Perspectives on Geographical Marginality

Borna Fuerst-Bjeliš
Etienne Nel
Stanko Pelc *Editors*

COVID-19 and Marginalisation of People and Places

Impacts, Responses and Observed Effects of COVID-19 on Geographical Marginality

Springer

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This book examines how COVID-19 has often enhanced social and economic marginalisation in different places and societies around the world. It explores the reality that selective deglobalisation is occurring and over and above the human tragedy which has been experienced, many societies and economies have had to adapt to the new reality which they find themselves in. Governments have been challenged to improve health care and provide economic relief and stimulus packages to sectors as diverse as tourism and education which have had to develop new ways of coping. Resilience theory is drawn on to help explain some of the creative responses which we observe, while in other places deep-rooted concerns for the future are a stark reality.

By describing how the pandemic has exacerbated pre-existing geographic, social and economic marginalisation, particularly for the most vulnerable places, societies and economic activities globally, this book provides insight into the impacts and implications across the world and reflects on the different experiences.

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Volume 7

This series is now indexed in Scopus.

This book series *Perspectives on Geographical Marginality* comprehensively overviews research, on areas and communities impacted by processes of marginalization as a result of globalization, economic, environmental, political and social change. This series seeks to discuss and determine what is geographical marginality by inviting leading international experts to publish theoretical and applied work. It also seeks to rigorously debate the degree to which local areas and communities are responding to these process of change and with what success.

The series stems from the International Geographical Union's (IGU), 'Commission on Globalization, Marginalization, and Regional and Local Response' (C12.29). As is suggested by its name, the commission researches the problem of geographical marginality offering a leading forum from which this series will be led. Marginality cannot be defined without putting it into a certain perspective: economic, political and social (including cultural). Marginality has to be clearly distinguished from peripherality. Marginal areas may be a part of periphery or even the centre, but "cannot really be attributed to them".

Proposed themes which will be covered include:

- Mountainous regions and globalization
- Regional development and policy /or: Globalization and its impact on local and regional development
- Theory of marginalization
- Transformation of rural areas from the viewpoint of globalization and marginalization
- Drivers of marginalization in border and peripheral areas.

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Chapter 8
Marginality and Resilience Strategies in Coastal Fishing Villages During the COVID-19 Pandemic in the State of Yucatan, Mexico

José Manuel Crespo-Guerrero and Araceli Jiménez-Pelcastre

8.1 Introduction

The COVID-19 pandemic triggered changes in human activities worldwide. Physical distancing was the primary measure recommended by health authorities to minimise contagion and preserve health. Information and communication technologies allowed a significant number of workers to continue working from home. Remote working was incorporated into everyday life across a broad range of economic sectors. Not all productive activities followed the same path, however, and so-called "essential" activities required the continued physical presence of employees in workplace settings.

In Mexico, activities deemed essential—until the reopening of normal operations—were in the areas of healthcare, safety, infrastructure maintenance, social government programs, and key sectors of the economy (DOF, 2020a, 2020b, March 31; DOF, 2020a, 2020b, April 29). Food production—including fisheries—was considered a key sector, as were storage and logistical services (port operations, airports, and land transportation systems).

A large portion of the inhabitants of coastal areas dedicate themselves to fishing at the global level (Bennet et al., 2020); this is a sector of remarkable economic, social, and nutritional importance (FAO & CELAC, 2020). According to the UN (2020) World Social Report, rural coastal fishermen live in poverty, lack structural facilities for protection against weather events, and have limited resources to invest in fishing

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gear and boats (UN, 2020). The COVID-19 pandemic has exacerbated the persistent marginality of fishermen in the Mexican state of Yucatan. This study documents the resilience strategies adopted by coastal fishermen to counter the adverse conditions of rural localities, which were aggravated by the global COVID-19 health emergency.

