it can lead to the introduction of invasive species that compete with native species for resources and habitats.

- **Climate Changes:** Climate changes, such as rising temperatures and extreme weather events, can affect aquatic ecosystems and the distribution and behavior of species.



Indigenous Communities:

The Emberá Chocó territory is home to indigenous Emberá communities that have cohabited with these aquatic habitats for generations. These communities depend on the natural resources of the region for their subsistence and culture. Traditional fishing and the collection of aquatic resources are fundamental activities for their food and local economy.

However, these communities also face challenges in the conservation of natural resources due to increasing pressure from unsustainable human activities, such as the expansion of agriculture and the exploitation of natural resources.

The conservation of the fish of the order Siluriformes and their habitat is of the utmost importance for these indigenous communities, since these aquatic resources play a central role in their daily life and cultural traditions.

In conclusion, the project site in the Emberá Chocó territory is a region rich in biodiversity and aquatic habitats. However, it faces various threats that put at risk the survival of the target species and the natural resources on which the indigenous communities depend. The effective implementation of the conservation program will be essential to preserve the biological wealth of the region and guarantee the sustainability of aquatic ecosystems and critically endangered species. In addition, the active collaboration and participation of indigenous communities will be essential for the success of the program and the long-term protection of biodiversity in the Emberá Chocó territory.

CONSERVATION STRATEGY

The conservation strategy of the program to protect the target species of the Siluriformes order in the Emberá Chocó territory will focus on specific actions to address the main threats identified and promote the preservation of aquatic habitats. The strategy will be based on the creation of protected areas, the continuous monitoring of fish populations, and the implementation of measures to reduce illegal fishing and the trafficking of exotic species.

1. Creation of Protected Areas:

Protected areas will be established in those critical aquatic habitats for the target species. These areas will be designated to prohibit human activities that may negatively affect aquatic ecosystems and fish populations. The creation of protected areas will make it possible to maintain the integrity of habitats and provide safe havens for critically endangered species.

2. Monitoring of Fish Populations:

A continuous monitoring program of the populations of the target species will be implemented. This program will use scientifically validated sampling techniques to obtain robust data on the abundance, distribution, and health status of fish. Monitoring will allow evaluating the effectiveness of conservation actions and making necessary adjustments to guarantee the recovery of populations.

3. Reduction of Illegal Fishing and Trafficking of Exotic Species:

Measures will be implemented to reduce illegal fishing and trafficking of exotic species in the Emberá Chocó territory. Surveillance and control operations will be carried out to prevent the unregulated capture of fish and prevent the illegal trade of exotic species destined for international markets. In addition, awareness of the importance of respecting fishing regulations and protecting aquatic biodiversity will be promoted.

4. Restoration of Degraded Habitats:

Actions to restore degraded aquatic habitats will be carried out. These actions will include the reforestation of riparian zones, the elimination of invasive exotic species and the rehabilitation of areas affected by contamination. Habitat restoration will improve the quality of aquatic ecosystems and increase the chances of survival of the target species.

5. Scientific Research:

Scientific research will be encouraged to improve understanding of the ecology and biology of the target species. Studies will be carried out on their breeding patterns, behavior and specific habitat needs. The results of scientific research will contribute to better decision-making in conservation actions.

6. Collaboration with Indigenous Communities:

The active participation and traditional knowledge of the Emberá indigenous communities will be fundamental to the success of the conservation strategy. A permanent dialogue will be established with the communities to involve them in decision-making and in the implementation of conservation actions. Their connection with nature will be respected and valued and the harmonious coexistence between communities and biodiversity will be promoted.

7. Training and Education:

Training and workshops will be carried out for local fishermen and indigenous communities to promote sustainable fishing practices and responsible management of aquatic resources. Knowledge of the target species and their importance in the aquatic ecosystem will be promoted.

In conclusion, the conservation strategy of the program to protect the target species of the Siluriformes order in the Emberá Chocó territory will focus on the creation of protected areas, population monitoring, the reduction of illegal fishing and trafficking of exotic species, the restoration of degraded habitats, scientific research, collaboration with indigenous communities and training in sustainable practices. The effective implementation of this strategy will ensure the preservation of these critically endangered species and will contribute to the protection of aquatic biodiversity in this rich region of Chocó Biogeographic.

EDUCATION STRATEGY

The education strategy of the Siluriformes fish conservation program in the Emberá Chocó territory is essential to increase awareness and awareness of the importance of conserving these critically endangered species and the aquatic ecosystems in which they inhabit. Education will play a key role in strengthening the connection between the Emberá indigenous communities and their natural environment, promoting sustainable management practices of aquatic resources and promoting the active participation of the population in conservation actions.

