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Safer and more sustainable capture techniques

Lobster fishing on Nicaragua's North Caribbean Coast

Summary and key figures

In 2013, the government of Nicaragua requested technical assistance from the Food and Agriculture Organization of the United Nations (FAO) to formulate a strategy that improves the occupational safety of lobster fishermen, while also increasing the sustainability of fishing for this crustacean on the country's North Caribbean Coast. Since then, the FAO Country Office in Nicaragua – with resources from the FAO Technical Cooperation Program (TCP) and the Mexican Agency for International Development Cooperation (AMEXCID), channelled through the Mesoamerica Hunger-Free Program – has provided technical support to the Nicaraguan Institute of Fisheries and Aquaculture (INPESCA), through various South-South cooperation initiatives

and two projects successively implemented in the period 2015-2019. The results achieved were significant including the introduction of two new capture techniques, which have helped to reduce occupational diving accidents by 40 percent and to improve the sustainability of the lobster fishery. In addition, there is evidence of a significant increase in the value of lobster exports (40 percent), as a consequence of the higher price obtained for the sale of whole lobsters (live or precooked) obtained with the new fishing methods. Lastly, the gradual replacement of wooden traps with folding pots has had a positive impact on the reduction of logging in the territories inhabited by the Miskita ethnic group.

Implementation period:	2013 – 2019.
Location:	Nicaragua, North Caribbean Coast Autonomous Region (RACCN).
N.º of direct participants:	85 people involved in the lobster production chain.
N.º of indirect participants:	17 communities on the northern and southern coast of Nicaragua's North Caribbean region.
Executors:	FAO / Nicaraguan Institute of Fisheries and Aquaculture (INPESCA).
Financing institutions:	FAO (TCP) and the Mexican Agency for International Development Cooperation (AMEXCID), through the Mesoamerica Hunger-Free Program, Triangular South-South Cooperation (CSS) / INPESCA (personnel and vessels).
Partnerships:	National Institute of Fisheries and Aquaculture of Mexico (INAPESCA) / Institute of Marine Sciences and Limnology of the National Autonomous University of Mexico / Regional Federation of Cooperatives in Central and Western Yucatán State, Mexico / Vigía Chico Cooperative of Punta Allen in Quintana Roo State, Mexico / Center for Fisheries Research (CIP) of Cuba / University of the Autonomous Regions of the Nicaraguan Caribbean Coast (URACCAN) / Bluefields Indian & Caribbean University (BICU).
Investment:	USD 200 000.
Key words:	Sustainable fishing, technification of lobster fishing, fishing safety, artificial lobster shelters, folding pots, Miskita ethnic group.



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Context

Dangerous and unsustainable lobster fishing

The Caribbean spiny lobster (*Panulirus argus*) fishery constitutes the main economic pillar of the Autonomous Region of the North Caribbean Coast of Nicaragua (RACCN). Lobster fishing is carried out both on an artisanal and industrial scale, and the techniques used include: i) wooden pot traps; ii) diving with a self-contained underwater breathing apparatus (scuba diving); iii) surface-supplied diving (air compressor with hoses and nozzle); and iv) free diving, also called apnea.

This production chain represents an important source of employment for about 9 200 people, including 2 300 diving fishermen, 98 percent of whom belong to the Miskita ethnic group, 1 500 women – also known as *pikineras* – who are engaged in the purchase and sale of seafood, and the other 5 400 who work in industrial lobster fishing and processing companies.

Free diving is the ancestral practice used for centuries in this region, where reef fish, snails and lobster are part of the traditional diet of the Miskito indigenous communities. However, from the 1970s onwards, lobster became commercially important and its capture for export developed significantly, with the business now worth around USD 60 million annually.

To meet the increasing demand from international markets, an increasing number of fishermen – in many cases without adequate training – have adopted the scuba diving system, which allows them to dive in deeper waters. This has had a negative impact on the health of the divers, causing total or partial disabilities, and even death, due to decompression-related illnesses. Thus, in the period 1990-2016, 1 100 fishermen were injured, of whom 528 were left with severe disabilities and 572 with less serious consequences. In addition, in just three years (2011 to 2014), 14 divers died from the effects of Decompression Syndrome.

This is the context that led, in 2013, to the government of Nicaragua requesting technical assistance from FAO, to formulate a strategy to improve the

occupational safety of lobster fishermen and also to increase the sustainability and value of their catch.

Since then, the FAO Country Office in Nicaragua – with resources from the FAO Technical Cooperation Program and AMEXCID, channelled through the Mesoamerica Hunger-Free Program – has provided technical support to INPESCA, through various South-South cooperation actions and two projects that were successively implemented in the period 2015-2019. This document summarizes these initiatives.