8.2 Theoretical Positioning and Conceptual Framework

Rural coastal fishing communities are geographically marginal. "Marginality is the position of people on the edges, preventing their access to resources and opportunities, freedom of choices, and the development of personal capabilities" (Von Braun & Gatzweiler, 2014, p. 3). Living in marginal areas implies a notion of marginality that "derives from physical remoteness (low accessibility to services and working places), ecological fragility, low population density, ethnic structure, having an underdeveloped economy, the unavailability of resources or inability to use them and isolation from political influence" (Pelc, 2017, p. 18). Stanko Pelc (2017, p. 27) asserts that from a geographic perspective, "marginality research can [therefore] take place almost everywhere, but it can focus on many different topics, considering the scale and the type of marginal region that the research is dealing with." The important aspects of such research are: the identification of the marginal individuals or social groups; the specific manifestations of marginality, its causes and consequences; and the role of geographic factors in marginalisation processes.

By contributing to the nutrition of people, fishing—along with hunting and gathering—is one of the earliest human activities, basically consisting of extracting fish from inland water bodies or the sea (Bottemanne, 1972). The natural environment plays an essential role in fishing, in addition to the skills of humans and the regulations that legally control it today. The Food and Agriculture Organization (FAO) defines the fishing sector as "including recreational, subsistence, and commercial fishing, and involving the capture, processing, and marketing sectors" (FAO, 2001, p. 130). Specifically, commercial fishing is the extraction of totally or partially aquatic species for the purpose of obtaining economic benefits (DOF, 2018, April 24).

Although coastal fishing has been linked with global trade fluxes and local companies have seen their businesses grow as a result of international trade agreements, coastal or small-scale fishing practised by coastal-rural populations is strongly linked to endogenous dynamics. This fishing is important in local economic systems and for a large number of families, involving local social groups—related by family ties or friendship—that are devoted almost exclusively to fishing, so that any labour reorientation is complex (Florido & Suarez, 2005). In addition, each stage of the production system has a differentiated capacity for capital accumulation, where extraction offers fewer profits than processing or marketing.

A short-range fleet usually lands its catch at beaches and base ports or at an adjacent inland location; consequently, coastal localities where fishing is consolidated are the scene of a set of linked activities constituting a significant part of the local economy. This has led to the emergence of locally based business clusters, which

can be greatly affected when local fishing conditions are transformed via, e.g., by closure of fishing grounds, resource crises, restrictive policies, and the declaration of a pandemic and its associated health protection measures (Florido & Suarez, 2005).

Hard work, uncertainty, and change are part of the everyday life of fishermen: when the small-scale fisherman deploys nets, sets lines, or places traps, they are never certain that the catch will be sufficient to yield a profit allowing them to cover investment expenses and a surplus to live and support their family. The instability of this livelihood depends not only on the nature and skills of the fisherman, but also on fishing policies and management tools that apply to this natural resource: species classified as commercial, sizes captured, seasonal closures, fishing quotas, permits, and fishing zones, among others (Crespo & Jiménez, 2021).

The employment created by fishing in developing countries is rarely registered with social insurance, so it lacks any labour protection. Fishermen are a heterogeneous group, and their vulnerability depends basically on the following: (a) ownership of the means of production (vessel, motor, and gear); (b) type of fishing permit or licence granted; (c) market value and abundance of the species to be captured; and (d) legal nature of the association or society, and size of the economic unit to which they belong. All of this exacerbates or mitigates their potential marginality in socioeconomic terms (Cortés, 2006). Of course, public fisheries policies can reduce marginality. Understanding the capacity of fishermen to adapt to change (their resilience) makes it possible to reveal the strategies applied to face crisis situations.

It is worth noting that resilient systems are those with essential functions that resist an adverse event or that are capable of developing adaptation mechanisms to such events (Escalera & Ruiz, 2011). In the case of fishing, essential functions include "sustaining food production, fishing jobs, identities, and cultures, as well as promoting resilient and healthy marine resources and ecosystems" (Smith et al., 2020, p. 3).

8.3 Methodology

This chapter is the result of the Program of Support for Technological Research and Innovation Projects (PAPIIT) of the *Universidad Nacional Autónoma de México* (UNAM), which financed the project: "Territorial Organization of Commercial Coastal Fishing Activities in the Protected Natural Areas of the State of Yucatan, Mexico" from 2019 to 2021.