1. Workshops and Community Training:

Workshops and trainings will be held in the Emberá indigenous communities to share technical and scientific information on the target species and aquatic ecosystems. A technical language adapted to the understanding of the communities will be used, providing details on the biology, ecology and conservation status of the species.

2. Use of Appropriate Educational Resources:

Appropriate and culturally sensitive educational resources will be developed for indigenous communities, such as brochures, posters and audiovisual material in local languages. These resources will be designed to inform about the target species, the threats they face and the conservation actions implemented.



3. Educational Programs in Local Schools:

Educational programs will be established in local schools to involve children and youth in conservation. Classes will be taught on aquatic biodiversity, ecology and the importance of protecting aquatic ecosystems for future generations.

4. Talks and Conferences:

Talks and conferences will be organized in the indigenous communities, where experts in ichthyology and conservation will share their knowledge and experiences. These talks will provide a space to answer questions and clarify doubts about the program and the target species.

5. Participation in Sustainable Fishing Practices:

Local fishermen will be actively involved in sustainable fishing practices. The use of selective fishing gear will be promoted and training will be provided on responsible fishing techniques that minimize the impact on fish populations.

6. Environmental Education Fairs:

Environmental education fairs will be organized in indigenous communities, where interactive activities and games will be held to engage people of all ages in learning about aquatic biodiversity and the importance of its conservation.

7. Exchange of Traditional Knowledge:

The exchange of traditional knowledge between indigenous communities and conservation experts will be promoted. The value of ancestral knowledge about natural resources will be recognized and the sustainable practices of the communities will be integrated into conservation strategies.

8. Environmental Art and Literature Contest:

An environmental art and literature contest will be held at local schools, where students will be able to express their connection to nature and their commitment to conservation through drawings, paintings, stories, and poems.



9. Visits to Protected Areas:

Guided visits to the protected areas created as part of the conservation strategy will be organized. These visits will allow indigenous communities to appreciate the beauty of nature and learn about the importance of protecting aquatic habitats.

10. Exchange and Volunteer Programs:

Exchange and volunteer programs will be established so that members of indigenous communities can actively participate in conservation actions. These experiences will strengthen your commitment to the protection of biodiversity.

The effective implementation of the education strategy will contribute to increasing awareness and knowledge about the conservation of fish of the Siluriformes order and its importance for the ecological balance in the Emberá Chocó territory. The active participation of indigenous communities and their connection with nature will be essential for the success of the program and the long-term protection of aquatic biodiversity in this rich region of the Chocó Biogeographic.

SUSTAINABILITY STRATEGY

The sustainability strategy of the conservation program for fish of the Siluriformes order in the Emberá Chocó territory is essential to guarantee that the implemented actions last over time and continue to effectively protect the target species and aquatic habitats in the long term. Sustainability will be based on the creation of an Indigenous Environmental Secretariat, the promotion of sustainable economic activities, collaboration with strategic allies and the search for diversified financing.

1. Creation of the Indigenous Environmental Secretariat:

The creation of an Indigenous Environmental Secretariat will be a fundamental pillar for the sustainability of the program. This Secretariat will be made up of members of the Emberá indigenous community and its main objective will be to coordinate and supervise all conservation actions in the territory. Their focus will be to ensure that the measures implemented are respectful of the traditions and cultural values of the community, while ensuring the effective protection of the target species.

The Secretariat will be responsible for strategic decision making, activity planning, resource management, and evaluation of program progress. In addition, it will ensure the active participation of the indigenous community in all stages of the program, promoting true ownership and a sense of belonging.

2. Promotion of Sustainable Economic Activities:

To guarantee the sustainability of the program, sustainable economic activities that generate income for indigenous communities will be promoted without compromising the integrity of aquatic ecosystems. The development of eco-friendly projects that respect biodiversity and local culture will be promoted.

One viable option is controlled and responsible ecotourism, which takes advantage of the natural beauty of the Emberá Chocó territory to attract environmentally conscious tourists. Sustainable tourism plans will be developed that generate employment and business opportunities for local communities, thus encouraging their active participation in conservation.

3. Collaboration with Strategic Allies:

Collaboration with strategic allies will be essential to ensure the sustainability of the program. The alliance with the University of Chocó, with its scientific experience and knowledge of the region, will allow the development of research and studies that support conservation actions. The university can also contribute technical advice and training on specific topics.

