

Fish Forever Program

Brazil Program Report 2017–2019



RARE BRASIL

Protagonism and sustainability of small-scale fisheries along the Brazilian coast



Ajuruteua fishing community - Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare)

“The world is a very big challenge, but today we are planting a seed, getting involved in this change together with the associations and partners. A good strategy for this is the training of leaders and professional qualification of fishers, to invest in collective work and improve their income.”

Zacarias Monteiro, Fisher and President of the ASSUREMAV
association of the Gurupi-Piriá Extractive Reserve

CONTENT

INTRODUCTION	4
LETTER TO OUR PARTNERS	6
CHAPTER 1 Global Challenge of Sustainable Fisheries Management	8
CHAPTER 2 An Overview of Sustainable Fisheries in Brazil	9
CHAPTER 3 Fish Forever Program	11
CHAPTER 4 Social and Ecological Results for Fish Forever – Cycle 2	30
CHAPTER 5 Life Stories	52
CHAPTER 6 Final Considerations	62
CHAPTER 7 A Vision of the Future	64
CHAPTER 8 Transparency	67
LIST OF ACRONYMS	68
BIBLIOGRAPHIC REFERENCE	69
OUR TEAM	70



Aerial view of the Tamatateua river and the Manitiua river in the background, in the Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare)



Reginaldo da Silva – crab fisher from the community of Tamatateua using the cambada technique to tie the crabs (photo: Enrico Marone/Rare)

Introduction

BY BEATRICE PADOVANI
RESEARCHER AT THE PERNAMBUCO FEDERAL UNIVERSITY

Fishery is one of the most important activities practiced in the Brazilian marine coastal zone, representing the country's social, cultural and economic heritage. In the last decade, small-scale fishers from all over the coast have intensified the fight for the right to access their territories and for the maintenance of a healthy environment, degraded by human activities and threatened by climate change.

In the midst of a disorderly fisheries management scenario, this struggle stands out for its preservation of identities, defense of the environment and sustainable fishing. With an increasing participation in the scenarios of debates and congregation of ideas, to tackle the challenges of the 21st century, the small-scale fisheries sector stands out for its relentless struggle to maintain its identity and principles. In addition to environmental protection and resistance to increasing degradation, ecosystem

management instruments have been rescued and incorporated into the maintenance of inclusive and resilient fishing territories.

Rare Brazil joined this struggle and these communities, learning and teaching, collaborating and standing out for its strategy of uniting, side by side, researchers and local communities in strengthening shared fisheries management. The Rare Brazil team managed, impressively, to adapt a model adequate for the local reality, through a lot of sensitivity and resilience of its team, through trial and error, but, mainly, listening and believing.

The pressure on these environments and the burden of the lack of integrated management is a very big challenge, and the work is certainly still a long way off. We hope that Rare Brazil will continue to advance, contributing to this struggle and believing in persistence and solidarity as essential principles, and in the commitment to the future of the coastal marine biome, traditional communities and fishing sustainability.

Letter to our partners

BY MONIQUE GALVÃO
(VICE-PRESIDENT FOR RARE BRASIL)

Two-thousand eighteen was marked by the launch of version 1.0 of the Fish Forever program, simultaneously, in four Brazilian states: Pará, Maranhão, Piauí and Pernambuco.

In parallel to the accelerated social mobilization for the launch of the *Pescar, Conservar, Prosperar* (Fish, Conserve, Prosper) campaign, we began the process of reviewing Rare Brazil's strategy, together with the Advisory Board, aiming to allocate our team closer to the main beneficiaries of the program: the communities in coastal areas of northern Brazil.

It was a complex transition, which involved moving the team and our operational headquarters in Brazil from Rio de Janeiro to São Paulo. I would like to express my thanks to everyone who accepted to continue with us and embarked on this change in the organization.

We opted for a coworking office at the new headquarters, in São Paulo, aiming to integrate ourselves with the Brazilian socioenvironmental impact ecosystem. In Belém, a team of professionals with vast experience in the challenges of fishing territories on the Amazon coast and in Brazil was formed.

We evolved towards a decentralized model, increasing the autonomy and responsibility of the entire team. We prioritized the focus on the development of the individual and, with this, we increased the engagement and integration of people. The motivation of our employees, beneficiaries, donors and other partners was the fuel that allowed us to expand the program to nine marine protected areas.

We initiated a process of formalizing various partnerships with social movements, the federal government, state and municipal administrations, universities and researchers that support the implementation of management, research, training and capacity building initiatives in the program's territories.

In 2019, we chose to centralize all our efforts in the state of Pará, due to partnerships that had already been established, the economic importance of artisanal fishing in the state, which involves more than 225 thousand fishers, and also due to the global relevance of mangroves in the Amazon, which are the largest continuous strip of mangroves in the world.

We also reviewed the scope and launched version 2.0 of the Fish Forever program, incorporating approaches to financial inclusion and markets, gender issues and adaptation to climate change, in addition to social mobilization and science in favor of the conservation of fish stocks. We understand that measuring the growth of fishers' income generation is as important as measuring the biomass of fish stocks.

We were able to build a systemic methodology for the Fish Forever program in order to integrate the social, economic and environmental dimensions. In fact, our challenge is to support fishing communities, promoting food security and the management of the territory and extractive resources of the protected areas.

In the public policy and governance agenda, we became a member of the Brazilian National Council for the

Environment (Conama). Despite the political situation, we accepted to be part of this space as we believe that we can support communication between civil society and the federal government.

Our program also transcended the country's geographic barriers and fostered an exchange between technical experts from the governments of Brazil and Mozambique, who had the opportunity to acquire a thorough understanding of the legal framework of the Brazilian Protected Areas System, SNUC.

The process of enhancing the fisheries agenda in Brazil is long and continuous, and our result indicators prove that we are on the right path, always through partnerships and coalitions with different segments of society and the government.

We reached 2020 and, like everyone in the world, we are reinventing and innovating to build the 'new normal' in order to relate to individuals in the current global scenario. We continue the work to manage fisheries resources in a sustainable way, always inspiring changes so that people and nature can prosper.

Thank you very much and enjoy the read!



The partnership with traditional communities is fundamental for the conservation of fishing resources, symbolized in this image of the vice president of Rare Brazil, Monique Galvão, and Dona Raimunda Costa of the São João da Ponta Extractive Reserve. (photo: Enrico Marone/Rare)



Landing of fish caught using a gillnet near the coast of Závora, Mozambique (photo: Jason Houston/Rare)



Aerial view of the city of Bragança and the fishing port near the Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare)

CHAPTER 1

Global Challenge of Sustainable Fisheries Management

Between 1961 and 2016, fish became a highly preferred protein source in the human diet worldwide. The average annual increase in fish consumption exceeded population growth and exceeded the combined acquisition of meat from all terrestrial animals. This expansion has been driven not only by the increase in production, but by factors such as the reduction of total bycatch in the world, with the year 2016 accounting for 79.3 million tons (FAO, 2018).

The commercial interest of fishery products has been promoting, as a consequence, the decline of fish stocks, which has already reached unsustainable ecological levels, as pointed out by the United Nations Food and Agriculture Organization (FAO). Nonetheless, they continue to be exploited with high wastefulness rates. In 2017, 19.7 million tons of fish caught did not reach consumers' tables because they were lost on the way (FAO, 2018).

In addition to wastefulness, the intense and unsustainable historical exploitation of the coastal zone in favor of economic growth has exacerbated the risks to the integrity of ecosystems, such as mangroves and coral

reefs. Added to this is the effect of climate change on fishery resources, which hinder the stock recovery potential (CUSHING 1995; STENSETH *et al.*, 2002; HOLLOWED *et al.*, 2013).

In this context, "Sustainable Development Goal (SDG) number 14, Conserve and sustainably use the oceans, seas and marine resources for sustainable development", covers goal 14.4, which recommends regulating extraction, ending overfishing and restoring stocks at levels that can produce maximum sustainable yield in the shortest possible time. It seems unlikely, however, that the world's fisheries will be able to recover 70% of stocks that are currently overfished or fully exploited (FAO, 2018) in the near future, since recovery requires time, usually two to three times as long as life each species.

Thus, reaching the goal requires effective partnerships between the network of actors (governments, academia, non-profit sector, communities) that interface with small-scale fisheries and the management of priority ecosystems for the conservation and recovery of fish stocks.

CHAPTER 2

An Overview of Sustainable Fisheries in Brazil

The Brazilian marine coastal zone has one of the largest coastlines in the world and is responsible for the provision of numerous ecosystem services, such as: climate regulation, water production, containment of natural disasters, carbon storage, areas with rich landscapes for tourism, capacity to dispersion of pollutants, marine and terrestrial biodiversity and supply of extractive natural resources, such as the marine species widely consumed by the Brazilian or foreign population.

Despite such importance and representativeness, for many years the governance scenario of the fisheries sector,

CONSERVATION UNITS FOR SUSTAINABLE USE

Co-management structures that have defined usage rules with the participation of the local population. They establish strategies for managing natural resources in a sustainable manner, ensuring livelihoods and protecting the biodiversity and culture of traditional communities

EXTRACTIVE RESERVES

Aim to protect the livelihoods and culture of traditional populations, as well as the sustainable use of natural resources. They can be designated only at the request of local communities. Once the federal government designates it, the community acquires an exclusive concession for all use rights.

ENVIRONMENTAL PROTECTION AREAS

Intended for the protection and conservation of biotic (fauna and flora), aesthetic and cultural attributes that exist there. Their main objective is the conservation of natural processes and biodiversity, through guidance, development and adaptation of various human activities developed there.



*Aerial view of Furo Pacamorema
–Mãe Grande de Curuçá
Marine Extractive Reserve
(photo: Enrico Marone/Rare)*



*Coral reefs in front of
Tamandaré - Costa dos Corais
Environmental Protection Area
(photo: Enrico Marone/Rare)*

especially the small-scale sector, has been disorganized, with low efficiency in the planning and implementation of consistent public policies, relating to the registration, regularization or coastal and marine spatial planning. The absence or inefficiency of such measures directly affects the conservation and maintenance of fisheries stocks, with a consequent decrease in resilience of countless traditional communities whose main means of subsistence and income rely on the activity.

Brazilian conservation units (CUs) are protected areas under the responsibility of the Chico Mendes Institute for Biodiversity, which are a part of the National System of

Conservation Units (SNUC) created in 2000. These CUs, mainly those designated as being of 'sustainable use' and with a marine interface, such as the Extractive Reserves, play an essential role in the resumption of fisheries management, since they promote the conservation of natural resources and the ways of life of the traditional communities that live there.

It is in this scenario, in order to protect marine resources and improve the quality of life of the traditional coastal population through participatory management and sustainable fishing practices, that Rare, through the Fish Forever Program, has been developing its activities in Brazil since the year 2014.



Meeting of the Fish Forever program in the community of São Francisco at the São João da Ponta Extractive Reserve (photo: Enrico Marone/Rare)

CHAPTER 3

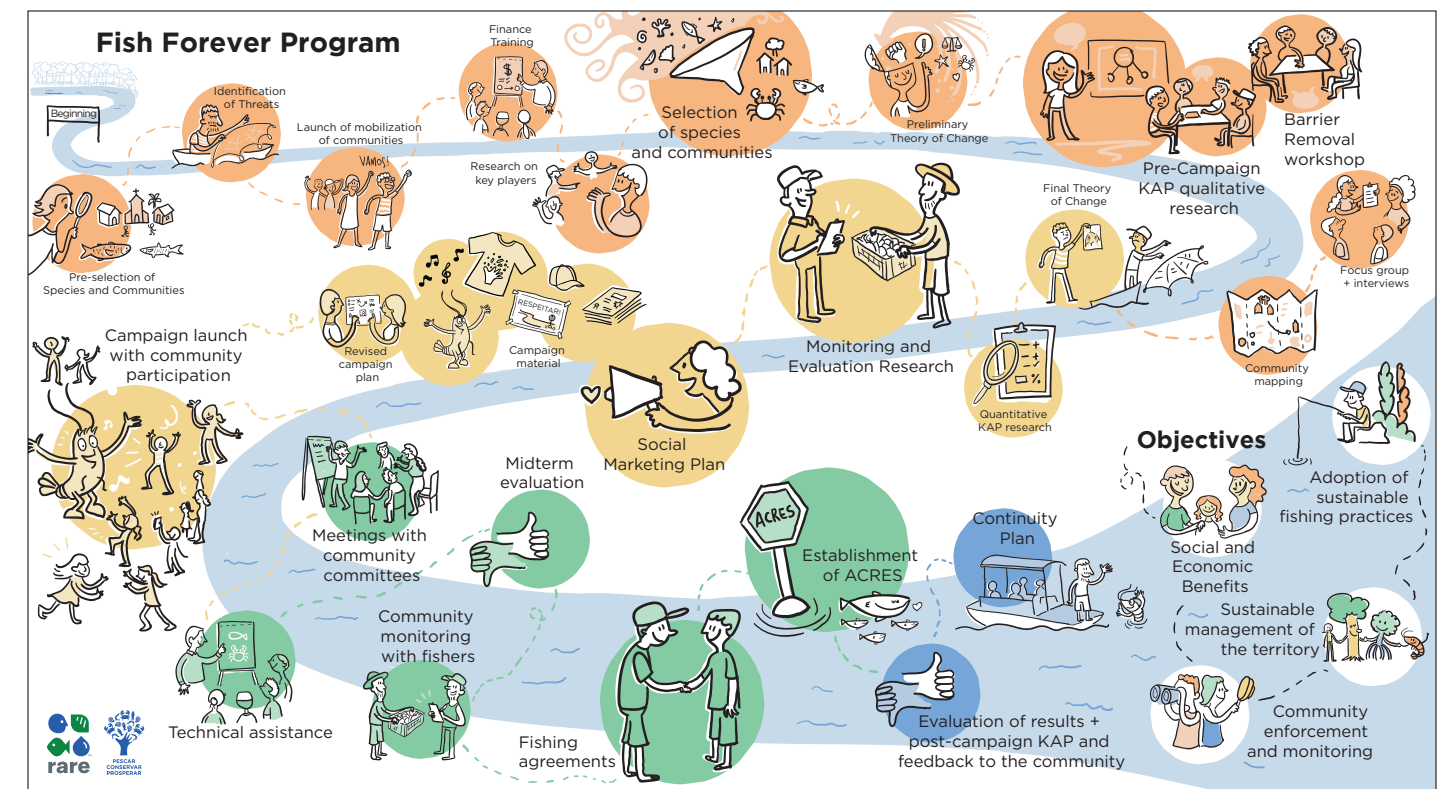
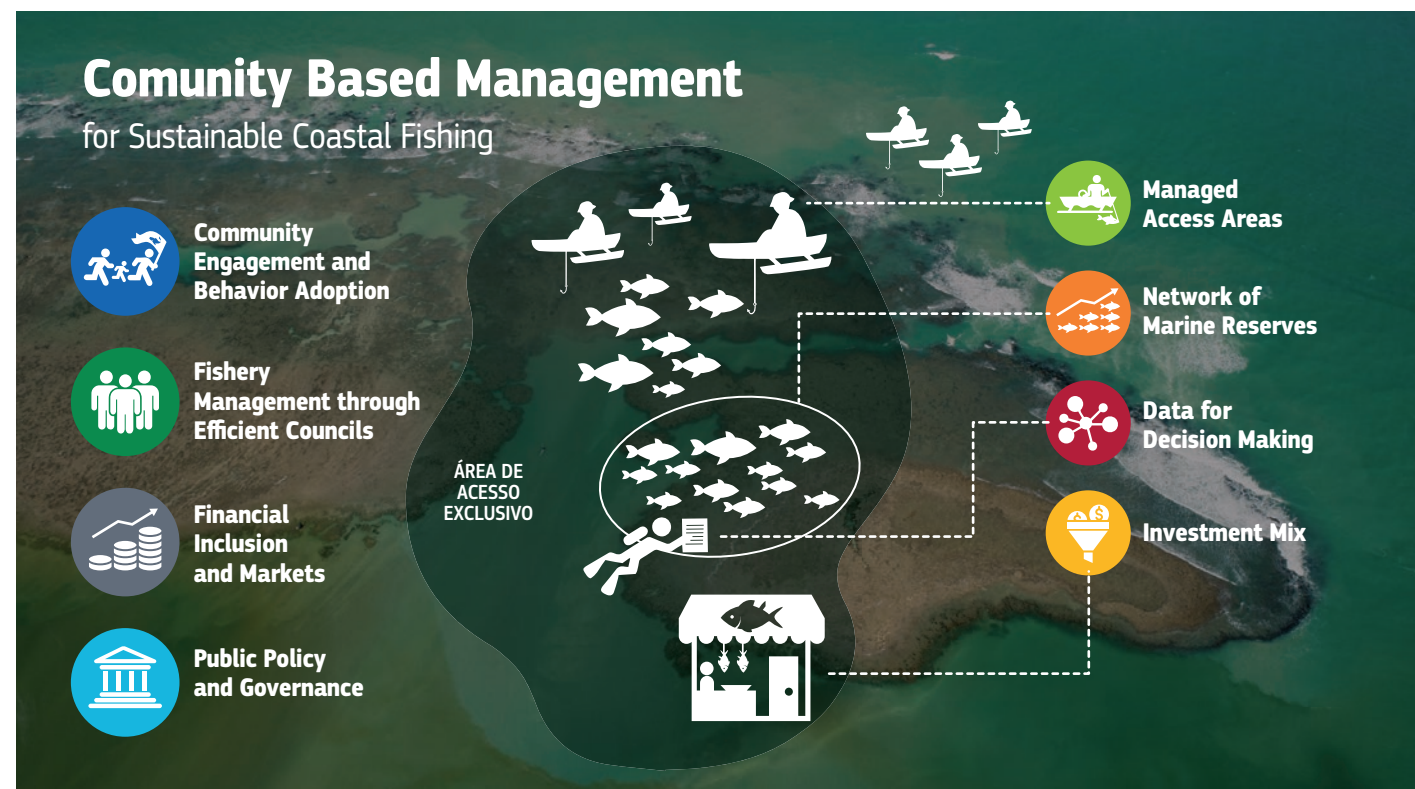
Fish Forever Program

The Fish Forever program aims to promote community-based management and has the adoption of behavior for the sustainable management of small-scale fisheries as its underlying backbone. For an efficient management of fishing activity, especially small-scale, it is important to recognize the rights of populations that depend on fishing activities and territories.