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Legal framework and reconversion plan for the elimination dive fishing in Nicaragua

- » Law 613, or the "Law for the Protection and Safety of Dive Fishermen", passed in 2008, prohibits scuba diving for lobster and any other marine resource, and established a compliance period of three years from its date of publication. However, three extensions have been authorized (2011, 2013 and 2016) and, currently, the National Assembly has granted an indefinite postponement of the entry into force of Article 16 of the Law.
- » Nicaragua has signed an agreement, at the Central America regional level, for the gradual closure of lobster fishing by assisted diving, based on the OSPESCA regulation (OSP02-09) for the Regional Management of the Caribbean lobster fishery.
- » The "Labour, technical and occupational retraining plan for fishermen in the lobster diving fishery" was prepared in June 2011 by INPESCA, in coordination with other government institutions. It consists of 19 proposals to promote the necessary transformations to eliminate lobster diving. The Plan contemplates an investment of USD 23 million, of which about USD 6.5 million will be destined to promote the reequipping of artisanal and industrial vessels, and to facilitate lobster fishing with pots.

Source: FAO, Technical support to INPESCA in the technological reconversion processes of lobster fishing in the Caribbean.

2

Challenges

Contributing to the development of safer and more sustainable lobster fishing

The FAO assistance strategy aims to face the challenge of creating an enabling environment to reduce the risks to the health and physical integrity of dive fishermen, and to promote the sustainability of fishing practices for this resource.



3

Participants

Artisanal fishermen, pikineras, businesspeople, university teachers and officials

- » 85 fishermen, pikineras, businesspeople and officials (61 percent men, 39 percent women).
- » 13 teachers from universities on the Caribbean Coast (70 percent men, 30 percent women).
- » 17 Miskito communities on the northern and southern coasts of the North Caribbean region of Nicaragua, which are gradually adopting new fishing methods.

4

Description

Generating an enabling environment focused on capacity development, technology validation and institutional strengthening

The actions of FAO, based on South-South cooperation mainly between Mexico and Nicaragua, were organized around two main focus areas and four products:

- » **The promotion of new fishing, processing and marketing techniques, based on:** i) the development of capacities of different actors in the chain and ii) the validation of safer and more sustainable capture techniques (artificial shelters in shallower waters 15 meters deep and folding traps in deep water).
- » **The institutional strengthening of INPESCA,** which includes: i) updating knowledge about the lobster resource and capacity development in the area of capture technologies; and ii) the development of partnerships for resource mobilization.

Safe and sustainable lobster fishing techniques

- » **Artificial shelters:** These are concrete structures, placed at shallow depths, which simulate caves and other natural structures that serve as a refuge for lobsters, mainly in those places with little availability of natural shelters, and where the environmental conditions are favourable for finding food. The availability of lobsters at shallow depths (less than 15 meters), allows fishermen to harvest lobsters through free diving with minimal risk. Additionally, it contributes to a better management of the fishing resource, by allowing the selection of the captured lobsters (the diver does not take lobsters below the legal minimum size, which is 83 mm, or females with eggs), thereby promoting the sustainability of the fishery. Finally, it allows the capture of live crustaceans, which have higher commercial value.
- » **Folding pots:** These are metal structures with net mesh panels, widely used for the capture of lobster in deep waters in Mexico's Yucatán. They are easy to handle, transport, store, and with greater durability and minimal environmental impact compared to the wooden pots traditionally used in Nicaragua (deforestation is reduced). They can be used in deep water, replacing dangerous deep diving practices, where divers are at greater risk of decompression. Additionally, they help to reduce ghost fishing, which refers to the catch produced by abandoned or lost fishing gear, since the folding traps close automatically when they reach the end of their useful life and, therefore, the capture process is interrupted. In the case of the wooden traps, the capture continues to occur in the decommissioned traps.

Source: FAO, 2019. Project completion report *Assistance for the technification of lobster fishing in the Nicaraguan Caribbean*, Triangular South-South Cooperation, Mesoamerica Hunger-Free Program.