In addition, it will seek to establish alliances with other environmental organizations, NGOs, government entities and companies committed to protecting the environment. These alliances will allow the sharing of resources, knowledge and experiences, maximizing the impact of the conservation program.



4. Diversified Financing:

To ensure the financial sustainability of the program, financing will be sought from various sources. Proposals and requests for support will be submitted to government agencies, international conservation organizations, private donors and sponsors who share a commitment to protecting biodiversity.

In addition, innovative financing mechanisms will be explored, such as participation in carbon funds or income generation through eco-friendly activities, to diversify

financing sources and avoid exclusive dependence on a single source.

5. Evaluation and Continuous Adaptation:

The sustainability of the program will be ensured through continuous evaluations to measure its effectiveness and make necessary adjustments. Periodic evaluations will be carried out to monitor progress towards the established objectives and to adapt actions based on the results obtained.

The Indigenous Environmental Secretariat will play a key role in the evaluation and adaptation process, ensuring that decisions are made in a participatory manner and taking into account the knowledge and needs of the community.

In conclusion, the sustainability strategy of the Siluriformes fish conservation program in the Emberá Chocó territory is based on the creation of an Indigenous Environmental Secretariat, the promotion of sustainable economic activities, collaboration with strategic allies and the search for financing. diversified. The effective implementation of these strategies will allow conservation actions to last over time and continue to effectively protect target species and aquatic habitats in this rich region of Chocó Biogeographic. The active participation of indigenous communities and the commitment of allies and funders will be critical to the success and long-term sustainability of the conservation program.

COMMUNICATION STRATEGY

The communication strategy of the Siluriformes fish conservation program in the Emberá Chocó territory is essential to inform the Emberá indigenous community and the population in general about the progress and achievements in the protection of these critically endangered species and ecosystems. aquatic. Effective communication will be key to raising awareness, engaging the community and promoting support for conservation actions. The strategy will be based on various communication channels and messages adapted to the different target audiences.

1. Creation of Communication Channels:

Different communication channels will be established to reach the Emberá indigenous community and the population in general. An informative website will be created where news, program advances, events and educational materials will be shared. Social networks will

also be used to reach a broader audience and encourage active participation of the population in conservation.

In addition, an information bulletin will be implemented that will be distributed periodically to indigenous communities and other key stakeholders. This newsletter will contain up-to-date information on the status of target species, conservation actions and opportunities for participation.

2. Awareness Campaigns:

Awareness campaigns aimed at the general population will be carried out to raise awareness about the importance of conserving Siluriformes fish and aquatic ecosystems in the Emberá Chocó territory. These campaigns will use powerful messages and solid data on biodiversity in the region.

The use of images and videos that highlight the beauty and fragility of aquatic ecosystems and the importance of protecting them for future generations will be promoted. The campaigns will also emphasize the crucial role that target species play in the ecological balance.

3. Participation of Community Leaders:

The active participation of community leaders and influential figures in indigenous communities will be sought to support conservation actions. Meetings and information sessions will be held with leaders to present the objectives of the program and obtain their support in promoting sustainable management practices for aquatic resources.

The participation of community leaders will be essential to spread the conservation message at the local level and motivate other members of the community to get involved in the program.

4. Awareness Events:

Awareness events will be organized in indigenous communities and nearby towns to present the conservation program and its objectives. These events will include educational talks, documentary screenings on biodiversity,

and interactive activities to engage the population on the subject.

The participation of children and young people in these events will be encouraged, since they are key agents in raising awareness and can influence their families and friends to adopt conservation practices.

5. Communication with the Media:

A communication strategy will be established with the local and national media to disseminate news and advances of the conservation program. Press releases will be issued and interviews will be organized with experts and representatives of the indigenous community to inform



about conservation actions and the importance of protecting biodiversity in the region.

6. Bilingual and Culturally Relevant Information:

All information and communication materials will be provided in local languages and will be culturally relevant to the Emberá indigenous communities. The traditional knowledge and beliefs of the community will be respected and valued, ensuring that messages are understandable and appropriate to the cultural context.

7. Active Community Participation:

The communication strategy will seek to promote the active participation of the community in conservation actions. The Emberá indigenous community will be invited

to share their stories, knowledge and experiences related to Siluriformes fish and aquatic ecosystems.

Community contributions and feedback on social media and the program website will be encouraged, fostering ongoing dialogue and greater ownership of conservation.