Thus, long-term management measures are adopted in order to maintain the sustainability of fishing resources and small-scale fishers. An example is the establishment of marine areas for exclusive use by fishers who are beneficiaries of a given protected area. Or the establishment of Conservation and Stock Recovery Areas

(ACRES), where especially the target species of economic and social interest can reproduce freely, without the pressure of fishing.

Between 2014 and 2019, the program was anchored in eight elements: **community support; fishery management; access to markets; fisheries policy; exclusive access; biological monitoring; enforcement and no-take zone.** The implementation of these elements in an integrated manner allowed the development of local capacity for data generation and consequent evidence-based decision making. It is a model that improves the governance of resources, enables the sustainable management of small-scale fishing activities.



Path of implementation of the Fish Forever program, built in a participatory way through the graphic facilitation of conversation design.

COMMUNITY ENGAGEMENT AND BEHAVIOR ADOPTION

Implement tactical campaigns – Pescar, Conservar, Prosperar (Fish, Conserve, Prosper) - for community mobilization and training, aiming at the adoption of sustainable fishing practices with about 4,000 fishers in the four states covered by the program.

FISHERY MANAGEMENT THROUGH EFFICIENT COUNCILS

Encourage and technically support communities and management bodies in the design of regulations for the management of target species of commercial interest, based on scientific data and traditional knowledge. Strengthen community leaders so they can participate in the managing councils of protected areas (APAs and Resex) and representative associations.

PUBLIC POLICY AND GOVERNANCE

Support the performance of the representations of social organizations (Confrem, CPP) in policy discussions aimed at traditional populations that depend on fish resources. Promote the facilitation of interaction between different actors: government, university, community. Encourage the creation and development of community committees and working groups for the governance of fishing territories.

NETWORK OF MARINE RESERVES

Support and foster strategic and scientific planning and consultations with communities for the creation of no-take and fish replenishment zones, or fishing areas under rotative systems.

DATA FOR DECISION MAKING

Monitor indicators of habitat quality, population structures and pressure on the harvesting of target species of commercial interest and of socioenvironmental importance for coastal communities and marine ecosystems. Promote the use of scientific data for decision making in the management of fisheries resources. Foster strategies and create local capacity for monitoring fishery production and fishing efforts on target species.

MANAGED ACCESS AREAS

Support the development of policies and instruments for participatory fisheries management in protected areas to guarantee rights for the use of fishing territories by beneficiaries of protected areas.

FINANCIAL INCLUSION AND MARKETS

Develop partnerships to increase communities' access to formal markets and public procurement. Provide technical assistance through partnerships and develop long-term strategic plans to improve and maintain the fishing supply chain in the state of Pará.

INVESTMENT MIX

Together with government partners, Rare seeks innovative approaches to access funds for coastal fisheries using combine financing from public sources, development networks, private sector, and philanthropic organization.

To carry out the Fish Forever program, Rare works with institutional partners and local leaders to identify the target audiences and break down the barriers that prevent sustainable behavior. To this end, it prepares and executes plans for the adoption of social behavior, promoting the ecological recovery of resources and ecosystems and maintaining the ways of life of traditional populations, as demonstrated by the implementation of campaigns, from design to final evaluation.

In the first two cycles of the Fish Forever Program, the Pescar, Conservar, Prosperar Campaigns were carried out between 2015 and 2017 and 2017 and 2019. The process was led by civil society organizations, which supported the selection of collaborators with potential for developing leadership and mobilization skills to act as Campaign Managers.

In this report, we will contemplate the results of Cycle 2, which took place between 2017 and 2019. The training structure offered a modular sequence, consisting of six training sessions organized according to actions and deliverables that were carried out by the campaign managers during the two-year period. The formative structure of the trainings included an introduction to the Fish Forever Program and the elaboration of the Behavior Change Theory for each area and work plan. CMs also developed

the strategies, prepared the launch and followed the Pescar, Conservar, Prosperar campaigns. Finally, they evaluated the results of the cycle.

The campaigns were designed based on the Theory of Change (ToC), defined according to each area of activity. The ToC guides the dimensions that must be improved in the projects to promote knowledge, attitude and practices aimed at the conservation of natural resources and the improvement of the quality of life of the fishing communities in a simplified way. The Theory of Change also facilitates the prioritization of objectives and activities to be adopted by the actors who implement projects, becoming a reference for the construction of quantitative indicators for evaluating program results and impact.

Within the scope of the campaigns, target species of social and economic importance were selected by the communities, encouraging the involvement of fishers and extractivists, in a participatory approach aimed at the planning and management of marine protected areas. Social marketing campaigns that consider local identity, culture and demographic characteristics, as well as personal stories and motivations of the fishers, were permeated throughout the process.



Managers of the Pesca, Conservar, Prosperar campaigns - From right to left, in the first row Carlos Lenny, Severino Ramos dos Santos, Alcinei Negrão Flexa, Joel Alviz de Jesus, Danilson Avelar; in the top row Luciano Galeno, Franciane Rodrigues Coelho, Cícera Estevão Batista, Josenilde Ferreira Fonseca, Amanda Gaspar, Josele Santos and Robson do Rosário Santos

Campaign Implementation and Management Model

The campaigns were implemented through a network of local actors, including **campaign managers, implementing partners, researchers and supervisors**. Each campaign manager was responsible for executing a work plan containing the description of the activities, person responsible, those involved, budget and schedule.

The work plans were subdivided into: **(i)** social marketing activities, which guided the development of social communication activities with communities and **(ii)** technical assistance activities, which promoted training opportunities for specific audiences, aiming to transfer knowledge and skills building on solutions to the challenges and barriers of managing selected target species.



Community meeting led by the Campaign Manager in Pacamorema – Resex Mãe Grande de Curuçá (photo Enrico Marone/Rare)



Training of campaign managers – class on biological monitoring in the Unama laboratory (photo: Enrico Marone/Rare)



Training of Campaign Managers – Belém, November 2018. (photos: Enrico Marone/Rare)

CAMPAIGN MANAGERS

Members of the community who, supported by local leaders and other management institutions, have as their main responsibility the development of community engagement activities in the sustainable use protected areas where they live.

IMPLEMENTING PARTNER

Local organizations of the protected areas, including non-governmental organizations, Resex umbrella associations (Aurems) and cooperatives. Responsible for the financial management of donation resources for the implementation of social marketing activities, community engagement and support for campaign managers in the process of co-creating campaigns with communities.

RESEARCHERS

Specialists in the target species of the campaigns who monitor ecological, social and economic indicators to learn about the quality of fish stocks, the area that supports the species and the impact of fisheries on the environment. The results of the analyzes aim to support management measures for the target species.

SUPERVISOR

Key actors from different institutions, such as ICMBio, Pastoral Fisheries Council, professors from public universities and master's students. The supervisor supports the campaign manager with technical advice on the development of activities.



Fish Forever Program Partners

In March 2017, a presentation was held in Belém to mark the beginning of Cycle 2 of the Fish Forever Program. Representatives of institutions such as the National Commission for the Strengthening of Coastal Marine Extractive Reserves (Confrem), Umbrella Associations of Extractive Reserves, Tamandaré and Rio Formoso Fishing Colonies, Pará State Department of Agriculture and Fisheries (SEDAP) and Chico Mendes Institute for Biodiversity Conservation (ICMBio), in addition to the campaign managers, were present.

Confrem is considered as a strategic partnership in the Fish Forever Program on a national scale, representing fishers in the reserves and promoting participatory management in which local communities become protagonists in decision-making processes.

Delivery of the certificates to the Campaign Managers with partners Confrem and ICMBio. Belém, May 2019 (photos: Enrico Marone/Rare)

STRATEGIC PARTNERS



ACADEMIC RESEARCH PARTNERS



IMPLEMENTING PARTNERS

ASSUREMAS
ASSOCIAÇÃO DOS
USUÁRIOS DA RESERVA
EXTRATIVISTA MARINHA
DE SOURE

MOCAJUIM
Associação dos
Usuários da RESEX
Marinha de São
João da Ponta



**ASSUREMAV • ASSOCIAÇÃO DOS
USUÁRIOS DA RESERVA EXTRATIVISTA
MARINHA DE VISEU PIRIA E GURUPI**



BENEFICIARIES



**RESERVA
EXTRATIVISTA
MARINHA
MÃE GRANDE
DE CURUÇÁ**

**RESEX
CAETÉ
TAPERACU**



**COLÔNIA DE
PESCADORES Z-05
TAMANDARÉ**

**COLÔNIA DE
PESCADORES Z-06
SIRINHAÉM**

**COLÔNIA DE
PESCADORES Z-07
RIO FORMOSO**

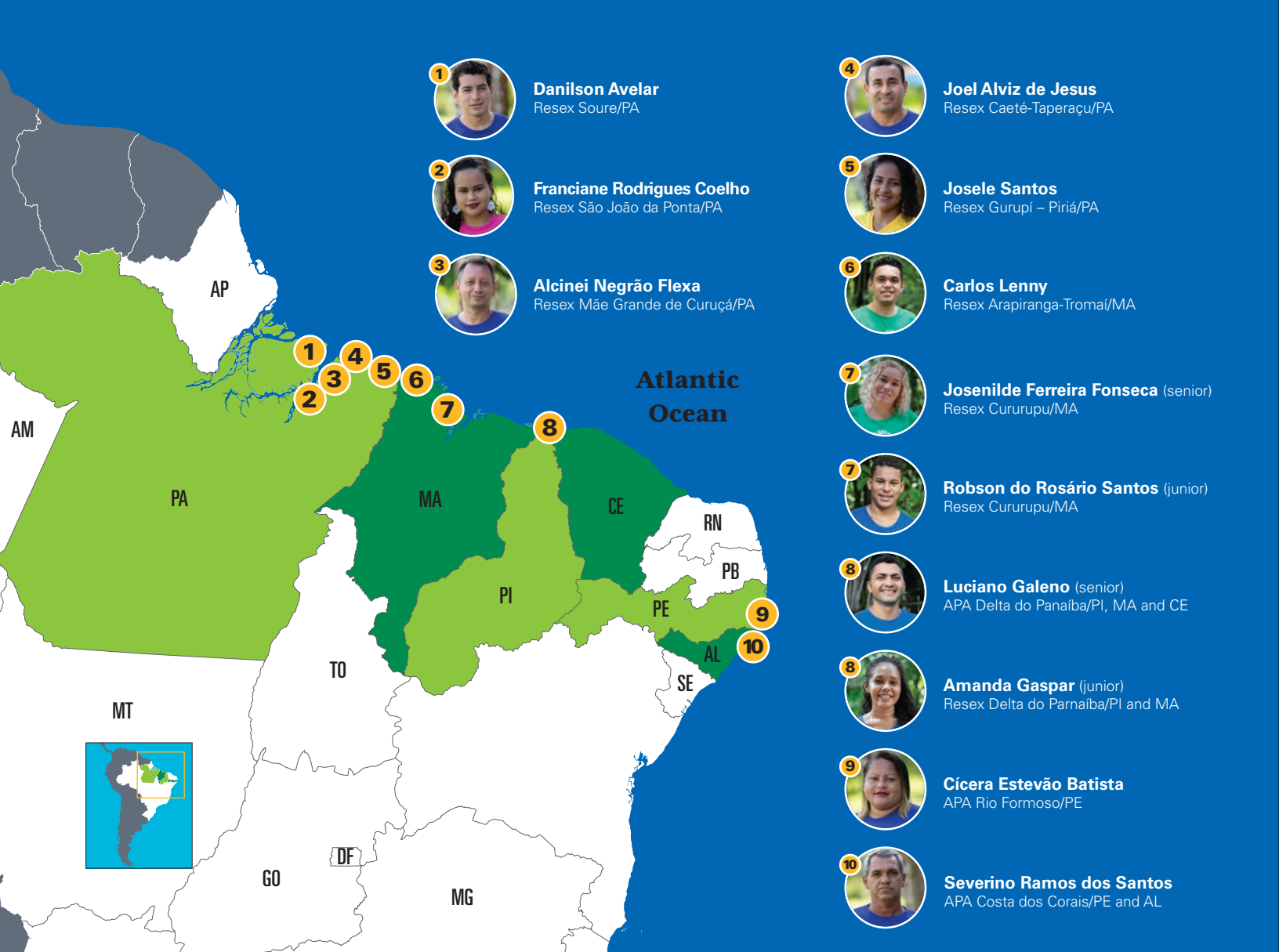
**COLÔNIA DOS
PESCADORES Z1
CÂNDIDO LOUREIRO**

**COLÔNIA DE
PESCADORES Z-09
SÃO JOSÉ DA
COROA GRANDE**

GOVERNMENTAL PARTNERS

Secretaria de
Desenvolvimento
Agropecuário e da Pesca





Sustainable use protected areas covered by the Fish Forever program during Cycle 2 and campaign managers for each area.

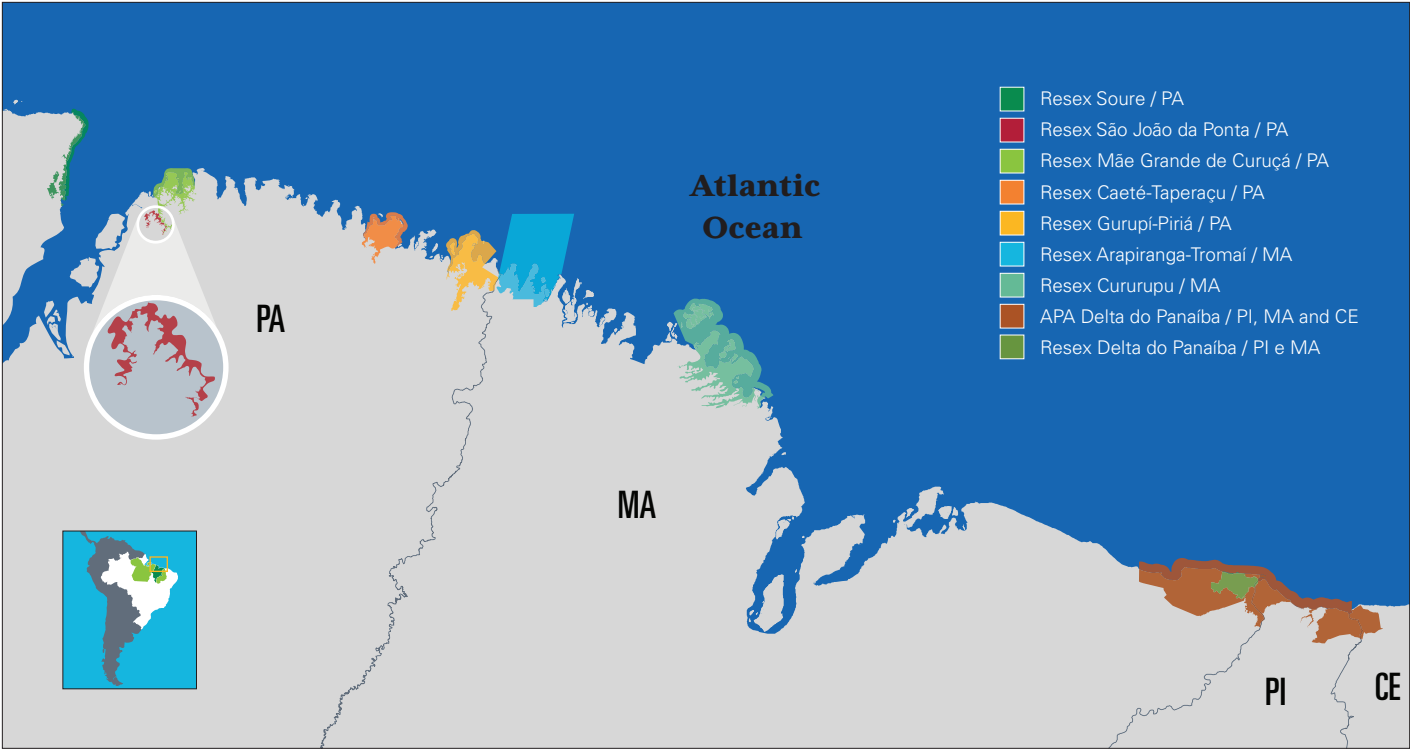
Where we work

The selection of the implementation areas for Rare Cycle 2 (2017-2019) was based on significant lessons from the organization's first two years of work in Brazil, with the implementation of Cycle 1 (2015 - 2017). Based on these lessons, Rare sought to develop a strategy to expand the impact of its actions, operating in regions of greater geographical proximity. The strategy strengthens the systemic management models in areas that have pre-existing demand for small-scale fisheries management.