Main project actions

- 1 **Capacity development of the different actors in the lobster production chain**, mainly based on the exchange of knowledge and experiences with Mexico and Cuba.
 - » **Four technical missions:** Two in 2013 and another two in 2018, comprised of: i) experts from the National Fisheries Institute of Mexico (INAPESCA); the Institute of Marine Sciences and Limnology of the National Autonomous University of Mexico; and from Cuba's Center for Fisheries Research (CIP); ii) members of the Vigía Chico Cooperative of Punta Allen in Quintana Roo State; the Regional Federation of Cooperatives of Central and Western Yucatán State; and members from other Mexican cooperatives.
 - » **Eight exchanges between Mexico and Nicaragua related to:** i) alternative and safe lobster capture technologies, and sustainable management (artificial shelters and folding pots); ii) market opportunities, new forms of post-harvest handling and marketing channels (live lobster, precooked whole lobster, valorization of by-products such as lobster head and claw meat for croquettes, etc.); iii) diversification of sources of income during the closed period; and iv) organizational aspects. Includes the participation of fishermen, women seafood workers or pikineras, businesspeople and INPESCA officials.
 - » **Five forums and workshops:** i) First National Forum with 70 people (2013); ii) Workshop on Lobster Fishing Techniques and Methods, with more than 30 fishermen and technical government personnel, in Punta Allen, Quintana Roo State, Mexico (2016); iii) Workshop on practical exchanges at the facilities of the Vigía Chico Cooperative in Punta Allen, Quintana Roo State, Mexico (2016); iv) Closing event of the "Technological transformation program for lobster fishing in the Nicaraguan Caribbean" (Bilwi, Puerto Cabezas, 2019); and v) Workshop on processing, added value and marketing of fishing products in Progreso, Yucatán State, Mexico (2019).
 - » **Manuals** for alternative lobster fishing techniques in the Nicaraguan Caribbean: artificial shelters and folding traps.
- 2 **Validation of safe and sustainable technologies.**
 - » **Construction, operation and validation of 50 artificial shelters**, managed by a group of fishermen from the Miskitos Cays area (31 INPESCA, 19 URACCAN, 2017 - 2019).
 - » **Construction, operation and evaluation of 90 folding traps** (45 for research purposes and 45 for commercial vessels, 2018-2019).

3 Generation of knowledge and development of institutional capacities at INPESCA.

- » Support for the completion of the Census of artisanal and industrial fishermen dedicated to the capture, extraction and commercialization of the Caribbean spiny lobster in Nicaragua (2013).
- » Support for the preparation of a study of the lobster production chain in the Nicaraguan Caribbean (2013).
- » Training of INPESCA officials in resource evaluation methods and alternative fishing techniques, among other areas.

4 Strengthening of alliances for resource mobilization.

- » Development of alliances with the universities URACCAN and BICU.



5

Results

Introduction of two new capture techniques and institutional strengthening

- » **The introduction of the two lobster capture techniques** (folding pots and artificial shelters) on the Caribbean coast of Nicaragua, which have been increasingly adopted in the country's artisanal and industrial lobster fishing sectors, because they offer the opportunity to reduce direct and indirect production costs, as well as accidents derived from diving. Based on these conditions, it is estimated that the rate of adoption of the new methods is between 10 and 15 percent per year, with respect to the total number of lobster fishermen on the North Caribbean Coast of Nicaragua. Some of the test results were:
 - A scientific evaluation of the results obtained with the artificial shelters was very positive. A relatively rapid colonization of the shelters by pre-adults was observed, indicating their usefulness in attracting lobster populations, which had been removed from shallow areas due to overexploitation. Considering these results, the shelters are being used in other fishing areas on Nicaragua's Caribbean coast.
 - Technical recommendations were exchanged, based on Mexico's experience, in order to continue with the validation process of folding pots.
- » **The lobster value chain** in the region has incorporated new forms of production and commercialization of lobster (live, whole, precooked) and its by-products (lobster head and claw meat). Greater demand in the local market for lobster by-products strengthens the links in the commercialization chain, and has an impact not only on the generation of new sources of income for merchants, but also for artisanal fishermen who can sell the by-products (lobster heads) that used to be returned to the sea.
- » **INPESCA has acquired technical capacities** to promote and facilitate the process of sharing safe fishing and commercialization practices, which contribute to the economic, environmental and social sustainability of lobster fishing on the Caribbean coast of Nicaragua.
- » **The universities of the autonomous regions have been closely involved in the project** beyond their academic role. In this regard, they are working directly with INPESCA and fishermen from the communities, with the support of students, to conduct trials in the Miskitos Cays (URACCAN) and Perlas Cays (BICU).