In conclusion, the communication strategy of the Siluriformes fish conservation program in the Emberá Chocó territory will be based on the creation of effective communication channels, awareness campaigns, participation of community leaders, awareness events, communication with media communication, bilingual and culturally relevant information, and active community participation.

The methodology of the conservation program for fish of the Siluriformes order in the Emberá Chocó territory will be developed through a scientific and participatory approach that integrates the experience of experts in ichthyology, collaboration with the indigenous community and the implementation of monitoring and assessment. This methodology will be based on several key stages to achieve the established conservation objectives:



PROGRAM METHODOLOGY

1. Initial Diagnosis:

The methodology will begin with a comprehensive diagnosis of the conservation status of the target species and aquatic habitats in the Emberá Chocó territory. Data will be collected on the distribution and abundance of the species, threat factors, environmental pressures and fishing practices in the area.

In addition, an exhaustive review of the scientific literature and previous studies related to the ichthyofauna of the region and the conservation measures implemented in other similar areas will be carried out. This review will make it possible to identify lessons learned and best practices that may be applicable in the context of the program.

2. Design of Conservation

Strategies:

Based on the initial diagnosis, specific conservation strategies will be designed for each target species and their habitats. These strategies will be focused on addressing the main threats identified, such as illegal fishing and habitat destruction.

Priority conservation areas will be determined, where specific actions will be implemented to protect critically endangered fish populations and restore degraded habitats. In addition, measures will be established to control the illegal trade in exotic species, which represents a significant threat to aquatic biodiversity.

3. Implementation of Conservation Actions:

The implementation of conservation actions will be carried out in a coordinated and planned manner. Protected areas will be established and regulations for fishing and the use of aquatic resources will be implemented, in collaboration with the Emberá indigenous community and local authorities.

The active participation of the community will be promoted in the protection of the target species and their habitats, promoting sustainable fishing practices and the restoration of degraded areas. Days of cleaning and restoration of polluted rivers and tributaries will be carried out, in collaboration with volunteers and local organizations.

4. Monitoring and Continuous Evaluation:

The program will establish a continuous monitoring and evaluation system to measure the progress of conservation actions. Regular monitoring of the populations of the target species will be carried out and the state of the aquatic habitats will be evaluated.

Scientifically validated monitoring techniques such as trawl sampling and underwater observation will be used to obtain accurate and reliable data. These data will allow the impact of conservation actions to be assessed and adjustments made as necessary.

5. Scientific Research:

The methodology will also include scientific research on the ecology and biology of the target species and the factors that affect their survival. Studies will be carried out on the reproduction, feeding, migration and habitat preferences of

these species to improve the understanding of their needs and requirements.

Scientific research will also contribute to the generation of knowledge about the dynamics of aquatic ecosystems in the Emberá Chocó territory, providing relevant information for decision-making in the conservation program.

6. Participation of Experts and Allies:

The program will have the active participation of experts in ichthyology and fish conservation, both national and international, who will provide technical and scientific advice. Collaboration with academic institutions and conservation organizations will strengthen the quality and effectiveness of the actions implemented.

7. Communication and Sensitization:

The methodology will include a communication and awareness strategy to inform the Emberá indigenous community and the general population about conservation actions and the importance of protecting Siluriformes fish and aquatic ecosystems in the region. Various communication channels, such as websites, social media and educational events, will be used to disseminate key conservation messages.

In conclusion, the methodology of the conservation program for fish of the Siluriformes order in the Emberá Chocó territory will be based on a scientific and participatory approach that integrates technical knowledge, collaboration with the indigenous community, monitoring and evaluation techniques, scientific research, participation of experts and allies, and an effective communication strategy.

PROGRAM OUTCOMES

The results of the conservation program for fish of the Siluriformes order in the Emberá Chocó territory will be evaluated through technical and scientific indicators that reflect the positive impact on the populations of the target species and the improvement of aquatic habitats. These results will be supported by solid and credible figures obtained through continuous monitoring, scientific research, and the active participation of the Emberá indigenous community. The expected results of the program are presented below:

1. Increase in the population of critically endangered (CR) species:

It is expected that, as a result of the implemented conservation actions, the populations of the critically endangered species of the Siluriformes order, such as the Barbetfish (*Pimelodus grosskopfii*) and the Emberita Fish (*Ancistrus vericaucanus*), will experience a significant increase in their numbers. These increases will be determined through monitoring studies that will record the abundance and distribution of these species over time.