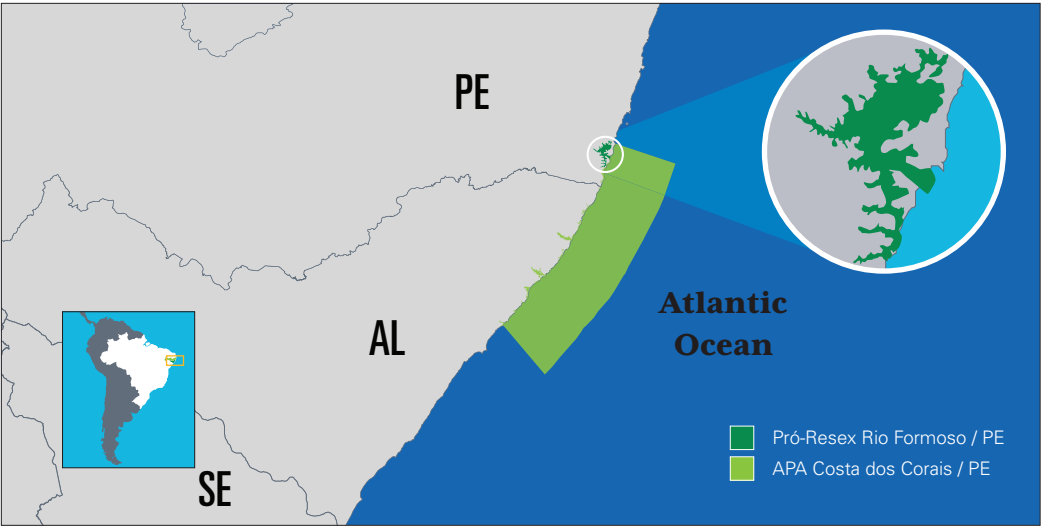
Ten marine protected areas were selected to participate in Cycle 2, five in the State of Pará, two in Pernambuco

and three in Maranhão and Piauí. Of these areas, eight are Coastal and Marine Extractive Reserves (Resex) and two are Environmental Protection Areas (APA). The five areas of Pará and two of Pernambuco represented new areas of activity, and those of the states of Maranhão and Piauí were continuations of the actions carried out in the previous cycle, being designated as replication areas, resulting from the continuity of actions in the territory between 2015 and 2019.

Approximately 4,000 fishers distributed in 44 communities distributed in the four states participated in Cycle 2.



Maps of protected areas in the northern (above) and northeastern (right) coast of Brazil covered by the Fish Forever program during Cycle 2.



STATE	PROTECTED AREA	YEAR ESTABLISHED	AREA
PA	Resex Gurupí-Piriá	2005	74,081 ha.
PA	Resex Caeté-Taperaçu	2005	41,807 ha.
PA	Resex Mãe Grande de Curuçá	2002	37,062 ha.
PA	Resex São João da Ponta	2002	3,203 ha.
PA	Resex Soure	2001	27,464ha.
PE	APA de Guadalupe	1997	44,799 ha.
PE	APA Costa dos Corais	1997	413,563 ha.
MA	Resex Cururupu	2004	185,046 ha.
MA	Resex Arapiranga-Tromai	2018	186,908 ha.
MA, PI and CE	APA Delta do Parnaíba	1993	309,593 ha
MA and PI	Resex Delta do Parnaíba	2000	27,022 ha.

Table: Protected Areas covered by Cycle 2 of the Fish Forever program (source: ICMBio, organized by Rare Brazil, 2017)



Landing of mangrove crabs (*Ucides cordatus*) in the port of Tamatateua – Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare)

Pescar, Conservar, Prosperar Campaigns








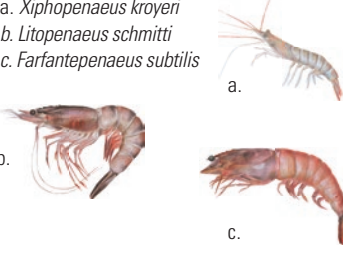

ASSESSMENT AND PLANNING

The selection of communities and target species was carried out through semi-structured interviews and participatory workshops conducted by the campaign managers, under the guidance of local leaders of the Umbrella Associations and managers of the protected areas. The selection of communities included requirements such as access to communication, participation in the governance of the protected areas and an expressive concentration of

fishers mostly focused on the catch of the same group, or single species.

The species of greatest local importance were evaluated using abundance, biometrics and fishing effort data available in scientific publications and through technologies that provided the scenarios for management based on the degree of vulnerability and productivity.

General Profile for *Pescar, Conservar, Prosperar* Campaigns

MPA	TARGET SPECIES	CAMPAIGN OBJECTIVES
São João da Ponta	Mangrove Crab <i>Ucides cordatus</i> 	A. Influence public participation in the project to designate ACRES B. Adopt sustainable fishing practices and comply with regulations C. Strengthen management bodies, deliberative councils
Mãe Grande de Curuçá	White shrimp <i>Litopenaeus schmitti</i> 	A. Support the creation of regulations for the target species B. Strengthen management bodies, deliberative council
Caeté-Taperaçu	Mangrove Crab <i>Ucides cordatus</i> 	A. Influence public participation in the project to designate ACRES B. Adopt sustainable fishing practices and comply with regulations C. Strengthen management bodies, deliberative councils
Gurupi-Piriá	Mangrove Crab <i>Ucides cordatus</i> 	A. Influence public participation in the project to designate ACRES B. Adopt sustainable fishing practices and comply with regulations C. Strengthen management bodies, deliberative councils
Soure (área controle)	Amazon shrimp <i>Macrobrachium amazonicum</i>	A. No campaign, only ecological monitoring of the target species and the behavior of communities
Arapiranga-Tromaí	Acoupa weakfish <i>Cynoscion acoupa</i> 	A. Motivate the target-audience to report catch data
Cururupu	Acoupa weakfish <i>Cynoscion acoupa</i> 	A. Encourage production monitoring B. Support the process of regulating ACRES C. Strengthen management bodies
Delta do Parnaíba	Snook <i>Centropomus undecimalis</i> 	A. Encourage the public to adopt sustainable fishing practices and comply with regulations
Costa dos Corais	Saltwater shrimp – 3 species a. <i>Xiphopenaeus kroyeri</i> b. <i>Litopenaeus schmitti</i> c. <i>Farfantepenaeus subtilis</i> 	A. Influence public participation in the project to designate ACRES
Guadalupe (Pró-Resex Rio Formoso)	Mullet <i>Mugil sp</i> 	A. Influence and promote community participation in supporting the project and creation of Resex (Pró-Resex Rio Formoso)



Fish Forever program meeting to remove barriers, in the community of Fernandes Belo – Gurupi-Pirã Extractive Reserve, February 2018. (photo: Enrico Marone/Rare)

Barriers Identified

Workshops called Pre-Barrier Removal were held between February and April 2017 in order to understand the barriers, benefits and possible solutions to achieve the behavior defined in the socio-ecological adoption objective. The classification of barriers and benefits in four dimensions allows us to understand the challenges of communities in terms of their ability to implement projects, their life experiences and interests, indicating which benefits would be closest to their needs. The dimensions defined were: technological, social or cultural, economic and political.

LACK OF DATA FOR DECISION MAKING The absence of management rules that reduce predatory fishing and promote the conservation of fishing resources. Since 2012, Brazil has been lacking production data on a national scale, and the professional fisher registration systems (RGP) do not issue the documents properly. The lack of systematic monitoring of fisheries strengthens the need to encourage the generation of community-based data, through effective social participation.

Globally, basic data for fisheries management, such as fishing effort, biomass, mortality, number of fishers and socio-economic profile are largely unknown information. Local initiatives do not supply the need to obtain information for socio-ecological management, where political limits do not overlap with the need to adopt sustainable practices, with respect to local identity and the ecosystem. Data are essential for continuous improvement in management and in generating knowledge about the fishing activity.

POOR SOCIAL OR CULTURAL PARTICIPATION The low participation or lack of interest of the communities in activities aimed at collective, rather than individual, benefits and purely economic interests (e.g. social assistance with financial support, access to material benefits). Other benefits needed to be as attractive as the economic ones to make social participation sustainable in the long run. Due to the lack of data to promote sustainable management measures, policies aimed at the fishing sector commonly reflect only economic benefits to users, where fleet renewal, oil and access to social benefits such as seguro defeso [a type of insurance for seasonal closures] are not supported by a proper enforcement and management of fisheries and their beneficiaries.

In addition, the communication difficulties between actors generate the need to adapt the language and promote translation between the different actors that are part of the participatory fisheries management. Greater difficulty in promoting the participation of fishers (men) in discussion spaces for management. Emphasize the importance of women in fisheries management, by promoting opportunities to participate in spaces for decision-making and policies that improve the quality of life and access to the rights of women fishers.

LACK OF CREDIBILITY AND POLITICAL SUPPORT The high distrust of communities in the public sector (especially management bodies) comes from the history of inefficiency in the implementation and execution of government policies aimed at the fishing sector. The reconstruction of relations between public institutions and communities could be supported by the program, in order to build a shared purpose between communities and institutional actors.

By improving communication and promoting social and ecological benefits, and by increasing community participation in decision-making spaces, conflicts in the fishing territory with other economic activities, such as tourism, can be reduced. Management plans and the creation of managed areas could support the resolution of disputes.

LACK OF INVESTMENT IN THE ECONOMIC ACTIVITY Due to the significant geographical dispersion of the communities in the territories of the protected areas, fishers aren't always able to access spaces for discussions for participatory management. The reason is the lack of personal financial resources for expenses such as transportation and food, costs that are not included in the subsistence way of life. Low investment in the management of sustainable use protected areas and in the fisheries value chain reduces the opportunities for communities to access participatory management.

Small-scale fishing is recognized as a go-to place, which, in times of crisis, receives people in a situation of social vulnerability, i.e., those who do not have surplus income to meet their basic human needs. Improving communication between institutions and representative leaders would facilitate access and dissemination of information on decisions made for fisheries management.

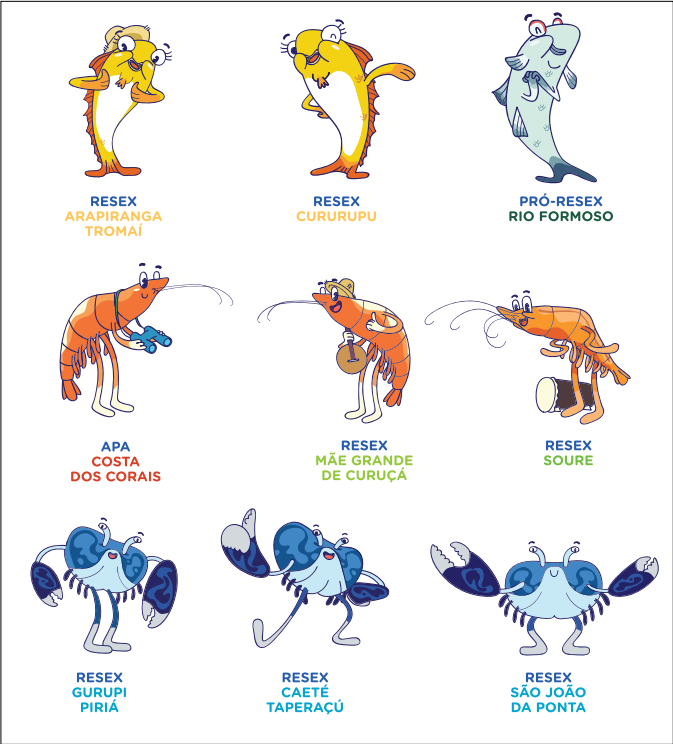


Campaign Launch in the Tremé Community – Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare)

Social Marketing

The program addresses human beings as the center of actions for the adoption of social behavior, seeking to empower leaders and communities to ensure their right to participate in decision making and participatory governance. To this end, it informs, shares and generates knowledge through tools, channels and products appropriate to the culture, language and way of life of the fishing communities.

Through social marketing, it seeks to create emotional and personal connections between “the action” to be promoted to a specific target audience (for example, the fisher who must respect the catch size of a given species), exemplifying the positive benefits for the recipient of the message when performing the action, who experiences a new stage of knowledge. By sharing this experience with his or her peers, he/she promotes social



Pescar, Conservar, Prosperar campaign mascots for the target species

norms for the conservation and sustainable management of fishing resources.

The products of Cycle 2 were planned and developed with the participation of the coordinators and validation of the communities. The Fish Forever Program is recognized by the Pescar, Conservar, Prosperar brand, which has been adapted to the identity of each campaign according to the target species and territory. The construction of the visual identity of the participatory campaigns was supported by marketing specialists from a communication agency who, in a participatory manner, helped the coordinators to develop their products, taking into account the following information:



Social marketing material – t-shirts and caps

COLOR a color that is related to the objectives of the campaign and based on a local identity should be chosen

MASCOT based on the persona and qualitative research, the coordinators shared the human characteristics of the local communities that could be incorporated into the mascot of the target species

COMMUNICATION MATERIALS Should be used according to the evaluation of the 4P's (place, price, promotion, product)

CAMPAIGN MUSIC Developed in partnership with a carimbó master* in the state of Pará, recorded in two versions, carimbó and forró.

*Translator's Note: A "master" of musical rhythm carimbó is someone who composes and performs, but also passes on the cultural legacy behind the music.

Campaign Song

Eu sou pescador gosto muito de pescar

I am a fisher I love fishing

Mas o que eu gosto mesmo

But what I really like

É do marisco do mar

Is shellfish from the sea

No mangal o caranguejo

Crabs in the mangrove

Na maré o camarão

Shrimp in the tide

Temos nossos peixes para a conservação

We have our fish for conservation

É preciso a união das comunidades

We need the communities to be united

Respeito aos acordos para conservar de verdade

Respect de agreements to really conserve

Eu sou pescador gosto muito de pescar

I am a fisher I love fishing

Mas o que gosto mesmo

But what I really like

É do balanço do mar

Is the sea breeze

Quando eu saio para pescar

When I go out fishing

Para ganhar o meu dinheiro

To earn my money

Vou levando a mensagem da campanha aos meus parceiros

I am taking the campaign message to my partners

Vamos pescar pescador, vamos participar

Let's fish fisher, let's participate

Da gestão da pesca para prosperar

In the fisheries management to thrive

Olha o pescador aí, e que legal

Look at the fisher there, and how cool

Ajudando a preservar o nosso litoral

Helping to preserve our coastline



Campaign Launch in the Treme Community - Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare)

PESCAR CONSERVAR PROSPERAR

RESEX ARAPIRANGA TROMAI

O que é uma Reserva Extrativista?

ESTAMOS TODOS INTERLIGADOS
TUDO QUE FAZEMOS TEM UM IMPACTO E ELAS A NÓS!

TEMOS DIREITOS MAS TAMBÉM DEVERES

UMA RESEX É COMO A NOSSA CASA! TEM REGRAS PARA CUIDAR

LUTAMOS PELA RESEX DESDE 1980

NÓS É QUE VAMOS FAZER! É UMA GRANDE RESPONSABILIDADE!

EXTRATIVISMO SUSTENTÁVEL

A RESEX PRECISA TER ASSOCIAÇÃO FORTE E CONSELHO DELIBERATIVO

DEPENDEMOS DA NATUREZA E ELA DE NÓS

MUNDO CONTINUANDO NÃO É SO MUNDU. PRA DOS MEUS PAIS É UM DIA SE RA' DOS MEUS FILHOS!

O QUE É UMA RESEX?

Pescador de Pesca amarela que participa do manejo do território e dos recursos pesqueiros garante melhorias na produção e qualidade de vida.

VENHA PARTICIPAR DAS ATIVIDADES DA CAMPANHA PESCAR, CONSERVAR E PROSPERAR E DISCUTIR A IMPORTÂNCIA DE INFORMAR SOBRE AS SUAS PESCARIAS. CONHECER A SUA PRODUÇÃO PESQUEIRA E O VALOR DE SUA RENDA, POSSIBILITA O ACESSO À CRÉDITO, VALORIZA A PROFISSÃO E FORTALECE A RESEX ARAPIRANGA-TROMAI.

UNAMA
UNIVERSIDADE DO PARÁ

GOV. DO PARÁ
GOVERNADOR ANÍBAL TEÓFILO

ICMBio
INSTITUTO CHICO MENDES

Bloomberg Philanthropies

rare

Banner of the Resex Arapiranga-Tromai campaign



Painting of canoes in the São Francisco community – São João da Ponta Extractive Reserve (photo: Enrico Marone/Rare)



Campaign launch at the Cururupu Extractive Reserve (photo: Ana Carolina Marciano)



Informative sign on the Conservation and Stock Recovery Areas in the Cururupu extractive reserve (photo: Ana Carolina Marciano)

Social Marketing activities held with the communities and lead by the campaign managers

- Launch of the campaign with leadership speeches and artistic presentations of local culture
- Paintings of fishing vessels participating in campaigns to enhance active groups
- Revitalization of community spaces for meetings
- Identification with traditional territory signs
- Use of sound cars and radio programs to publicize campaign activities
- Painting and producing murals with campaign messages and logos
- Theater performance developed by the communities
- Delivery of gifts to participants
- Fishing competition and regatta
- Support for traditional festivities of local culture
- Banners and information posters on regulations and seasonal closures
- Lectures in schools for children and youth on the importance of fisheries management



Training on the use of the crab basket in the Tamatateua community – Caeté-Taperaçu Extractive Reserve. (photos:Enrico Marone/Rare)

Technical Assistance

The daily routine of social marketing campaigns was combined with technical assistance activities aimed at developing skills and knowledge in the communities. The objective: improvement of sustainable fishing, marketing and governance practices. Below are some examples of the training and actions carried out by the program:

- Training for the creation and empowerment of deliberative councils by ICMBio/Regional Coordination 4 and support for campaigns
- Training of fishers and middlemen to use the crab basket (basqueta) by Sedap/PA
- Feedback of ecological monitoring and production results led by UFPA, CEPENE, IRCOS and UFPE, IFPI, UNAMA

- Training for leaders and communities on shared management and creation of protected areas for sustainable use through the Pastoral Fisheries Council and ICMBio
- Training in administrative and financial management of associations representing small-scale fisheries
- Exchanges of leaders and communities to share knowledge among peers
- Participation of campaign managers in national, state and local conferences to share results

Socioeconomic and Behavioral Assessment – Knowledge, Attitude, and Practice (KAP)

The socioeconomic and behavioral quantitative research – Knowledge, Attitude and Practice (KAP) – took place in the pre and post-campaign moments. The objective was to evaluate the impacts and the effectiveness of the campaigns in the economic, social and behavioral aspects of the communities where Rare operated, in the states of Pará and Pernambuco. For this survey we assumed that it would not be necessary to carry out the research in the communities of the States Piauí and Maranhão included in the activities of Rare since 2015 due to the influence of Cycle 1.