A literature survey was initially conducted using the keywords *COVID-19* and *FISHING*. FAO and other international bodies have funded multiple reports addressing the impacts of the COVID-19 pandemic on food and employment (FAO, 2020a; FAO & CELAC, 2020; FAO & CEPAL, 2020).

Mexican publications that addressed fisheries and COVID-19 focused on resilience and, to a lesser extent, socioeconomic impacts (Cobi, 2020a, 2020b, May 4; Fondo-SAM, 2020; EDF et al., 2021; López et al., 2021; Segura et al., 2021; Vázquez,

2021). To understand the economic structure of fishing activities in Yucatan, theoretical foundations related to the spatial organisation of the economy were considered (Abler et al., 1972; Kostrowicki, 1975).

To describe the fishing situation from a multiscale perspective, international, federal, and state sources were reviewed. International sources include the FAO, the Economic Commission for Latin America and the Caribbean (ECLAC), and the Community of Latin American and Caribbean States (CELAC). Federal sources include the National Commission for Aquaculture and Fisheries (CONAPESCA*[1]), the National Register of Fisheries (RNP*) and the National Institute of Statistics and Geography (INEGI*). The Yucatan Secretariat of Sustainable Fisheries and Aquaculture (SEPASY*) provided state-level data. Some socioeconomic data were depicted via specialised mapping.

From March to October 2020, we maintained remote communication (telephone, WhatsApp) with social and private representatives of the fisheries sector, which allowed us to gather testimonies about their experiences as they occurred. Various participants were also approached on-site, allowing us to observe and note details that normally go unnoticed under other research approaches. Two field trips were conducted between November and December 2020, followed by three additional trips in 2021, with the objective of observing and interviewing people involved in fisheries activities in the fishing villages of Yucatan and Merida, the state capital. A questionnaire was administered to 38 individuals, and 34 interviews were conducted based on it. The narrative followed a chronological order and covered the experiences of the individuals between January 2020 and the date of the interview.

8.4 Characteristics of Fishing Villages in Yucatan

The state of Yucatan is located in its namesake peninsula, bordered by the Gulf of Mexico to the north, with a coastline that extends 378 km. CONAPESCA reported 16,936 fishermen in Yucatan state in 2018, however, the figure reported by SEPASY in 2019 is 10,500. This illustrates the difficulty in producing accurate census data, mainly due to migration and irregularities in the fishing sector. There are 4000 small boats (less than 10.5 m in length) legally registered. (CONAPESCA, 2018).

The Yucatan coast is home to 15 localities where commercial fishing is practised (Fig. 8.1). A similar number of population centres near the coast, including Mérida (the state capital), are home to people conducting fishing-related activities that commute to and from fishing villages; commuting increases along with seasonal workers from various economic sectors coming from the neighbouring states of Veracruz, Tabasco, Campeche, and Chiapas (0.1). As a result, the economy that fuels the sector extends beyond the Yucatan coastline.

Ten fishing villages are considered rural, i.e., have a population of less than 2500 inhabitants (inh.) (INEGI, 2020a; Fig. 8.1). The most densely populated villages

[1] Hereafter, acronyms marked with * correspond to the name of the institution in Spanish.