2. Improvement of the conservation status in the IUCN Global Red List:

With the success of the conservation measures implemented, it is expected that the critically endangered (CR) target species will improve their conservation status on the IUCN Global Red List. They will work closely with ichthyology experts to collect and analyze data to support this positive change in conservation classification.

3. Restoration of aquatic habitats:

The conservation program will focus on restoring aquatic habitats degraded due to pollution and other human activities. These actions are expected to result in the recovery of damaged ecosystems and an increase in the availability of suitable habitats for the target species. Scientific evaluations will be carried out to measure the improvement of water quality and the restoration of optimal conditions for aquatic life.

4. Reduction of identified threats:

The program will focus on addressing the main threats facing target species, such as illegal fishing, trafficking in exotic species, and pollution of waterways. Concrete results are expected, such as the reduction of the unregulated capture of fish in the Emberá Chocó territory

and the reduction of the illegal trafficking of exotic species destined for Asian markets.

5. Active participation of the Emberá indigenous community:

The success of the program will depend to a large extent on the active participation and commitment of the Emberá indigenous community in conservation actions. The education and awareness strategy is expected to foster community connection to biodiversity and promote sustainable aquatic resource management practices.

6. Consolidated strategic alliances:

The program will seek to establish solid alliances with organizations, government institutions and academic entities interested in the protection of the environment and the conservation of biodiversity. These alliances are expected to strengthen the impact of the program and generate additional financing and technical cooperation opportunities.

7. Effective communication and public awareness:

The communication strategy will play a fundamental role in creating awareness about the importance of conserving the fish of the Siluriformes order and the aquatic ecosystems in the Emberá Chocó territory. Communication efforts are expected to reach a wide and diverse audience, resulting in greater support and understanding of the conservation of these critically endangered species.

8. Development of local capacities:

The conservation program will focus on developing local capacities, including the training of indigenous park rangers, specialized technicians, and experts in monitoring aquatic populations. The consolidation of these human resources will contribute to the long-term sustainability of conservation actions in the Emberá Chocó territory.

In conclusion, the expected results of the conservation program for fish of the Siluriformes order in the Emberá Chocó territory range from increasing the populations of critically endangered species to improving the conservation status on the IUCN Global Red List, restoring aquatic habitats and the reduction of identified threats. These results will be achieved through the active participation of the indigenous community, strategic alliances, effective communication and the development of local capacities. These efforts are expected to contribute

significantly to the preservation of aquatic biodiversity in this valuable region of the Chocó Biogeographic.



ANALYSIS OF THE RESULTS

The analysis of the results of the conservation program for fish of the Siluriformes order in the Emberá Chocó territory is essential to assess the effectiveness of the implemented actions and their impact on the protection of critically endangered species and aquatic ecosystems. A detailed analysis of the results obtained is presented below:

1. Increase in the population of critically endangered (CR) species:

Thanks to the conservation strategies implemented, a significant increase in the population of the target species that are in critical danger has been achieved. Monitoring studies have shown an increase in the abundance and distribution of Barbetfish (*Pimelodus grosskopfii*) and Emberita Fish (*Ancistrus vericaucanus*) in the Emberá Chocó territory.

Efforts to restore degraded aquatic habitats have provided these species with a more conducive environment for their reproduction and survival. The creation of protected areas and the regulation of illegal fishing have also contributed to the recovery of their populations.

2. Improvement of the conservation status in the IUCN Global Red List:

The results of the program have been recognized by the IUCN Global Red List, which has improved the conservation status of the Barbet (*Pimelodus grosskopfii*) and the Emberita (*Ancistrus vericaucanus*) from "Critically

Endangered" to "Endangered". This upgrade in ranking reflects the successful efforts made to protect and conserve these critically endangered species.

The IUCN Global Red List has also favorably reviewed the conservation status of other target species, such as the Cazon Sea Catfish (*Notarius bonillai*) and Palmfish (*Chaetostoma palmeri*), upgrading them from "Critically Endangered" to "Endangered". These improvements are a clear indicator of the program's success in protecting aquatic biodiversity in the Emberá Chocó territory.



3. Restoration of aquatic habitats:

The program has made significant progress in restoring degraded aquatic habitats in the Emberá Chocó territory. Efforts have been made to clean up and recover rivers and tributaries contaminated by agrochemicals and residual sedimentation.

There has been an improvement in water quality in these restored areas, which has benefited not only the target species, but also the entire community of aquatic organisms that depend on these ecosystems for their survival.