Behavior adoption is measured by the KAP survey, with indicators developed from campaign-specific theories of change and socioeconomic issues to assess the quality of life of the communities. According to the innovation adoption curve, about 18% (initial majority) of the target audience should express a certain behavior or adopt an idea so that the other groups can adhere to the novelty, thus triggering the new social norms.



Fishers on rafts on coral reefs in front of Porto de Pedras - Costa dos Corais Environmental Protection Area (photos: Enrico Marone/Rare)

The surveys took place through structured interviews with fishers who work in the fisheries for the respective target species of each sustainable use protected area. In total, 1,115 fishers were interviewed in all protected areas in the states mentioned above. The sample number was estimated according to the number of fishers in each community.

Castelo fishing dock – Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare)

	 SOCIAL PROFILE	 ECONOMIC PROFILE	 SOCIAL CAPITAL
 Pará	Most crab fishers in Pará state are between the ages of 25 and 44	The average family income in communities was between BRL 0 and BRL 4,000	A decrease in social capital increase in most extractive reserves
	Most shrimp fishers are over the age of 60 .	In Pará state, 50.56% of those interviewed have a monthly family income varying between BRL 0 and BRL 499	Results show that the trust the population has on the managers related to decision making that affects the communities varies among protected areas
	71.35% are the main providers in the household income	Target species fisheries represent the main source of subsistence for the communities	Fishers are still reluctant in believing in the equal processing of fisheries resources.
	87.3% of the family units have one or more people (including the fisher) responsible for income	72% of fishers have access to some of the following services or items: electricity, refrigerator, stove and natural gas, radio, satellite antenna/internet.	54% of fishers believe that the community can fish in a more sustainable manner.
	68.49% of fishers interviewed have a low education level, most of which never completed elementary school.	Following the implementation of the campaigns we were able to observe an increase in the percentage of fishers who always have food for their family in most of the protected areas.	Increase in 9% of the fishers who believe the fishers comply with the fisheries rules in the Extractive Reserves.
 Pernambuco	66% of the fishers are above 44 years of age	Fisheries represent the main source of income for 70% of the families	Following the campaign there was a 14% increase in the amount of fishers who believe the Protected Area managers make the best decisions for the population.
	54% of the fishers have not completed elementary school	70% of the fishers are the main providers for the household income	45% of the fishers believe that the community is capable of adopting measures to make fisheries sustainable.

Knowledge, Attitude, and Practice

The results showed an increase in the knowledge of local fishers in relation to more sustainable fishing practices and regulations, participatory management and the importance of creating ACRES. However, the results presented demonstrate that the Extractive Reserves of Pará (Resex Caeté-Taperaçu, Gurupi-Piriá, São João da Ponta and Mão Grande de Curuçá) still need assistance with regard to increased interpersonal communication, attitude and adoption of behavior, due to the extensive territory and quantity of fishers.

The results related to social and economic capital are largely influenced by the geopolitical context in which the fishing communities find themselves. Although the program influences improvements in the perception of relationships developed in close proximity between communities, managers and academia, the lack of improvement and guarantee of rights from a national perspective for fishing professionals impacts on the slow rise in the improvement of the quality of life of these populations, directing the need for joint action in partnership and scaling networks between governments.



Fernandes Belo river
fishing dock – Gurupi-Pirirá
Extractive Reserve (photo:
Enrico Marone/Rare).

CAPÍTULO 4

Social and Ecological Results

Profile of the target audience

- Predominant family composition between five and eight people per family
- 70% of fishers with schooling classified as incomplete elementary school (up to four years of study)
- Greater concentration of family income between BRL 0 and BRL 499 and BRL 499 and BRL 1,000
- Artisanal fishing activity as the main source of income for the entire target audience



Participatory monitoring certificate delivered to fisher at the
Cururupu Extractive Reserve (photo: Mayra Nascimento)



Exchange on the use of crab baskets with fishers and
middlemen from Pará with the Marine Extractive Reserve
Delta do Parnaíba. (photo: Enrico Marone/Rare)



Summary of Program Results:

- Invited six campaign managers who are members of management councils
- 372 meetings of committees and working groups were held
- 39 deliberative council meetings were held
- Six technical proposals for fisheries management were developed
- 15 working groups were created
- 8,000 landings recorded
- 804 tons of landed fish monitored
- Estimated that 90% of fishers are unaware of their production
- In Pará, 80% of the catches refer to ten target species
- In Pará, 5,401,690 crabs landed in six communities in Caeté and Gurupi and São João da Ponta, generating US\$ 625,856.00 with the commercialization of the mangrove crab in six fishing communities in Pará
- 3,823 crabs sold directly to consumers through open markets held in partnership with SEDAP, with BRL 4,983 in generated income
- Administrative and financial training, reaching ten local associations and 60 participants
- 12 training sessions were held to strengthen deliberative councils in partnership with ICMBio
- Six exchanges and 120 participants
- Six training courses for campaign managers were carried out - about 300 hours of educational activities
- Three trainings were carried out for middlemen to adopt the crab basket, an instrument used for transportation that helps preserve the species, led by SEDAP technicians
- Increase in the number of fishers willing to adopt the crab basket (social technology to reduce crab mortality during transport) as a social technology from 34% to 46% after a nine-month social marketing campaign
- Increase in the social confidence index and commitment to good fishing practices by fishers
- Drafting of a technical proposal to create a Resex in the municipality of Rio Formoso and Tamandaré
- Creation of a deliberative council with support from the campaign at Resex Arapiranga-Tromaí
- Management measure established for the rotation of the acoupa weakfish fishing grounds at Resex Cururupu
- Fisheries agreement for management of regional shrimp developed at Resex Mãe Grande de Curuçá
- A management plan was developed in the Environmental Protection Area of the Delta do Paranaíba, contemplating the fishers from the Resex Delta do Parnaíba in participatory consultations. Subsidy for campaigns to include relevant information about the target species "snook"
- A proposal for the management of shrimp fishing grounds in the Costa dos Corais Environmental Protection Area was developed and submitted for evaluation by the advisory board, for inclusion in the management plan



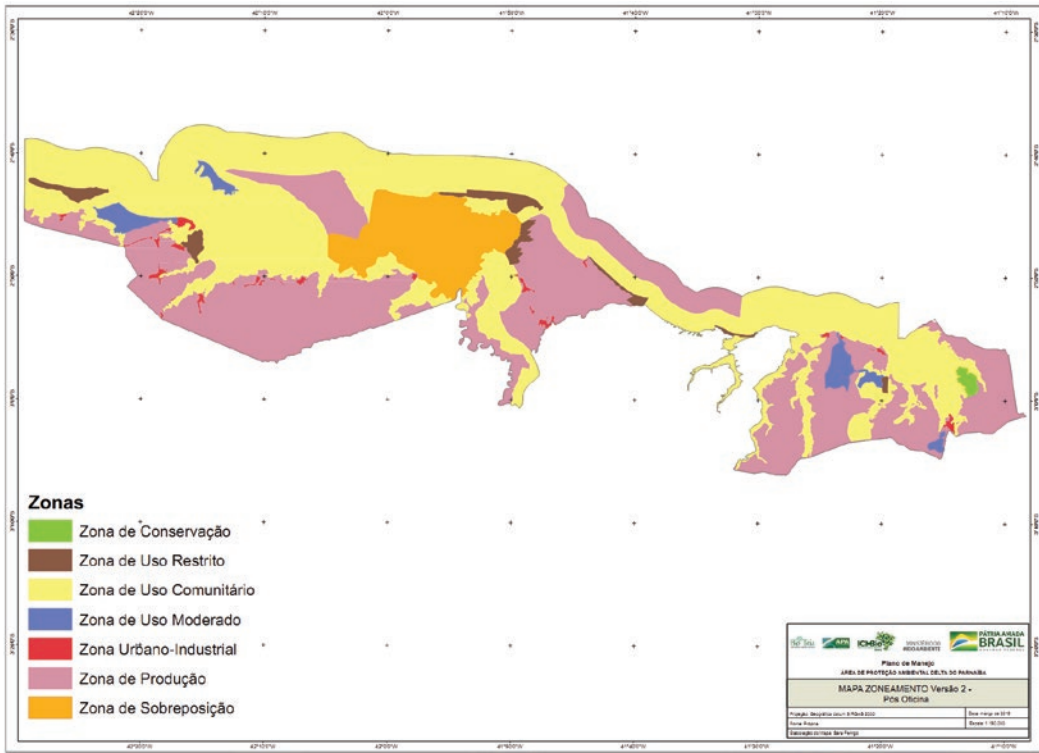
Fish market in Belém – direct sale to the consumer through a partnership with SEDAP (photo: Jonas Batista)



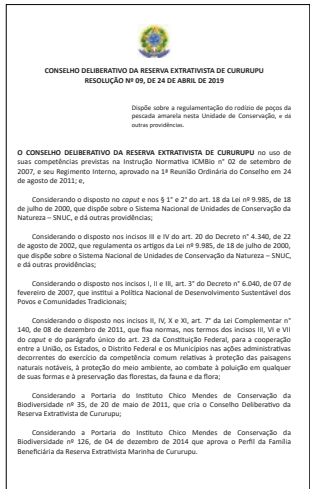
Landing of bandeirado (catfish) in the Castelo community fishing dock – Caeté-Taperaçu Extractive Reserve (photo: Enrico Marone/Rare).



Fishermen at Resex Arapiranga-Tromai (photo: Enrico Marone/Rare)



Zoning of the APA Delta do Parnaíba management plan



ICMBio Resolution which establishes the rotation of the acoupa weakfish fishing grounds at Resex Cururupu.

Fisheries Assessment

As previously mentioned, small-scale fisheries that take place in protected areas are of great economic and social importance for the North and Northeast regions of Brazil, since they provide products and inputs for the whole country and constitute the ways of life of the local populations. However, there is a need to evaluate these fisheries, which are under constant exploitation and impact, either due to the lack of adequate management measures or the lack of knowledge of the exploitation status of fishery stocks.

Unlike KAP, fishing monitoring took place in all areas of Cycle 2, each with its own particularity. During monitoring, data such as volume landed by target species, capture per unit of effort (CPUE), fishing gear and capture locations were calculated. All actions were carried out by community monitors. Below are summaries of ecological monitoring projects and production by region.

MARANHÃO

PROJETO: Characterization of fishing and landing of acoupa weakfish (*Cynoscion acoupa*) in communities of the Arapiranga-Tromai and Cururupu Marine Extractive Reserves in the state of Maranhão

RESPONSÁVEL TÉCNICO: Dr. Mauro Tavares e MSc. Calebe Maia, of the Universidade da Amazônia – UNAMA

RESEX ARAPIRANGA-TROMAI

Landings: 132

Annual production: 12,820kg

Species: acoupa weakfish (*Cynoscion Acoupa*)

Average length: 97cm

Characterization: performed on average by three fishers on each vessel, they spend one to 12 days at sea and make an average of three sets per trip, each lasting an average of three hours

Fishing gear: gillnet (18cm mesh size) (106), handline (23) and longline (01)

Fishing locations: São Pedro beach, Tucundia, Sardinha beach, Pindoal river, Barra do Peixe, Barra de São Jorge



Fishers at the Arapiranga-Tromai Extractive Reserve (photo: Enrico Marone/Rare)

The research at Resex Arapiranga-Tromai was implemented shortly after the creation of the reserve and was structured to provide information on fisheries targeting the acoupa weakfish, one of the main species exploited by the region's artisanal system. The aim was to understand the productive variations that occur throughout the year and the conditions of the fish stocks of the species, aiming at the conservation of the resource.

At Resex Cururupu, the project expanded the acoupa weakfish landing monitoring developed in Cycle 1, expanding data collection from one to five communities. The research sought to evaluate the rotation system of the fishing grounds in the Resex communities where the species is caught, in addition to understanding the degree of conservation of the resource and monitoring the functionality of the system established in a participatory manner with the community.

The data were collected using a structured form with the support of a trained local monitor. On a daily basis, information on landed volume (kg) and biometry (cm) of specimens landed at the main ports of the Resex was collected.

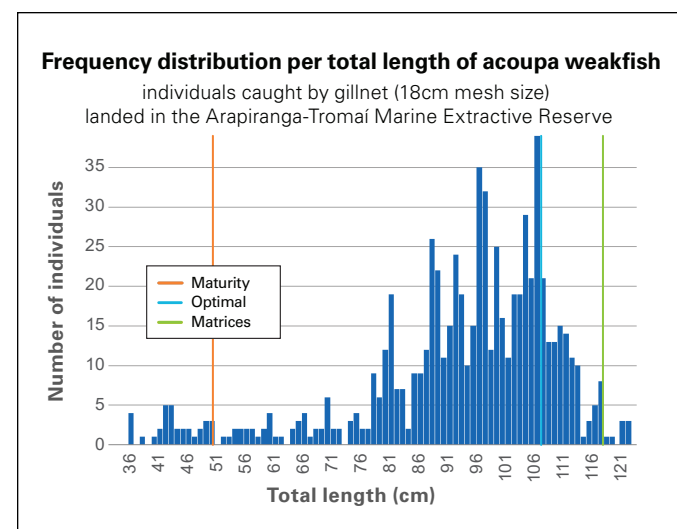
A total of 2,250 individuals were landed through gillnet (18cm mesh size) fishing, equivalent to 98.3% of the total. CPUE values were notably influenced by the local rainfall pattern, being responsible for an abrupt reduction in September and reduced values in the following months. A total of 907 acoupa weakfish landed were measured. These specimens had an average of 97 ± 10



Acoupa weakfish being measured and weighed by community monitors in Maranhão (photo: Caleb Maia)

cm, 86 ± 43 cm and 7.597 ± 2.50 kg in total length, standard length and weight, respectively.

The average total length of the catch is below the average length of the first maturation (51cm - Cycle 1 Technical Report). About 2.5% of the individuals caught using the gillnet (18cm mesh size) were below this length. Most catches were of the average size of the optimal length of extraction, i.e., fishing is exerting greater pressure on the stock that is reproductively active, showing a high selectivity of fisheries targeting acoupa weakfish when using this fishing gear.



Frequency distribution per total length of individuals captured by using a gillnet (18cm mesh size) landed in the Arapiranga-Tromai Marine Extractive Reserve

RESEX CURURUPU

Landings recorded: 328

Annual production: 21,175 kg

Fishing gear: gillnet (18cm mesh size) (317), handline and longline (11)

Species: Acoupa weakfish (*Cynoscion acoupa*)

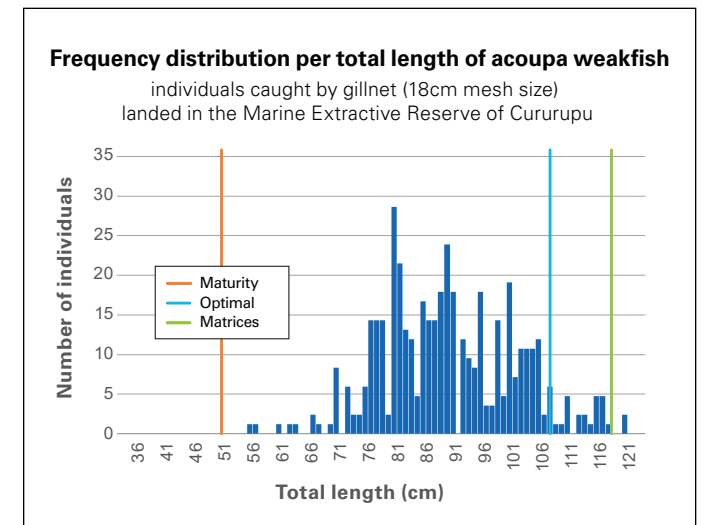
Characterization: carried out on average by three fishers on each vessel, one to 20 days at sea making an average of nine sets, with an average duration of three hours each

Fishing locations: Barra de Mangunça, Poço do Muricitiua, Cajual, Zumbi, Baía de Guajerutia, Barranco, Retiro, Barra Velha

The representativeness of the gillnet (18cm mesh size) landing is 97.9% of this total (19,650 kg). CPUE varied over the months, with increases followed by decreases, with high peaks in November and January. The average cost and expenses used to carry out fishing, including meals, ice and fuel, was BRL 703.00, with a maximum general cost of more than BRL 2,800.

Biometric measurements were obtained for 945 individuals (24.8%) captured by the gillnet (18cm mesh size). The total length, standard length and weight of the individuals caught with this fishing gear was on average 87 ± 12 cm, 76 ± 12 cm and 6.177 ± 2.685 kg, respectively. All individuals registered in gillnets (18cm mesh size) fishing had a total length greater than 51 cm. Therefore, fishing with this fishing gear has characteristics that can guarantee the maintenance of stocks. The specimens captured by the net, in general, reached the minimum average length of first maturation.