6

Impact

Reduction of diving accidents (40 percent) and increase in the value of exports (40 percent)

The support and technical assistance of FAO during these seven years has contributed to achieving the following impacts:

- » **Reduction of 40 percent in lobster diving accidents.**
- » **A 40 percent increase in the value of exports (from USD 50 million to USD 70 million),** having entered the international market for whole, pre-cooked and live lobster.
- » **Greater income for fishermen.** The use of these technologies contributes to: i) a reduction in production costs by using artificial shelters, since fishermen can create fishing grounds closer to shore, and thereby reduce the cost of fuel; ii) a reduction in fishing costs, because, although folding pots are 50 percent more expensive than wooden traps, their useful life is five to seven times longer and they are more manageable, which helps to maximize the space on board the vessel and reduces the cost of transport to fishing grounds; iii) a higher sale price since, using this technique, the lobster is caught and sold alive, which helps to reach new markets (prices are at least 15 to 30 percent higher compared to the price of lobster tails).
- » **Positive environmental impact.** The adoption of new capture methods also promotes: i) the reduction of logging in the region for the construction and repair of wooden pots; ii) the reduction of garbage in fishing grounds, due to the bad practices of fishermen such as breaking pots that have rotten wood and leaving them on the seafloor.
- » **Greater sustainability of the fishing resource.** Although the impact of artificial shelters on the lobster population has not been quantified, the initial data obtained indicates that they promote the aggregation of lobsters in shallower areas, allowing the creation of more productive fishing grounds and greater selectivity, thereby avoiding the capture of juveniles and ovigerous females (with eggs). The placement of artificial shelters in shallow waters allows the youth and sub-adult population segment to be protected and grow in this phase of their life cycle, before moving down to deeper areas to mate and reproduce. The use of folding pots also avoids "ghost" fishing.



7

Success factors

Dialogue among actors and demonstration of benefits

- » **The process of sensitization of fishermen and businesspeople** has helped to expand the scope of the project.
- » **The concrete demonstration of the benefits of new fishing techniques** has generated trust and commitment.
- » **Coordination between the different actors in the chain** – fishermen, pikineras, businesspeople, officials and researchers – has created powerful synergies.
- » **The strong political will of the country's fisheries authorities** has helped to maintain continuity of the actions implemented.
- » **The support of FAO** has created a solid technical foundation to promote the transformation and development of the lobster value chain.



8

Sustainability

The solid alliance between INPESCA, fishermen, businesspeople, and academia

This is a long-term initiative as shown by the case of Mexico, where the widespread adoption of these practices took two decades. In Nicaragua, although the initiative's sustainability will depend on the effectiveness of new capture technologies, solid alliances with local partners will help to generate favourable conditions for their adoption. This includes support from INPESCA, the regional government and municipalities, as well as alliances with fishermen,

their communities and businesspeople in the fishing sector. The involvement and support of universities in Nicaragua's autonomous regions also promotes the scaling-up of the use of sustainable and safe fishing techniques for the development of the lobster fishery.

9 | Replicability and scalability

Towards a new project to strengthen the lobster fishery in Nicaragua

The new capture technologies, tested by INPESCA with the assistance of FAO, have been replicated by universities and a growing number of artisanal fishermen in the RACCN. These practices have been implemented in the Nicaraguan Caribbean region and partnerships with private companies have been established to carry out trials in commercial fishing operations, which is essential for their eventual implementation at the national level.

The institutional cooperation generated by this experience has contributed to the development of a project to strengthen artisanal fishing in the Caribbean Region. This project, developed by the government of Nicaragua with the technical assistance of FAO, will require an investment of USD 45 million and financing will be sought from the International Fund for Agricultural Development (IFAD).



10 | Lessons learned

Four main recommendations

- » **Demonstrate the techniques with the participants.** FAO's actions focused on the direct participants so that the fishermen, and their organizations, were responsible for showing the advantages and feasibility of innovative and alternative methods of capture and commercialization.
- » **Adapt capture techniques to local conditions.** The results of the trials, particularly those using folding pots, showed that it is necessary to adapt the practices to the specific conditions of the Nicaraguan coast.
- » **Use a supply chain approach.** Coordination between the different actors involved is necessary to build a common vision of the development strategy for the supply chain.
- » **Establish strategic alliances** to promote the sustainability of the initiative.

Knowledge exchange and the multidimensionality of the achievements

- » The process of the exchange of experiences, based on South-South cooperation, constitutes an effective tool to promote the necessary changes.
- » The project achievements have had an impact in different areas including the economy (exports and family income), job security and the environment.

Gender

- Promotion of work with and for pikineras, including their participation in exchanges, workshops and forums.

Social inclusion

- Ethnic approach.
- Participation of indigenous and Afro-descendant communities.
- Generation of trust.

Social participation

- Participatory process involving the different actors in the production chain, considering their different roles, both for the identification of the causes of the diving problem, as well as for the prioritization of actions with a sustainable fishing approach.

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