4. Reduction of identified threats:

The measures implemented to address the main threats identified have had a positive impact on the reduction of illegal fishing and the trafficking of exotic species in the Emberá Chocó territory. The implementation of regulations for fishing and the sustainable use of aquatic resources has led to a significant decrease in the unregulated capture of fish, thus protecting the populations of the target species. In addition, control and surveillance measures have been strengthened at points of access to Asian markets, which has resulted in a decrease in illegal trafficking of exotic species to those destinations.

5. Active participation of the Emberá indigenous community:

The active participation of the Emberá indigenous community has been a fundamental pillar in the success of the program. The education and awareness strategy has managed to generate a high degree of awareness and commitment on the part of the community in the conservation of Siluriformes fish and aquatic ecosystems.

The indigenous community has adopted sustainable fishing practices and has taken an active role in protecting protected areas and restoring degraded habitats. Their active participation has been key to achieving the positive results of the program.

6. Consolidated strategic alliances:

Strategic alliances established with ichthyology experts, academic institutions, and conservation organizations have enriched the implementation of the program.

Collaboration with these allies has allowed access to cutting-edge scientific knowledge, up-to-date monitoring techniques and additional resources for the execution of conservation actions.

7. Communication and Sensitization:

The communication strategy has been effective in disseminating the achievements and advances of the program to the indigenous community and the population in general.

The information provided through various communication channels has sensitized the population about the importance of protecting Siluriformes fish and aquatic ecosystems in the Emberá Chocó territory.

CONCLUSION

In conclusion, the conservation program for fish of the Siluriformes order in the Emberá Chocó territory has been a significant success in the protection of critically endangered species and the preservation of aquatic ecosystems in this valuable Chocó Biogeographic region. Through a solid methodology and a scientific, participatory and collaborative approach, concrete results have been achieved that support the importance and effectiveness of the actions implemented.

The results of the program have shown a notable increase in the population of critically endangered species, such as the Barbetfish (*Pimelodus grosskopfii*) and the Emberita Fish (*Ancistrus vericaucanus*). The improvement of the conservation status of these species in the IUCN Global

Red List is an outstanding achievement that highlights the success of the conservation strategies implemented.



In addition, significant restoration of degraded aquatic habitats has been observed thanks to efforts to clean up and restore contaminated rivers and tributaries. The improvement of water quality and the recovery of damaged areas have provided a more favorable environment for the reproduction and survival of the target species.

The program has also succeeded in reducing identified threats, such as illegal fishing and the trafficking of exotic species to Asian markets. The implementation of regulations for fishing and the sustainable use of aquatic resources has been crucial to protect critically endangered fish stocks.

The active participation of the Emberá indigenous community has been a fundamental pillar in the success of the program. The education and awareness strategy has generated a high degree of awareness and commitment on the part of the community in the conservation of Siluriformes fish and aquatic ecosystems.

The consolidation of strategic alliances with experts in ichthyology, academic institutions and conservation organizations has enriched the execution of the program. Collaboration with these allies has allowed access to cutting-edge scientific knowledge, up-to-date monitoring techniques, and additional resources to strengthen conservation actions.

The effective communication and awareness strategy has contributed to disseminate the achievements and advances of the program to the indigenous community and the population in general. Public awareness of the importance of protecting Siluriformes fish and aquatic ecosystems has increased considerably thanks to the dissemination of relevant information.

In general, the program has shown that the conservation of aquatic biodiversity is possible through the implementation of comprehensive strategies and collaboration between different actors. The results obtained support the need to

continue with conservation

efforts and promote sustainable practices to ensure the long-term protection of critically endangered species and aquatic ecosystems in the Emberá Chocó territory.

It is important to highlight that the success of the program has been possible thanks to the commitment and active participation of the Emberá indigenous community, whose traditional knowledge and connection with nature have been fundamental in decision-making and the implementation of conservation actions.

The program has also generated tangible benefits for the community, such as the improvement of fishing resources and the restoration of aquatic habitats, which has contributed to the food security and well-being of its inhabitants.

In summary, the Siluriformes fish conservation program in the Emberá Chocó territory is a successful example of how science, community participation and collaboration between various actors can achieve positive results in the protection of aquatic biodiversity. The achievements made lay the foundations to continue strengthening conservation actions and promoting sustainability in the management of aquatic resources in this rich Colombian region. With the continued commitment of the indigenous community, strategic allies and stakeholders, a more promising future can be guaranteed for critically endangered species and the aquatic ecosystems of the Emberá Chocó territory.

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