Landing of acoupa weakfish in the community of Guajerutia – Marine Extractive Reserve of Cururupu (photo: Enrico Marone/Rare)



Frequency distribution per total length of individuals caught by gillnet (18cm mesh size) landed in the Marine Extractive Reserve of Cururupu



Consideration Relevant for Management

The catch of acoupa weakfish in the Resex Cururupu and Arapiranga-Tromai shows seasonal patterns influenced by the local rainfall system:

- The gillnet (18cm mesh size), used predominantly in the two reserves, presents high selectivity in relation to the length of the collected specimens
- Most of the individuals collected were close to the optimum catch size, which guarantees the recruitment of new individuals in the fish stock of the species
- The evaluation carried out for the rotation systems established in the fishing grounds was not conclusive. It is necessary to refine information regarding the population dynamics of the species, in order to understand its life cycle and factors (natural or not) that influence the variation of the fishing stock exploited in the communities
- It is necessary to continue the process of regulation and seasonal closures for the species



Professor Beatrice Padovani with fishers at the Cururupu Extractive Reserve (photo: Mayra Nascimento)

Conservation and Stock Recovery Areas - Repensa Pesca (Rethink Fishing) Program

In order to guarantee the effective management of acoupa weakfish in the reserves, we need to refine knowledge about the species' fish stocks and provide data on population dynamics and larval dispersion patterns. To this end, the partnership proposed with the Repensa Pesca (Rethink Fishing) Program is strategic. It will carry out stock feasibility studies, with continued observation of fisheries monitoring data, added to studies of reproductive and growth ecology.

Repensa Pesca was selected in the "MCTI/MPA/CNPq n. 22/2015" call for proposals, with scope in the "Brazilian Marine Fisheries Management", thematic line IV, which aims to provide an "Ecosystem Assessment of Demersal and Pelagic Fishery Resources on the North and Northeast Coasts". The Program, coordinated by Professor Beatrice Padovani Ferreira from the

Federal University of Pernambuco - UFPE - operates in nine states in the North and Northeast and has the support of 32 partner institutions, including social movements linked to fishing, such as the Fishers' Movement (MPP), Pastoral Fisheries Council and Confrem.

The development of the program aggregates aspects of ecology and biology of species combined with an ecosystem approach to assess stocks. Their studies also consider traditional knowledge in data collection and validation. In the Resexs Cururupu and Arapiranga-Tromai communities, the project has an estimated duration of one year. It aims to provide subsidies for the effective management of fisheries, through tools such as the creation of networks of Conservation and Stock Recovery Areas (ACRES).

PIAUÍ

PROJETO: Monitoramento da pesca na APA Delta do Parnaíba

RESPONSÁVEL TÉCNICO:

Dr. Cézar Fernandes, Universidade Federal do Piauí – UFPI

Considerações Relevantes para o Manejo

- The project was proposed as a continuation of a work initiated in Cycle 1 of Rare's operations in Brazil, which collected information for the preparation of the unit's management plan. In the second phase, the research monitored the landings through a daily monitoring program of the main species with greater representation, collecting information on production and biometrics in the APA Delta do Parnaíba, also covering the area of the Resex Delta do Parnaíba.
- The records were made using structured forms with the support of a trained local monitor. The monitor worked in the main landing ports of the fishing communities of the APA and Resex.
- The average CPUE in number of sets per species ranged from three to 26 kg, while the average CPUE in number of fishing days per species varied between ten and 100 kg.



Cast net fishing in the lagoon of the Canary community, Resex Delta do Parnaíba (photo: Enrico Marone/Rare)

APA e RESEX DELTA DO PARNAÍBA

Landings recorded: 101

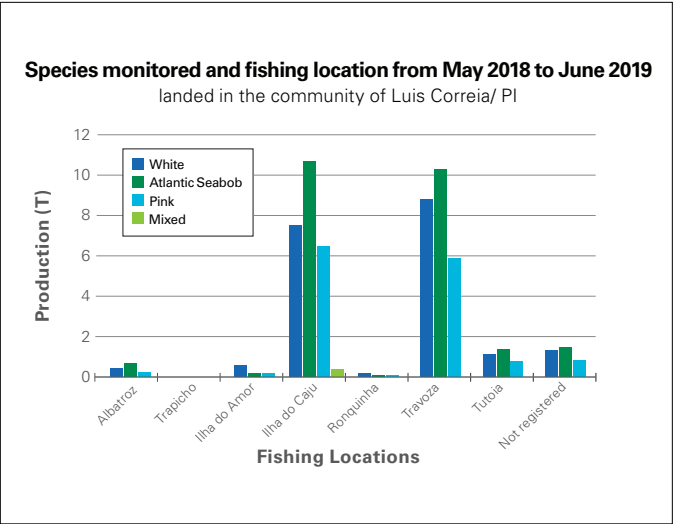
Total shrimp production: 62,000 kg

Fishing gear: trawl net

Locations monitored and target species: Luis Correia – White shrimp (*Litopenaeus schmitti*), Atlantic seabob (*Xiphopenaeus kroyeri*), and Northern brown shrimp (*Farfantepenaeus brasiliensis* and *F. subtilis.t*)

Characterization: boats vary from nine to 14 meters in length, they work with two to four fishers, on cruises that last from one to 25 days at sea. The number of trawlings per month ranged between 30 and 63

Fishing locations: Albatroz, Trapicho, Ilha do amor, Ronquinha, Travoza, Tutóia



Species monitored and fishing location from May 2018 to June 2019, landed in the community of Luis Correia/PI

- A total of 37,600 fish individuals were landed during the collection period. Production in kilograms per month peaked in February (3,516.2 kg) and June 2019 (3,224.92 kg). As for the quantification of individuals per month, a greater peak was observed in June 2019, with 10,399 specimens.



APA E RESEX DELTA DO PARNAÍBA

Desembarques Registrados: 1.796

Produção total de camarão: 23.392,25kg

Principal arte de pesca: rede de emalhe à deriva

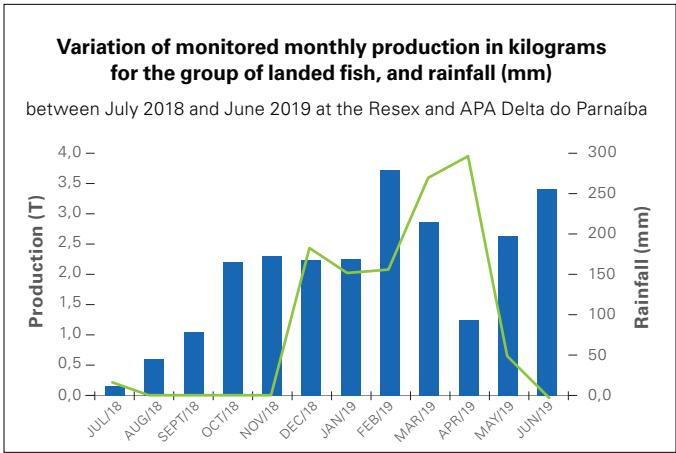
Locais monitorados e espécies-alvo:

Morro do Meio – pescada-amarela (*Cynoscion acoupa*); Ilha das Canárias e lagoa – robalo flecha (*Centropomus undecimalis*); Porto dos Tatus – bagre negra velha (*Sciades herzbergii*) e tainha (*Mugil curema*); Pedra do Sal – ariacó (*Lutjanus synagris*), chancarona (*Lobotes surinamensis*), pescadinha-gó (*Macrodon ancylodon*)

Caracterização: embarcações com comprimento de 3m e 10m, com tripulação entre um e cinco pescadores, com saída e chegada em período inferior a 24h – média de 7h de pescaria por dia. A operação de pesca apresentou uma variação de três a sete lances de pesca com, tempo de duração em torno de três horas por lance



Gillnet fishing, known locally as *caçoeira de robalo* (snook fishing), in the Delta do Parnaíba Extractive Reserve (photo: Enrico Marone/Rare)



Variation of monitored monthly production in kilograms for the group of landed fish, and rainfall (mm) between July 2018 and June 2019 at the Resex and APA Delta do Parnaíba

- Among the target species captured, greater production was observed in kilograms and number of individuals for king weakfish (6,260.7 kg, 24,017 fish), indicating that this is the main fishing resource in the Resex and APA Delta do Parnaíba, followed by fat snook (5,463 , 47 kg, 1,116 fish).
- The lengths of the target species and their relationship with the selectivity of the fishing apparatus and the landing site presented themselves as strong indicators of the sustainability status of the fisheries. The catch of the snook (*Centropomus undecimalis*) showed an average length of 70 cm on landings in the Ilha das Canárias. In Lagoa Salgada, with the net fishing device, the average found was 17cm, and using the cast net the average was 14cm, according to what was expected for the life cycle phase and the main fishing gear. In the other locations, Luis Correia, Morro do Meio and Pedra do Sal, the average lengths presented were above 50cm.

Considerations Relevant for Management

- The ICMBio program *Monitora* has the same type of configuration adopted for the application of participatory monitoring in the Delta do Parnaíba. The validation of the participatory monitoring activities of the Fish Forever project in Delta do Parnaíba may support the implementation of the program at the national level. The Atlantic seabob and white shrimp accounted for the largest volume of landings in Luis Correia, in line with expectations for the Northeast and coastal fisheries.



Mouth of the Formoso river – Pró-Resex Rio Formoso (photo: Enrico Marone/Rare)

- An increase in the volume of catches was observed in February 2019 for the fish group, especially for tripletail and king weakfish. This might be possibly related to the distribution and abundance of these species in the local habitat.
- The selectivity for line fishing for acoupa weakfish in Morro do Meio (~60 cm in average length) was proven, indicated by the campaign managers with the results of the local fishing agreements. At Pedra do Sal, however, the average size of individuals was around 30 cm. Considering the length of sexual maturity (L50) for the species (42.7 cm – FISHBASE), it is necessary to regulate these catches to preserve young individuals.
- The average length of mullets was greater than 24 cm in the fisheries monitored at Resex and APA Delta do Parnaíba, above the L50 estimated locally at 23 cm (UFPI).

- The presence of approximately 50% of individuals with a length below the L50 estimated at 55 cm for the tripletail (FISHBASE) was observed in the fisheries, except for those caught using a line in Pedra do Sal, indicating the need for fishing management for that location.
- King weakfish is one of the most important fishing resources in the APA Delta do Parnaíba, according to the project data. It was possible to observe a percentage around 90% of the fish caught with a length above the L50 estimated at 23.7 cm (FISHBASE).
- The lane snapper has an estimated L50 of 23.8 cm (FISHBASE), and 85% of the individuals caught in the APA Delta do Parnaíba, according to the data, were above the mentioned L50. Pedra do Sal, however, presented individuals smaller than 20 cm.

PERNAMBUCO

PROJECT: Fish Forever in the estuary-reef complex of Rio Formoso/Carneiros (APA de Guadalupe): integrity and ecosystem connectivity as a conservation strategy


TECHNICAL EXPERT RESPONSIBLE: Dr. Beatrice Padovani, professor at the Federal University of Pernambuco – UFPE.

This project was designed to support the process of creating the Rio Formoso Extractive Reserve, located in the Municipalities Tamandaré, Rio Formoso and Sirinhaém, state of Pernambuco, in accordance with Normative Ruling n. 3 of September 18, 2007, of the Chico Mendes Institute of Biodiversity Conservation, which governs the guidelines, rules and procedures for the creation of a Federal Conservation Unit in the categories of Extractive Reserve and Sustainable Development Reserve.

At APA Guadalupe, the project continued monitoring, research and conservation actions in the estuary complex of Rio Formoso, with a focus on the mullet, through an integrated space-time approach, involving local actors in the actions through the promotion of regional ecological knowledge and traditional practices.

On a quarterly basis, expeditions are made to register fisheries within the communities and the fishing gear used. For *camboa* fisheries – fishing gear of low selectivity, traditionally used by local fishers – the values of monthly CPUE will be estimated and the species of mullet (*Mugil spp.*), biometrics (cm) and biomass estimates will be identified. In addition, *camboa* zoning is being carried out, where maps presented served as a basis for discussions with the community at campaign meetings. The calculation of the mangrove area is also being carried out, based on satellite images. New points are being incorporated into the maps, including areas of deforestation. The results will be presented in the next report and during feedback to the community.

Studies at APA de Guadalupe are longstanding. They started with the *Recifes Costeiros* (Coastal Reefs) Project and received contributions from initiatives such as the *Meros do Brasil* (Groupers in Brazil) Project and INCT Amb-Trop, encompassing aspects of fishing, connectivity and the conservation of endangered species. The project "Fish Forever in the estuary-reef complex of Rio Formoso/Carneiro: integrity and ecosystem connectivity as a conservation strategy" was implemented in partnership with the Federal University of Pernambuco, under the responsibility of Professor Dr. Beatrice Padovani.



APA DE GUADALUPE

(Pró-Resex Rio Formoso) – Fisheries censos

Landings: 193 days monitored


Fishing gear recorded: arrastão, combination of fishing gear, batida de gaiteiro, camboa, shelled molluscs collection, trap, gerere, linha mergulho, rede de cambão, gillnet, cast net

Species: several

In the estuarine complex of Rio Formoso, several fishing gears were used simultaneously. The most frequent were the drift net, with around 37% participation, followed by the cast net (30%) and camboa (10%). The fishing gear with the highest catch was the camboa, with an average value of 100kg per harvest, with a harvest of around 700kg being recorded in July 2018.



Camboa in the Formoso river (photo: Gabriel Vianna)



APA DE GUADALUPE

(Pró-Resex Rio Formoso)
Camboa monitoring

Landings: 21 *camboas*

Species recorded: mullet (*Mugilidae*), *Gerreidae* – Mojaras, jacks and scads

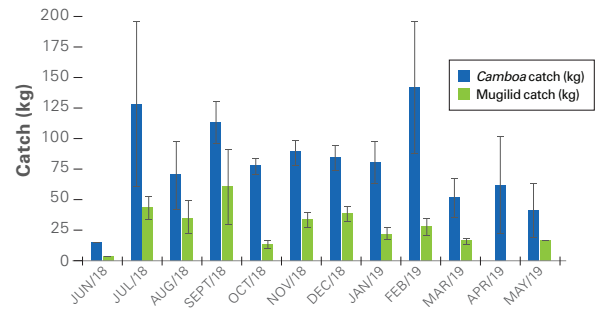
Mullets (*Mugilidae* family) make up the most captured family in the Rio Formoso estuary, representing approximately 45% of catches, followed by the *Gerreidae* family, with about 30%, and carangids, with 13% of catches, with the jack fish being the species responsible for about 11% of the total family. Mugilids were identified as a focus group of the campaign for their importance in fisheries. The largest mullet catch, by a single *camboa*, was 150kg (approximately 98% of its total catch), with two other *camboas* showing mullet catches over 100kg (corresponding to 66% and 69% of their total catch).

Considerations Relevant for Management

- Together with representatives of the Fishing Colony of Rio Formoso, Tamandaré and Sirinhaém, campaign managers, members of the Meros do Brasil project, members of the Federal University of Pernambuco,

Monthly distribution of mullet catches and total catches per camboa in the estuary complex of Rio Formoso

between June 2018 and May 2019. For April and May 2019, the data obtained by the collectors is in the process of being included. The bars correspond to standard error.



Monthly distribution of mullet catches and total catches per camboa in the estuary complex of Rio Formoso, between June 2018 and May 2019. For April and May 2019, the data obtained by the collectors is in the process of being included. The bars correspond to standard error

representatives of traditional communities and part of the Environmental and Territorial Zoning consultancy team for Nautical Activities (ZATAN), three points were marked for the implementation of the Estuarine Life Preservation Zones (ZPVE): Toca de Baixo (Rio Ariquindá), Nova Holanda (in front of Cruzeiro do Reduto) and Pedra da Margarida or Pipiri (Rio Formoso). The Sanctuary is a seal to strengthen the conservation of species, and the ZPVEs aim to ensure the conservation of estuarine species and the export of this biomass for fishing in the surroundings.

- The group established areas for embarkation and disembarkation of passenger or cargo boats, areas for bathers and water sports, prohibition of motorcycle traffic in the estuary, prohibition of spearfishing or fishing with similar gear, prohibition of motorized vessel traffic and prohibition of sailing events, except regattas and religious events. It was defined that upstream of Cruzeiro do Reduto only small vessels (according to NORMAM) for artisanal fishing and/or community-based tourism will be allowed to traffic in the area.
- Currently, the group is in the process of consolidating maps of the areas that will be brought up for discussion in the community, for the consolidation of management measures.
- The technical proposal for the creation of the Rio Formoso Extractive Reserve was prepared.

PERNAMBUCO

PROJECT: Survey of fisheries and proposal for the implementation of a rotation system of areas of use in artisanal shrimp fishing: an ecosystem approach in APA Costa dos Corais, municipality of Tamandaré/PE

TECHNICAL EXPERT RESPONSIBLE: Dr. Mauro Maida (Departament of Oceanography at the Federal University of Pernambuco)

The project carried out at APA Costa dos Corais aimed to describe the operational characteristics of the shrimp fishing activity through the survey of vessels and fishers who work in the Tamandaré region, as well as local ecological knowledge. The objective is to prepare and submit drafts of normative rulings for zoning and ordering fisheries (Ordinance/ Normative Ruling/ Fisheries Agreement) to the agencies responsible.

The proposal is to include two areas in the APA management plan to protect and guarantee the perpetuation of the shrimp species exploited by the community. The areas were mapped through bathymetric analysis to evaluate the sediment, in addition to tests with devices for density and biomass estimates. Vessels operating in the area are being tracked using a system installed on cell phones and provided to fishers to record vessel tracking.



City of Tamandaré – Costa dos Corais Environmental Protection Area (photo: Enrico Marone/Rare)



Costa dos Corais Environmental Protection Area (photo: Enrico Marone/Rare)

APA COSTA DOS CORAIS

Fish landings: 1,571

Shrimp landings: 36 (May to December 2018)

Species: shrimp and others

The shrimp fishing period in 2018 was particularly short compared to previous years. Fishing activities started in April and by mid-August most of the boats had given up due to low profitability. The fishers then started to migrate to the line or net fishing (platform and continental slope).

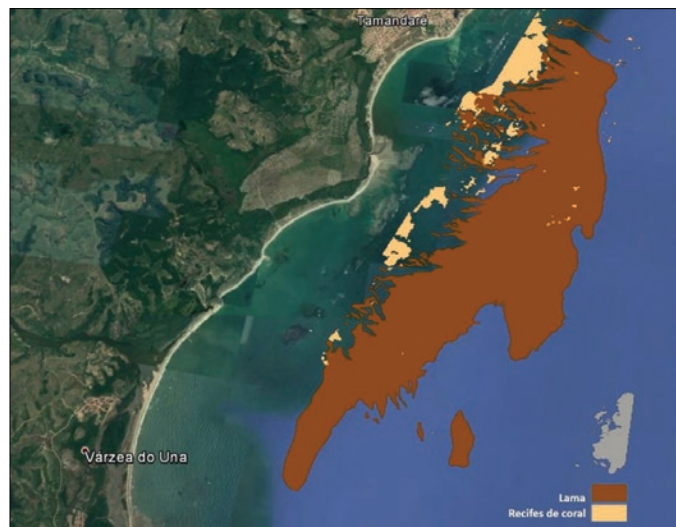
In 2017, the fishery extended until the month of November. In the second half of August 2018, only vessels that fish at night were observed. As the Tamandaré fleet culturally only operates in daytime fisheries, the vessels observed in nighttime operations came from neighboring municipalities. In order to know the port of origin of these vessels, a radar tracking was performed during the night period at the end of the fishing season. Another observed event was irregular fishing frequency. A large part of the Tamandaré fleet broke down and remained in maintenance for long periods. When comparing annual production using the average CPUE (daily production), 2018 was significantly lower than the previous year.

The data indicate that only 30% of the total weight captured is from the target species of the fishery, and that 50% (fish and invertebrates) is discarded from the fishery, almost entirely composed of juveniles of various species of fish and crabs.

As the trawling is long, lasting about four hours, the probability of an animal being found alive at the end of the trawl is very low. This information generates elements to initiate a discussion about a planning measure that limits the trawling time, for example four one-hour trawls, instead of a four-hour trawl. As most boats are not equipped with winches and the nets are lifted by hand, it is certainly a proposal that initially will have a lot of resistance to be approved.

The catch composition data associated with the trawl tracking and net opening data allow accurate estimates of productivity per area (kg/ha), as exemplified in the table below.

The impact that shrimp fishing has on benthic habitats is well illustrated by the results of the tests carried out. One hectare trawled resulted in an average production of 670 grams of shrimp. If we consider white shrimp, the species with the highest market value (BRL 30/kg paid to fishers in 2018), production was 120 grams per hectare trawled, i.e., BRL 3.60 per hectare. In an estimate carried out for the year 2002, using much less precise methods than possible with this new tracking system, an average production for the entire harvest of that year was calculated at 780 grams/ha (total shrimp).



Management area for shrimp fishing grounds in front of the municipality of Tamandaré (source: UFPE/IRCOS).

Considerations Relevant for Management

- Within the scope of the project, the inclusion of two fishing areas in the management plan of APA Costa dos Corais was proposed for the protection and sustainability of diversity and fishery resources.
- The mapping data verified that the Tamandaré shrimp fishing grounds has a total area of about 1,670 hectares (16.7 km²).
- The trawl test carried out with the tracking system indicated that a vessel, in a single trawl per day, explores about 1% of the total fishing grounds area (16.34 hectares). To measure the impact of the activity, this estimate must be multiplied by at least ten vessels performing two four-hour trawls a day, plus those outside vessels that drag in 24-hour shifts with double nets and winches. Notably, the fishing grounds habitat and shrimp production do not support the fishing model currently being used.
- The adoption of technologies for vessel tracking can be a low-cost and highly engaged solution for fishers to plan a management of the target species of high social, economic and ecosystemic benefit.

PARÁ

PROJECT: Monitoring of artisanal fishing in the Marine Extractive Reserves of Mãe Grande do Curuçá, São João da Ponta and Soure

TECHNICAL EXPERT RESPONSIBLE: Dr. Mauro Tavares, UNAMA

In Marine Extractive Reserves of Mãe Grande Curuçá and Soure, shrimp (*Litopenaeus schimitti*, *Penaues subtilis* and *Xiphopenaeus kroyeri*), and regional shrimp (*Macrobrachium amazonicum*) were the target species chosen. Despite being species of different habits, the collection methods used for sampling in these two reserves were adapted in order to optimize the sampling effort and the capture of individuals. For both species, biomass (grams/m²), density (number of individuals/m²) and selectivity of fishing gear used by fishers were estimated, correlating with physical-chemical factors of the water and rainfall variations.



Artisanal fishing using a cast net in Pacamorema – Atlantic seabob (*Xiphopenaeus kroyeri* – Mãe Grande de Curuçá Extractive Reserve (photo: Enrico Marone/Rare)

RESEX MÃE GRANDE DE CURUÇÁ

Landings recorded: 92

Total production: 781.1 kg

Main fishing gear: *puçá* net


Main fishing location: Beira Boca

Characterization: fisheries last one day, with an average of 1.3 hours. They take place using canoes, usually with two fishers

Target species: *Penaeidae*



Artisanal fishing – regional shrimp caught using a matapi trap – Soure Extractive Reserve (photo: Enrico Marone/Rare)



RESEX SOURE

Landings recorded: 99

Total production: 747.5 kg

Main fishing gear: *matapi* trap and cast net

Main fishing location: Seminário

Characterization: fishing lasts an average of 3.7 hours a day, being carried out by one to six fishers using canoes with one to 13 *matapi* traps, which can be used together with a net or trawl

Target species: *Macrobrachium*



Artisanal fishing using a cast net in Pacamorema – Atlantic seabob (*Xiphopenaeus kroyeri* – Mãe Grande de Curuçá Extractive Reserve (photo: Enrico Marone/Rare)

PROJECT: Species diversity, size, and biomass

TECHNICAL EXPERT RESPONSIBLE: Dr. Bianca Bentes (Pará Federal University)

A total of 13 species of shrimp were identified during the collections in the Curuçá and Soure reserves, the greatest wealth recorded in the local dry period. The relative biomass calculated by location was higher in the municipality of Soure, particularly in the Igarapé Seminário, where the captured volume exceeded 2 kg. The volumes produced were always higher in the rainy season in the municipality of Soure. In the municipality of Curuçá, Penaeidae prawns were caught in all locations, especially Igarapé Pinheiro, where the average biomass was the highest recorded in the period. For Paleomonidae shrimp, the largest individual was caught at the 'Barra Velha' site, in the municipality of Soure.

PROJECT: Shrimp sustainability and management

TECHNICAL EXPERT RESPONSIBLE: Dr. Bianca Bentes (Pará Federal University)

The study carried out in the Marine Extractive Reserves of Mãe Grande Curuçá and Soure shows a marked seasonality in the catches for each species of shrimp. In particular, fresh-water shrimp, such as those of the genus *Macrobrachium*, have a “harvest” markedly in the rainy season, which strongly directs the use of *matapi* traps along the various tidal channels visited. The dominance of marine shrimp occurs mainly in the dry period, when salinity is higher.

Catch dynamics, as well as fishing in general, follow this seasonal rhythm. Considering the observed effort, it seems to be salutary in maintaining the population structure of the species. The diversity of shrimp, as presented, is relatively large, and consumption strictly obeys the dynamics of the availability of species.


We understand that there are many shortcomings and that they could be the target of new management initiatives. The living conditions of the main actors of this resource are precarious in structural, health and economic terms. Families that use shrimp fishing as a source of income and/or food have low education levels and family income, which highlights the need for government actions aimed at socio-economic sustainability in fishing communities. Thus, we suggest strategies for the management of shrimp fisheries mainly based on social actions, namely:

- Implementation of social organization
- Awareness and training programs focused on ecological sustainability and fisheries management

Governmental actions provided the strengthening of social organizations, as well as fisheries management geared to the local reality. The strengthening of these mutual organizations favored the implementation of programs aimed at ecological (community awareness), social (improvement in the quality of life of the local population) and economic (increase in family income) sustainability, which contributes satisfactorily to the improvement in quality of life of the local population.

PROJECT: Monitoring of artisanal fishing in the Marine Extractive Reserves of Mãe Grande do Curuçá, São João da Ponta and Soure

RESPONSÁVEL TÉCNICO: Dr. Mauro Tavares, UNAMA



RESEX SÃO JOÃO DA PONTA

Landings recorded: 284

Total production: 37,280 units

Main gear: arm and tie technics (*braceamento* and *laço*)

Main fishing locations: Mariparema

Characterization: fisheries are carried out mainly with motorized canoes (*rabeta*), which can spend from one to five days fishing, and have an average duration of eight hours a day

Target species: mangrove crab (*Ucides cordatus*)




PROJECT: Monitoring of the mangrove crab fisheries in communities of Caeté-Taperaçu (Bragança-PA) and Gurupi-Piriá (Viseu-PA) Extractive Reserves)

TECHNICAL EXPERT RESPONSIBLE: Dr. Bianca Bentes (Pará Federal University)

The objective was to study population parameters, biology and ecology of species of socioeconomic importance landed in some communities of the Caeté-Taperaçu (Bragança) and Gurupi-Piriá (Viseu) Extractive Reserves, in addition to monitoring the species and generating impact indicators. In the project, production data (crab units) and biometry (m) of crabs landed in the main ports of the communities were recorded, in addition to density estimates (number of crabs/m²) and biomass (gram/m²) *in loco*, through standardized methodology. Furthermore, at Resex Gurupi-Piriá, general fisheries are recorded for holistic and ecosystemic understanding of practices in order to ensure a more reliable assessment and identify more sustainable characteristics of the fishery.

The records of crab landings and fisheries in general took place on a daily basis with the support of community members trained by the UFPA team.



RESEX GURUPI-PIRIÁ

Landings recorded: 1,349

Total production: 14,899kg

Main fishing gear: *malhadeira* (net fishing) and longline

Main fishing locations: Furo Novo and Pesqueirão

Characterization: fisheries can last from one to 13 days, with one to four fishers who often use canoes with a motor or paddle for displacement

Main species: Pemecou sea catfish (*Sciades herzbergii*), shrimp (*Penaeide*) and acoupa weakfish (*Cynoscion acoupa*)

Fishing of the mangrove crab in the São Francisco stream – São João da Ponta Extractive Reserve

FAMILY	COMMON NAME (ENGLISH)	SPECIES	AUTHOR/YEAR
Ariidae	Sea catfishes Fork-tailed catfishes	<i>Bagre</i> sp	•
		<i>Bagre bagre</i>	Linnaeus, 1766
		<i>Sciades couma</i>	Valenciennes, 1864
		<i>Sciades parkeri</i>	Trail, 1832.
		<i>Sciades</i> sp	•
		<i>Amphiarus rugispinis</i>	Valenciennes, 1840
		<i>Cathorgos spixii</i>	Agassiz, 1829.
		<i>Sciades proops</i>	Valenciennes, 1840.
Auchenipteridae	Zamora catfish Jaguar catfish Slopehead catfish	<i>Pseudauchenipterus nodosus</i>	Bloch, 1794.
Batrachoididae	Frogfishes Toadfishes Bastard Stonefish	<i>Batrachoides surinamensis</i>	Bloch & Schneider, 1801.
Carangidae	Jacks	<i>Trachiotus</i> sp	•
Carcharhinidae	Requiem sharks	<i>Carcharhinus</i> sp	•
Centropomidae	Common snook	<i>Centropomus undecimalis</i>	Bloch, 1792.
Cichlidae	Cichlid	<i>Astronotus ocellatus</i> <i>Cichla</i> sp	Agassiz, 1831. •
Dasyatidae	Stingray	<i>Dasyatis</i> sp	•
Haemulidae	Grunts	<i>Genyatremus luteus</i>	Bloch, 1785.
Megalopidae	Tarpons	<i>Megalops atlanticus</i>	Valenciennes, 1946.
Mugilidae	Mullets	<i>Mugil</i> sp	• •
Penaeidae	Shrimp	<i>Penaeus subtilis</i>	Perez Farfante, 1967.
Pimelodidae	Long-whiskered catfish	<i>Brachyplatystoma rousseaux</i> <i>Brachyplatistoma vaillantii</i>	Castelnau, 1855. Valenciennes, 1940.
Portunidae	Ornate blue crab	<i>Callinectes danae</i>	Smith, 1809.
Rachycentridae	black kingfish lemonfish	<i>Rachycentron canadum</i>	Linnaeus, 1766.
Sciaenidae	drums croakers jewfishes	<i>Cynoscion virescens</i>	Cuvier, 1830.
		<i>Micropogonias furnieri</i>	Desmarest, 1823.
		<i>Cynoscion acoupa</i>	Lacèpede, 1801.
		<i>Plagioscion squamosissimus</i>	Heckel, 1840.
		<i>Macrodon ancylodon</i>	Bloch & Schneider, 1801.
Scombridae	albacores mackerels	<i>Scomberomorus brasiliensis</i>	Caollet, Russo & Zavala, 1978.
Serranidae	groupers sea basses	<i>Epinephelus itajara</i>	Lichtenstein, 1822.
Tetradontidae	pufferfish blowfish toadfish	<i>Colomensus psittacus</i>	Bloch & Scheider, 1801.
Trichiuridae	ribbonfishes cutlassfishes hairtails	<i>Trichiurus lepturus</i>	Linnaeus, 1758.

Table: Family, common/vernacular name, probable species, author and year of fish caught in the controlled shipments of the communities of Centro Alegre and Fernandes Belo, in the municipality of Viseu, Resex Gurupi-Piriá, from May 2018 to April 2019

RESEX GURUPI-PIRIÁ

Landings recorded: 1,765

Total production: 2,739,568 individuals

Main fishing gear: hook and arm technique

Characterization: fisheries are carried out with canoes and have an average duration of five and a half hours, with an average CPUE of 40 crabs/hour. The average length of landed crabs is 6.93 cm.

Main species: mangrove crab (*U. cordatus*)

The period of greatest local precipitation also presented the highest averages of fishery production. The Amazon region, specifically in the local winter (rainy season), is characterized not only by increased production, but also by an increase in the variety of species caught, as well as the diversity of fishing gear.

Ten ethnospecies presented in the Resex Gurupi-Piriá represent more than 85% of the total catch. A total of 80% of the species have a medium to long life cycle (close to ten or more years), constituting fishing directed to species such as the acoupa weakfish, catfish and snook.



RESEX CAETÉ-TAPERAÇU

Landings recorded: 2,158

Total production: 2,624,914 individuals

Main fishing gear: hook and arm technique

Characterization: fisheries are carried out with canoes and have an average duration of 6.2 hours, with an average CPUE of 33 crabs/hour. Commercial crabs average 7.57 cm.

Main species: mangrove crab (*U. cordatus*)

The tapping net , responsible for a large part of the collection, is a form of capture considered prohibited since the Environmental Crimes Law (9,605, of February 12, 1998). The use of forms of capture considered illegal by Brazilian law is quite common throughout the Northeast of Pará. In addition, it is an easy form of capture, which allows the retention of considerable volumes of fish even with the generation of a relatively large amount of tailings, which includes fish of small sizes, marginal vegetation and garbage, also common in the various areas where fisheries are carried out.

Crab: an important fisheries resource in Pará state

Throughout the research period, the Tamatateua community was the most productive in the number of crab landings made, however, the average production per trip was higher for the Centro Alegre community, especially in July, when production reached 220,000 units.

This high productivity for that month may be associated with the local period and school holidays, when the number of tourists in the beach towns of northeastern Pará increases considerably. In the same period, the variation in the price of the first sale is readjusted in the order of almost 50%, when the exchanges range from BRL 10.00 (± BRL 3.00) to BRL 15.00 (± BRL 2.00) on average in all studied locations. These values are above those observed in the research carried out from 2005 to 2011 (BRL 1.50 to BRL 2.50).

Miguel Francisco de Assis Silva, artisanal fisher and crab collector. Fernandes Belo mangrove – Gurupi-Piriá Extractive Reserve (photo: Enrico Marone/Rare)



Open market in the city of Bragança – sale of mangrove crab (*Ucides cordatus*) (photo: Enrico Marone/Rare)

The duration of the trips varies according to the autonomy of the fishers, mainly due to the availability of food. They can be carried out during a single tide or last for a few days, when the fishers are accommodated in temporary ranches, built on stilts, near the collection sites. In this case, the collectors arrive at the mangroves using larger vessels, which transport more people.

Crab population assessment and management considerations

At Resex Caeté Taperaçu, crabs are larger and heavier in the dry period, especially in the fringe zone. On the other hand, in this same zone, in the rainy season, specimens of smaller size and weight are found. Larger and heavier crabs are found in impacted mangroves, regardless of the seasonal period. The proportion of males and females is different from 1:1, the number of males is always greater than that of females.

At the Resex Caeté Taperaçu, the results from the collections were slightly different from those observed for the mangroves of Resex Gurupi-Piriá. In the intermediate zones, the largest and heaviest crabs are always

observed, especially in the dry period, when the animals have a higher average. According to the areas considered more and less impacted, it was evident that those with the least impact have the largest and heaviest crabs. Finally, the proportion of males at the expense of females was higher in the dry period, corroborating the scientific literature. In the rainy season, however, the proportions seem to match, showing an important aspect from a biological point of view.

As it is a species that, even with a recruitment considered relatively high compared to the cryptic species of K and R strategist, as is the case of crab, apparently the recruitment for fishing has managed to maintain the current state of the exploitation effort in the fishing areas of studied. However, it must be agreed that the effort needs to be somewhat controlled, in light of seasonal variations or the chance of the abundance of the species. In this context, it is worth discussing the optimal exploitation of the resource, which is a point that should be calculated and analyzed. With a small timeseries associated with the collection gaps in some months, the aforementioned calculation was impossible, given that the projects have a beginning and an end.

Even considering the data limitations, we defined some points of reference as a strategy to enable a multidisciplinary and integrated ‘management’ process:

- A) Ecological reference points – pollution in mangroves and deforestation
- B) Economic reference points – unfair production chain with many intermediaries and low wages, unknown maximum revenue, as well as optimum economic and financial effort
- C) Social reference points – low education level, absence of job offers, medical assistance that does not exist in the communities, non-observance of labor rights and lack of access to unemployment insurance during the closed season.
- D) Environmental reference points – traceability of local projects, reduction of crab extraction at certain times of the year and in specific areas
- E) Legal reference points – need for more human resources and availability to carry out infringement processes



Boat arriving at the landing port in the Treme community - Caeté-Taperaçu Extractive Reserve (photo Enrico Marone/Rare)

Value chain and labor relations in the production of the mangrove crab

The mangrove crab can be purchased in four forms: live, cooked whole, “meat” or “claws”. There is also a rearrangement of these forms of commercialization, in the ways described below:

1. **BUNCHES:** most common form of marketing, in which live crabs are tied in 10 to 14 units, with the final consumer responsible for cooking them
2. **PANEIROS:** commercialization of approximately 40 crabs stored in artifacts woven in straw and sold live
3. **BAG:** about 100 units of crabs stored in burlap sacks. Usually intended for processing in factories and neighboring cities
4. **CLAW:** separate sale of part of the animals' chelipeds (usually sold per kilo), after the animals have been cooked
5. **MEAT:** the crab meat is removed after the animals are cooked and sold per kilo
6. **BUTCHERED:** in this case, the crabs are brought to pieces and sold raw to middlemen who cook them and perform some type of processing, to later sell to final consumers

The labor relations in the collection and marketing chain of the crab fishery production system happen between relatives, acquaintances and friends, without any formality or legalization. In the supply chain, we identified some categories, namely:

CRAB FISHER – MIDDLEMAN RELATIONSHIP. The collected crabs are delivered to pre-established middlemen, called *armadores*, who normally provide boats to transport the collectors to the mangroves. This relationship can be maintained exclusively or alternated with situations in which collectors seek the best offers at the landing and commercialization locations. The specimens are purchased whole (bunch or *paneiro*) or butchered.

RELATIONSHIP BETWEEN MIDDLEMAN AND CRAB FISHER. The middleman acquires the product from the crab collectors and delivers them to the crab fisher, who perform the processing, leaving the products in the form of meat or claws. These relationships may or may not be fixed. Sometimes, the middleman provides 'vouchers' for the collectors, an advance for domestic expenses, which compromises future work. For each kilogram of processed meat or separate claw, about 50 crabs are extracted.

CRAB FISHER- MIDDLEMAN. The crab is purchased by the collectors directly from the crab fishers, and after being processed, it is sold to middlemen. Buyers of the benefited products may or may not be fixed.



Boats arriving at the fish landing port in the communities of Treme and Tamatateua in the Resex Caeté-Taperaçu (photo: Enrico Marone/Rare)

Processing of crab meat in the community of Treme in the Resex Caeté-Taperaçu (photo: Enrico Marone/Rare)



‘For as long as I can remember, I already had a middleman, so much so that I am one today! It’s good for me, but not for the crab. The ideal would be that each person could sell their own product to whomever they want. Many times, I don’t have money to buy tobacco, so I have to get it from the middleman. But that’s nothing compared to a father who has to provide for his son every day! How do you get rid of the middleman in a situation like that?’

(A., 48 years old, crab collector).

The total production of crabmeat, claws and whole crabs is directed to the markets of the the municipalities, to the capital Belém, and to the cities of Fortaleza, Natal and Recife. The total volume produced is unknown. The buyers' requirements regarding the quality of the whole or processed product are: color - meat must be very white, free of impurities such as shell and odor residues - and crabs considered “strong”, those of larger size and which are supposed to arrive at their destinations alive, supporting transport conditions more efficiently.

The presence of two crab processing companies was observed. Although they were not interviewed directly, they seem to have an important role in generating employment, income and channeling the captured crabs.



Sandra Regina,
leader of the Auremag
association and Confrem
(photo: Enrico Marone/Rare)

CHAPTER 5

Life stories

Sandra Regina

The fisher who keeps youth engaged in struggles

As a child, when she wasn't studying, Sandra Regina Pereira Gonçalves, 49, was fishing. Since she was seven years old, when she started to collect shellfish alongside her mother, in the waters, muds and sands of Curuçá (PA), she has gotten the main sustenance of the house from these flooded lands (*maretórios*) which she helped baptize. "If we studied in the morning, we would go fishing in the afternoon, if the tide was good. If I studied in the afternoon, I would go in the morning", she tells us.

Born in the municipality, she grew up in a house made of clay, in Bairro Alto, where she estimates that around 80% of the population are fishers and shellfish gatherers. Even today, starting at the age of nine, children go alone, on foot or in a canoe, to harvest fish and shellfish, which, abundantly, make this region a fertile place for seafood and also for coastal-marine leadership.

Her interest in the living conditions of artisanal fishers in the region has its roots in a time when women did not usually participate in fish and shrimp fishing, an activity that is almost exclusively male. Gradually, husbands and wives began to share tasks and nets in the fishing business, with the skill of women to conduct canoes when fishing throughout the Curuçá River estuary.

While getting her teaching degree, working as a tutor for children from all over the neighborhood, teaching Portuguese, mathematics and science, Sandra followed the involvement of her mother in the *Associação Beneficente Nossa Senhora de Nazaré* in

Bairro Alto. In the group, formed mainly by women, the debates on the need to conserve forests and springs that offer water and perennial food to communities in the region were advancing.

It was in activities of the Catholic Church, during her first Eucharist, that the teacher came into contact with the concepts of environmental education, in a course offered by Ibama (Brazilian Environmental Protection Agency) for youth and children. It was a time when cattle ranching farms were spreading while the interest of external groups for the establishment of shrimp tanks in the tidal zone increased.

A member of the local youth movement, she even added carnival celebrations to the embryo of a struggle that would make her ideas and energy heard and felt, not only in the 17 Brazilian coastal states and in Brasília (DF), but that would project her voice to other continents and international environmental forums discussing the future of fishing and the environmental sustainability of the oceans.

It was the end of the 90s, when the model of areas protected through marine extractive reserves reached the northeast of Pará as a possible solution to guarantee the conservation of an extensive region. The entire coastal zone, inhabited by historically established traditional communities, would have the opportunity to protect its economy, culture and food based on artisanal fishery products.

The mobilization that began in Curuçá, would be taken by Sandra and other regional leaders to the 19 coastal municipalities, where a broad process of dialogue and awareness-raising matured. The result was the creation of the first four Extractive Reserves (Resex) in the region, in 2002, including the Resex Mãe Grande de Curuçá, covering all neighborhoods in the urban area and the rural area of the municipality.

In 2003, along with 21 other founding partners, the fisher and teacher established the project to defend her territory, now also recognized by a new word created there, 'maretório' [meaning a territory of tides, or flooded areas]. Since then, many benefits have been achieved by the

local population, which has, through the work of Auremag - Users Association of the Mãe Grande de Curuçá Extractive Reserve, access to development resources to improve living conditions, purchase equipment, get credit for housing and conquer other basic rights.

In this journey, Sandra helped to build the relationship between the communities and non-profit organizations, such as Unesco and Conservation International (CI-Brazil), whose approach was facilitated by Waldemar Vergara Filho, recognized by local leaders as a mentor of protected areas of sustainable use on the coast of Pará.

With the experience already accumulated in about two decades of articulation in defense of the rights of fishers,

Sandra made contact with the Fish Forever program in 2014, when Rare arrived in Brazil. The partnership with the organization, established two years later, came to strengthen the mission of the Extractive Reserve, increasing the visibility of

fishers, while promoting less impactful fishing practices and promoting awareness of the fish supply chain.

"The campaign was very important, because it gave the fishers the recognition they did not have. Many of them say that now they know what they are, what they want and how they want to work, in a sustainable way, with balance, so that, later on, the populations have and can see what we are seeing today", says Sandra.

Between one fishery and another, Sandra became one of the main leaders of the Brazilian coastal-marine populations, being one of the founders of Confrem, where she currently holds the position of first treasurer. As director of Finance at Auremag, she continues to represent the voice of her land, whether in solving day-to-day challenges, or in the role of national coordinator who knows the importance of fighting to guarantee an improvement in the quality of life of those who place real food on the table of millions of Brazilians.

"For us, it is very important when the partner sees people and sees that people really live and exist in that environment, and this work with Rare was very important for that", she concludes.

*"Today, we are sure that the fish can end,
but this will only happen if we end it"*

Sandra Regina, leadership at
Auremag and at Confrem



José Carlos da Silva (aka Navalha) – Confrem and Assuremav representative



Josele Silva in the Fernandes Belo mangrove – Gurupi-Piriá Extractive Reserve

José Carlos da Silva and Josele Silva

Generations in the struggle: Josele and the path of sustainability that is passed on from father to daughter

It was certainly not by chance that the 32-year-old from Pará, Josele Campos da Silva, became one of the Pride Campaign Managers, part of Rare Brazil's Fish Forever program at Resex Gurupi-Piriá, in the northeast of the state where she was born.

Her ability and desire to transform her own reality and that of those who live around her comes from the cradle, based on the example she had at home since she was born, as she herself says: “My father raised me with fishing, working in the sea to feed us and struggling to improve the lives of fishers. I liked the profession since I was little, I was always proud of it”.

Fisher, crab picker, community leader, woman, wife and mother, Josele knows the importance of her family's achievements so far, but she also knows that there is still a lot to be done: “I have a 10-year-old son, he is in the fifth grade. My dream is that he studies more and can one day give continuity to our struggle, defending the rights of those who need it most, the fishers and the crab collectors”.

But Josele's story cannot be told without starting with the life and work of his father, José Carlos Tavares Silva, or Navalha as he is called by everyone who knows him or has been affected by his work. Currently, he is one of the leaders of the National Commission for

the Strengthening of Extractive Reserves and Traditional Coastal and Marine Extractive People (Confrem) in Viseu, Pará. If his life trajectory is one of victory, it is also marked by sacrifice, tragedies, obstinacy and a lot of struggle in favor of the fishing communities in the places where he lived, lives and works.

Twice, still in his childhood and adolescence, he had to leave the beach community where he lived because the sea took over the land and houses. Where he currently is, at Resex Gurupi-Piriá (PA), which has been established for 12 years, he participated in the organization of communities from the beginning, working to converge the objectives and struggles of the 50 communities inserted in the place. He helped create and consolidate the extractive organizations in the region, such as the Intercommunity Council and the Fishers' Association.

Before that, he worked in conditions similar to slavery, from Sunday to Sunday, on third party boats, earning just enough to eat and dress. To make matters worse, the use of unsustainable methods helped to reduce the amount of fish available for extraction.

Navalha knows from experience, therefore, how important the union and training of fishers is for their dignity. Thus, as he himself explains, it has always been among his objectives, since he started his activism with the

fishers of the community, "to change the way we work, so that we can value ourselves more and more."

It is with this example at home that Josele lived since as long as she can remember. She came to see her father receiving death threats for defending the interests of his people and grew up with the firm purpose of following his ways. That is why it is not surprising that she engaged in the Pride Campaigns, which trains and empowers extractivists to build sustainable and profitable fishing and artisanal collection methods.

“The Rare project was fundamental for me to discover my potential as a leader”, she says, looking back and recognizing the path of personal growth that she has followed while helping her community to improve together with her, on the same journey.

Working with crab scavengers, her first challenge was to exercise leadership as a woman, in an activity mostly performed by men. “A young woman, wanting to act as a leader in a team of crab collectors, a difficult category to deal with, is not easy”, she explains.

It is a job that involves gaining confidence and power of persuasion: “It was already difficult to convince crab collectors to participate in meetings. They work so hard and they have to go to a meeting when it was their time off? It



Navalha monitors fisheries in the Resex Gurupi-Piriá (photo: Enrico Marone)



Josele Silva representing Resex Gurupi-Pirirá during the event Energy & Communities

is necessary to understand the importance of everything to be willing. But we managed to overcome this challenge”, she recalls.

Overcoming the initial challenge that Josele talks about was critical to the success of the entire program. It is through these meetings and similar activities that the training of local leaders and the transmission of knowledge for the sustainable use of local fishing resources, through practical and theoretical classes, are carried out.

Josele's job was to sensitize the community to engage and commit to the proposed practices. “This was another great challenge. I had a lot of difficulty speaking in public and using the computer, I got upset, but I never thought about giving up”, she says, adding that, throughout the process, she completely overcame the difficulties, a personal growth that she will carry forever.

Josele joined Fish Forever at Resex Gurupi-Pirirá about three years ago. It is a program aimed primarily at children of fishers who continue in the same activity. “It was passed on to us that the idea was to enable us to receive the baton and continue what had been done by the older fishers, often the parents of those who were there, to continue in the struggle for the promotion of our work”.

The activity, in fact, paid off. With the practices taught by technicians and multipliers and absorbed by collectors, it was possible to obtain products of greater commercial value and in greater quantity, with

sustainable methods and the manufacture of more efficient handling equipment. “One of the most rewarding things was seeing the smile of the crab collectors when they managed to sell their product at the fish market at a better price,” says Josele.

The rewards go beyond professional improvement and reach deeper spheres of social and family life for fishers. “What was left for all of us was the organization of the community. We see that today they are more organized, families are more united, talking more about preserving the crab, talking more about their income.”

Thus, the results obtained transform the present and the future, as described by Navalha's daughter: “Nowadays, we hear the collectors saying: 'If I don't care for the crabs, one day we won't be able to collect them anymore.' So, we see that something can change, that they are thinking about the future. There are fishers who took children to the meeting, to learn from an early age to preserve, to know the value they have and that it is important to always be united.”

Josele's work and involvement is recognized by the community. Fisher Zacarias Monteiro, another local leader, in a meeting held to debate the results achieved, stated: “The partnership with Rare strengthened our leaderships and

our entity, which ended up greatly improving the financial management and administrative management of our activity. Josele was very important to us, because she developed a lot during the project and brought this improvement to all of us.”

Today, Josele is in perfect condition to carry out the community's interests, following in her father's footsteps in the struggle to conserve resources, her livelihood and her community. It is through the strengthening of community participation in the adoption of best fisheries management practices that this can be achieved, motivating in the communities the notion of belonging and pride in the conservation of natural resources. Thanks to the committed work of Josele and her father, the communities at Resex Gurupi-Pirirá are closer to this reality.

“One of the most rewarding things was seeing the smile of the crab collectors when they managed to sell their product at the fish market at a better price,”

Josele, coordenadora do programa Pesca Para Sempre



João Lima in São Francisco community demonstrating the use of the crab basket (photo: Enrico Marone/Rare)



João Lima

Learning and teaching good practices to help adapt behaviors

“We win with the crab baskets, first, because crab mortality decreases, second, because we are only going to carry good quality products, and third, we all win, not only us, but the mangrove and the consumer”, explains the crab collector João de Lima Coelho, 57, council member of the São João da Ponta Extractive Reserve, one of the closest to Belém.

Knowing that he will be able to offer a product based on quality, not quantity, is today a certainty that João has, based on the availability of the fishing resource and the conservation of the mangroves that he helps preserve. The adoption of a crab basket for transporting animals is one of the achievements that marine extractive reserves have offered to the region and of which he is one of the greatest enthusiasts and multipliers.

“The mangrove is a very important thing for all of us, not only for fishers, but for everyone who uses the air to breathe, which is an air that we can say is pure air that comes from the oceans and from within the mangroves”, explains

In fact, João's traditional knowledge is recognized by research on carbon stocks that show that mangroves play a fundamental role in global climate changes, since their vegetation stores up to four times more carbon than other tropical forests in the world.



João Lima at RESEX São João da Ponta (photo: Enrico Marone/Rare)

“The mangrove brings good things to us as well as for the birds, fish, many birds that eat and sleep inside the mangrove, where there are several crustaceans, several mollusks that also eat there, several fish that eat seafood inside of the mangrove. So, it is very useful, not only for us, men and women fishers, but also for birds and fish”, adds João.

A fisher since he was 10 years old, the council member later learned, with friends, to collect crabs, betting that it would be an easier way to generate income than the daily routine he saw his fisher father go through. “I conquered a family and raised everything with seafood and crab, fish and shrimp, fish and crab, with nothing but this seafood I built a beautiful family, thank God”, says João, father of nine children.

It was only in 2009, seven years after the creation of the extractive reserve, that he became a member of the Association of Users of the São João da Ponta Extractive Reserve (Mocajum) and began to collaborate with his knowledge and energy in the defense of the extractive activities he performs since childhood.

With guaranteed work for himself and his children, while the stocks of mangrove crab last, João shares with the other leaderships of the region efforts and policy-making forums to ensure the longevity of the mangrove and its sources of income. “I say that this sea is our bank, this mangrove swamp is where we will get the seafood, the livelihood for us to buy other goods for our household needs.”

As part of the Fish Forever program, João accompanied the offer of assistance to improve the crab supply chain, helping to promote the adoption of less impacting social technologies in the transport of live animals to markets.

“Rare’s support for the Resex São João da Ponta was very good, it has been very good and has a great future, because good things happened where it went, where it worked. In the communities that joined the Pride Campaign, we saw, in each family, in each extractivist, the look, speech and knowledge that it passed on to these families through the [Campaign] managers, the campaign people, who supported each other and worked for the campaign”, remembers João.

Projecting a future, like most of the coastal-marine leaders involved in the program, he has hope for new generations. “My dream is to leave my legacy for the younger people, to instruct them to continue the work they will be doing, knowing that the Resex will remain alive in the young people who will work and continue this mission.”



João Lima visits the mangrove with Waldemar Vergara Filho (ICMBio) and Brett Jenks (Rare) (photo: Enrico Marone/Rare)



Severino Santos during the trainings and the campaign launch (photo: Enrico Marone/Rare)



Severino Ramos Santos

The art of dialogue as a tool to articulate various sectors on the Northeastern coast of Brazil

The son of a civil servant and a domestic worker, born and raised in the Recife neighborhood of Brasília Teimosa, the fisher Severino Ramos Santos, 53, nicknamed Raminho, got on a fishing boat for the first time in 1985, when he was 18 years. Before that, he had been working since he was 14 as a freight and reel loader. Since then, he has always been a fisher.

“I never had a formal contract, with a boss, working for someone. I started cleaning the fishing boat, never stopped. Fishing and the sea are my life”, summarizes Raminho, who left Brasília Teimosa in 1997, when he went to the fishing municipality of Tamandaré (PE), close to his wife's family and far from the rent that compromised almost all of his income in Recife. It was there that he got to know shrimp fishing more deeply, as well as ICMBio, Rare and the Fish Forever program. But all in good time.

When he arrived in Tamandaré, Raminho didn't know most people in the community, made up of a few hundred fishers. The exception was his wife's family. His father-in-law

and his brothers-in-law lived and live on shrimp fishing. “I was talking, getting to know people. I soon joined the Fishers’ Colony, to have the right to work on community boats, before I bought my own. There I started to understand how the association worked, what the fishers needed most, the relations with the city hall, enforcement agencies and research institutions”, he recalls.

Thus, in 2005, after living in town for seven years, the outsider Raminho composed for the first time the board of directors of Fishers’ Colony. With a speech and vision aimed at bringing everyone together, the fisher was gaining the trust of his peers, within a colony divided politically around two political groups, who are also the ones who usually dispute the positions in the city hall and in the City Council of Tamandaré.

In 2009, Raminho was again elected to the Colony, this time as vice-president. In 2013, the group of fishers that had the support of the then mayor parted ways. The lack of unity and disagreements threatened the smooth running of the institution. It was in this context that the colleagues themselves sought Raminho, asked him to run for election, as someone who could unite the community. The mayor was against the idea, but the name of the fisher was imposed by the support he received, and the election ended up taking place, that same year, with Raminho for president, and the other contestants withdrawing their candidacies. In 2017, Raminho was re-elected, until August 25, 2021.

Rare and the Fish Forever program enter this story in November 2016, when Raminho was called to join and assist in the implementation of a mapping program for the shrimp trawling area in Tamandaré. With research under the coordination of Mauro Maida, professor at the Federal University of Pernambuco (UFPE) and researcher at the Instituto Recifes Costeiros (Ircos), and using a mapping and control application of the region’s so-called fishing grounds, the program, for its effective application, required the trust and engagement of all fishers not only

from Tamandaré, but also from the beaches and neighboring communities, who work over the same fishing grounds, of 16 square kilometers in the region’s sea.

Severino Ramos was the right man for the job. The application used in the project is installed on cell phones, which are distributed to fishers. Through it, workers identify rocks and reefs that can harm fishing and damage trawls, can access maritime routes, weather and tide forecasts. In return, they must provide researchers with numerous measurements, such as area of turned fishing grounds, amount of fish extracted, times and locations of fishing activities. Raminho explains

the nature of the challenge he embraced:

“We had to convince the fisher that that institution, that researcher, was there asking him to gather information about his/her fishing, but it wasn’t to chase, to fine, to prevent people from working. It was to gather information and, everyone together, work in a better way for the whole community and for nature as well.”

The colony president was right. In addition to the obvious and direct utility of using the application for the fisher, Fish Forever detected a number of realities and guided approaches to improving conducts throughout the program. “We found that the fishing grounds turned over during the night fishing, which was made by fishers from other regions, impaired the morning fishing. We saw that there were people doing industrial fishing, with more than one net, using a winch to pull. We also discovered that the entire fishing grounds area is one, not four, as we thought, there are only reefs in the middle, which with the application we can avoid”.

The research data added to Raminho’s political wisdom and the gift of bringing together people generated the expected results. It was the fisher who managed to set up meetings and put the Tamandaré fishers at the same table with those from neighboring communities, together with researchers and ICMBio employees. “We

managed to unite everyone and set a fishing rotation system and schedules, reducing predatory methods, dividing the fishing grounds so that everyone could have their livelihood without destroying the ocean and the shrimp species”, he explains. Furthermore, yes, the fishers agreed to use the application and fill the reports with the necessary data for the surveys. “They saw that it was going to be used to benefit and not to persecute fishers”, he says.

If asked, Raminho can tell you what, personally, Fish Forever brought him and his family. He learned to speak in public, sharpened his talent for leadership, optimized

his fishing activity and even rode an airplane for the first time in his life, while participating in project activities in Belém, Pará. But when asked about the benefits of the program in general, Raminho doesn’t just think of himself:

“It was very good for everyone who participated, everyone. We were not able to eliminate all kinds of problems, nor predatory fishing. But we found a way to unite. We exchanged with other communities that fish for shrimp. We shared what we knew and learned a lot of different things. Tamandaré fishers are stronger and more united today. Are aren’t these benefits that the program brought? Of course, they are!”

“We knew how to come together. We exchanged with other communities that fish for shrimp. We offered what we knew and learned a lot of different things.”

Severino Ramos (Raminho),
Fish Forever campaign manager



Severino Santos at
the fishing colony
headquarters in Tamandaré
(photo: Natali Piccolo)



Artisanal fishing of regional shrimp in the Tucupi hole between Pesqueiro and Céu community – Soure Extractive Reserve

CAPÍTULO 6

Final Considerations

Resex Modelo para Gestão Compartilhada da Pesca

Cycle 2 of Rare's activities in the states of Pernambuco, Maranhão, Piauí and Pará presented numerous challenges, ranging from operating in regions with low socioeconomic and educational levels to the need for basic training for associations that should be responsible for local project management. On the other hand, we were able to observe throughout the process that regions with high fishing potential and traditional communities present numerous possibilities for local improvements, since socioeconomic development aligned with conservation aspects enables equity and availability of essential resources in the medium and long term.

The campaign managers were instrumental in the development of the campaigns and, certainly, the training process was essential for the strengthening of such leaders in their areas of activity, since their activities are continuous even after the completion of Cycle 2. Local leaders need to be strengthened and must, necessarily, be legitimate representatives of communities. There is a need to choose people who are a mirror of the local reality and spokespersons for the population. The problem of class representation is common to all fishers in the state of Pará. The lack of strong representations that speak for the category is still evident throughout the Brazilian coast, whereas the fishing sector, particularly that

which brings together sea workers, is considered the most disorganized in Brazil (Isaac *et al.*, 2006).

In general, participatory monitoring is a major challenge for obtaining data on fisheries, aspects of the biology of the main species caught, selectivity of fishing gear and their space-seasonal variation. In order to obtain a wider range of fisheries coverage and its variables, therefore, it is essential to expand monitoring at the level of fishers and ensure technical support and training. It is known that every transition generates a demand for time to adapt and carrying out participatory monitoring in locations where there was no similar activity is a major challenge. Few examples of monitoring work in Brazil, especially with regard to the North and Northeast regions of the country. The continuity of the collection, with systematization and analysis of the data, is essential for making decisions regarding the conservation of natural resources and fisheries management.

Thinking about the management of fishing species is, above all, thinking about investments to add value to the product, raw or benefited, that guarantee better yields and improve the quality of life of fishers. These strategies should not be associated with an increase in fishing effort, but, necessarily, with the optimization of the

catches that already exist, either by increasing the size of the product marketed by encouraging community-based associations - following successful management experiences - or by expanding consumer markets, improving product access to alternative markets.

The process of adopting paradigms in fishing, especially in small-scale fisheries, arises from the need to make users their own managers. Necessarily, it is recognized that many communities still do not have a degree of interference maturity that allows the adoption of collective management measures. Therefore, this is the moment to invest and train to strengthen actions that can truly induce good practices in the use of resources so as not to compromise their future abundance.

The shared management of natural resources enables the sustainable appropriation of the right to territorial use. When traditional communities feel empowered, the relationship with their environment changes, evolving in all aspects. An effective way to ensure food security, the quality of life and income of artisanal fishers and sustainable fishing in Brazil is to encourage government agencies to incorporate the principles of the Fish Forever program, making small-scale fisheries management approaches more efficient.



Coral reefs in front of Porto de Pedras – Costa dos Corais Environmental Protection Area. Porto de Pedras, Alagoas



Children on the banks of the river in the town of Soure – Soure Extractive Reserve (photo: Enrico Marone/Rare)

CHAPTER 7

A Vision of the Future – Evolving the Program to Fish Forever 2.0

In Cycle 1 of the Fish Forever Program (from 2015 to 2017), we observed that social, collective and financial capital and trust in management institutions - the last item in particular and the most critical - were low enough to characterize communities in conditions of social vulnerability and with little capacity to overcome challenges.

The results of the socioeconomic research of Cycle 2 (from 2017 to 2019), especially in the state of Pará, were similar, shedding light on the points most in need of attention. Through participatory assessment with fishers and key actors (universities, social movements, managers and extension technicians), there was a lack of adaptive management. Added to this situation is the low representativeness and confidence of fishers in the management of protected areas for sustainable use.

The consequence is a weak perception of governance over the territory and subsequently the low participation of the target audience in co-management. This occurs due to the lack of identification of the benefits in the contribution with the groups and decision-making spaces, which in practice distorts the execution of shared management over traditional territories.

Given this experience and context, in the next three years, from 2019 to 2022, Rare Brazil plans to promote the improvement of the governance structure of small-scale fisheries carried out on the coast of Pará and of the deliberative councils of the 12 Extractive Reserves currently existing in the state.

This vision will be conceived through three interrelated guidelines of the program, which are also transversally integrated into the behavior adoption solution:

1. Foster the financial and market inclusion of artisanal fishers by training the target audience on personal financial management, strengthening administrative-financial associations and developing business plans and partnerships with state and municipal programs for productive inclusion based on fish markets and public purchasing program.
2. Support the establishment and strengthening of community-based management, through the development of capacities and knowledge of the key actors on concepts of fisheries management and sustainable management practices. Provide data and modeling to support decision making, support the development of management plans for target species and execute behavior adoption campaigns.
3. Support the improvement of governance policies, giving priority to the communities' access to the use of fishing resources, such as the revision of the identification of users of extractive reserves and fishing and use licenses. Encourage community participation in technical regional and national discussion groups.



With this, Rare improves the methodology of the Fish Forever Program to a 2.0 version, especially incorporating the socioeconomic aspect in addition to the environmental conservation aspect.

The next version of the Fish Forever Program, in addition to the three guidelines specified above, will implement an action plan based on seven elements that, when promoted simultaneously and in an integrated manner, will promote an efficient management of fisheries territories and resources. They are:

1. Financial inclusion (Guideline 1)
2. Inclusion in markets (Guideline 1)
3. Behavior adoption (Guideline 2)
4. Managed access areas (sustainable use protected areas) (Guideline 2)
5. Network of conservation and stock recovery areas (ACRES) (Guideline 2)
6. Data for decision making (Guideline 2)
7. Public Policy & Governance (Guideline 3)



The following indicators were set as goals for the next phases of the Fish Forever program in the state of Pará:

- After the first year, Rare will directly reach six Extractive Reserves, five deliberative councils, six umbrella associations, six municipalities, 35 communities and approximately 7,000 fishers.
- After the third year, Rare will directly reach 12 Extractive Reserves, ten deliberative councils, 12 umbrella associations, 12 municipalities, 64 communities and approximately 16,800 fishers, corresponding to 20% of the territory in which it operates.

Another evolution of the Fish Forever Program will be the structuring of a new operational implementation model. With the help of volunteers working in interface with the artisanal fishing activity in Pará, two working groups will be formed by key actors with influence and competences at the state and local level. The state working group will promote the creation of behavioral adoption campaigns

at the state level and will advise and support program initiatives and partnerships, facilitating network building paths. Local groups will be formed for each Extractive Reserve and will act to mobilize the community and build trust to promote the adoption of behaviors to improve the quality of life of coastal communities.

Finally, the methodology of the Fish Forever 2.0 program provides for an alignment of the monitoring & evaluation (M&E) plan associated with the Sustainable Development Goals (SDGs). The program will link the focus of small-scale fishing to public policy commitments and priorities, facilitating political and financial support for sector improvement in Brazil. Rare remains confident in the construction of this new artisanal fisheries agenda in the country, counting on the collaboration of the network of partners in order to guarantee the greater participation of fishers in the shared management of fishing territories, as well as in the engagement of state agencies and municipal governments to improve the quality of life of fishers and their families.


CHAPTER 8

Transparency

We believe in the responsibility that everyone - social and private organizations, the public sector and civil society - has in building a more egalitarian country. We need to invest in transparency in accountability and that is why we present below the donations and amounts received between the fiscal years 2017 to 2019.


Rare Brazil Donations

FY17 – FY19* (Value in USD)

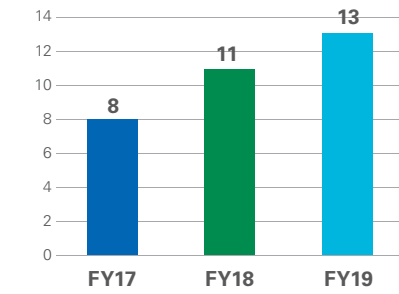
	FY17	FY18	FY19
Foundations/Institutes (2 donators)	1,638,542	2,091,935	1,717,318
Individual Donators (2 donators)	4,219	—	4,794
 TOTAL	1,642,761	2,091,935	1,723,729

Resources Implemented per Budget Item

FY17 – FY19* (Value in USD)

BUDGET ITEM	FY17	FY18	FY19
Operational Expenses	1,120,415	1,060,491	1,055,293
Program Expenses	522,346	1,029,852	666,819
 TOTAL	1,642,761	2,090,343	1,722,112

Amount of Collaborators



Fiscal Year	Amount of Collaborators
FY17	8
FY18	11
FY19	13

Benefits

- Health insurance covering dependents
- Meal allowance
- Cellphone with Internet coverage
- Home Office policy
- Paid leave 2 days/year
- Possibility of bonus according to performance

* FY = fiscal year – October to September

LIST OF ACRONYMS

APA	Environmental Protection Area
ACRES	Conservation and Stock Recovery Areas
AMREMC	Umbrella Association for Cururupu Extractive Reserve Users
Assuremacata	Umbrella Association for Caeté-Taperaçu Extractive Reserve Users
Auremag	Umbrella Association for Mãe Grande Curuçá Extractive Reserve Users
Mocajuim	Umbrella Association for São João da Ponta Extractive Reserve Users
Assuremas	Umbrella Association for Soure Extractive Reserve Users
Assuremav	Umbrella Association for Viseu, Piriá and Gurupi Extractive Reserve Users
Aurems	Umbrella Association for Extractive Reserves
CPUE	Catch Per Unit Effort
CEPENE	National Center for Research and Conservation of Marine Biodiversity in the Northeast
CONFREM	National Commission for Strengthening Extractive Reserves and Coastal and Marine Extractive Peoples
KAP	Knowledge, Attitude and Practice
CNPq	National Council for Scientific and Technological Development
CONAMA	National Environment Council
CPP	Fishermen's Pastoral Council
COOPEC	Carutapera Artisanal Fishermen's Cooperative
FAO	Food and Agriculture Organization of the United Nations
Fidesa	Foundation Institute for the Development of the Amazon
Ibama	Brazilian Institute of the Environment and Renewable Natural Resources
ICMBio	Chico Mendes Institute for Biodiversity Conservation
IFPI	Piauí Federal Institution
INCT Amb-Trop	National Institute of Science and Technology – Tropical Marine Environment
Ircos	Coastal Reef Institute
MCTI	Ministry of Science, Technology and Innovation
MPA	Ministry of Fisheries and Aquaculture
MMA	Ministry of Environment
M&E	Monitoring and Evaluation
MPP	Artisanal Fishers’ Movement
NORMAM	Maritime Authority Standards
SDG	Sustainable Development Goals
CIA	NGO Comissão Ilha Ativa
UNESCO	United Nations Educational, Scientific and Cultural Organization
NGO	Non-Governmental Organization
RGP	General Fisheries Registry
RESEX	Extrative Reserve
SEDAP	Secretariat of Agriculture and Fisheries of the State of Pará
SEAP	Special Secretariat for Aquaculture and Fisheries
SNUC	National Protected Areas System
UC	Nature Conservation Unit
UNAMA	Amazônia University
UFPE	Pernambuco Federal University
UFPI	Piauí Federal University
ZPVE	Estuarine Life Preservation Areas
ZATAN	Environmental and Territorial Zoning of Nautical Activities

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change so people
and nature thrive.



Aerial image of the low tide beaches of the Pesqueiro estuary and fishing boats
– Soure Extractive Reserve (photo: Enrico Marone/Rare)



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