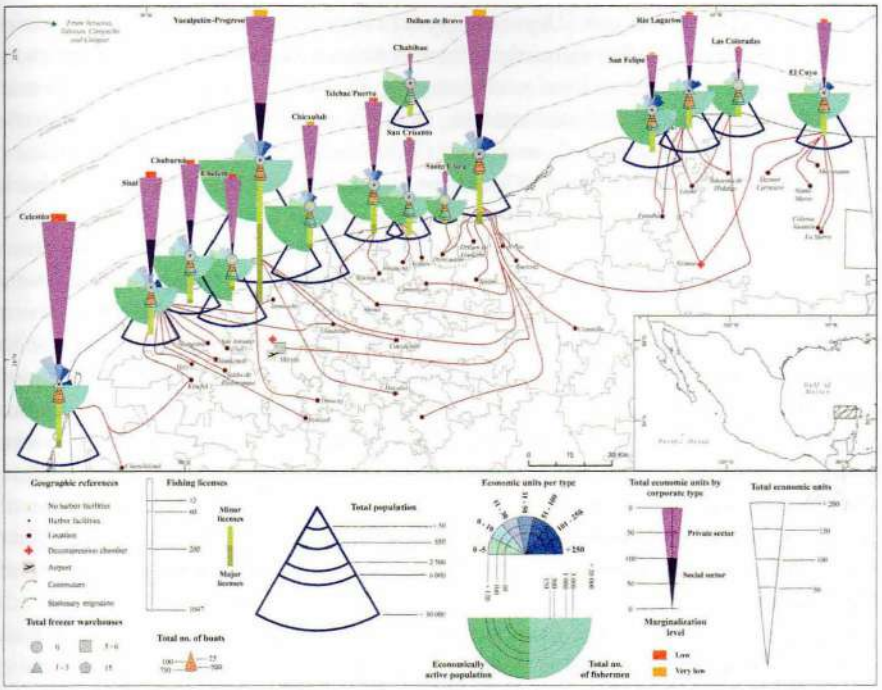

Fig. 8.1 Territorial structure of the fishing sector in the state of Yucatan (*Source* Own elaboration. Cartography by José-Alberto Garibay-Gómez from CONAPESCA, 2018; DENUE, 2022; INEGI, 2020a; SAGARPA, 2009; Webgate-European Commission, 2020; and field surveys in 2020 and 2021)

are Progreso (41,965 inh.) and Celestun (8266 inh.). These, together with Mérida (995,129 inh.), form a triangle that concentrates virtually all industrial and commercial fishing activities, functioning as a fishing cluster. For example, 43 of the 67 octopus freezing plants recorded in the state are located in Progreso and its port, Yucalpeten (SAGARPA, 2009), as well as 13 of the 25 plants licensed for the export of fishery products to the European Union (Webgate-European Commission, 2020). The Mérida airport is the point of export for fresh seafood, while frozen products are transported by sea from the Progreso-Yucalpeten port zone.

According to the latest data published by CONAPESCA (2018), the state of Yucatan ranks fifth countrywide in the economic value of its fishing production—5.75% out of a country total of 2,17 billion US dollars (USD)—and tenth in live weight landed—58,170 tons (2.7%) out of a country total of 2.16 million tons.

In Mexico, Yucatan is the largest producer of octopus (*Octopus maya*; *Octopus vulgaris*) and grouper (*Epinephelus morio; Mycteroperca bonaci*), and the third largest producer of lobster (*Panulirus argus*). These species are highly valued in international markets, with lobsters having a high market value, followed by octopus and grouper having medium–high market value. Ranking third are hogfish (*Lachnolaimus*

maximus), yellowtail snapper (*Ocyurus chrysurus*), and lane snapper (*Lutjanus synagris*), with a medium market value; these three species are exported to the U.S. market. Additional fish that are utilised commercially include species of low economic value consumed in the national market, such as crevalle jack (*Caranx hippos*), calamus (*Calamus calamus; C. nodosus; C. lowered*), snapper (*Lutjanus griseus, L. analis*), and spotted seatrout (*Cynostion nebulosus*); Atlantic sharpnose shark (*Rhizoprionodon terraenovae*) is also of low market value.

The Marginalisation Index,[2] designed and published by the National Population Council (CONAPO, 2013), shows that fishing villages have marginalisation levels ranging mostly from low (ten localities) to very low (five localities). However, some individual fishermen face difficulties accessing economic resources and lack social recognition. This group comprises individuals with neither means of production nor fishing licences, thus, they work as day-labourers for an economic unit. They are not registered in the government Social Security system, so are not entitled to a future pension, healthcare services or accident insurance. These individuals rarely complete secondary education, which limits employment retraining opportunities for them. Labourers are the predominant workers involved in fishing activities in Yucatan. This profile shares similar characteristics with coastal fishermen in developing countries (FAO, 2020a).

The economic units of the fisheries sector ("UEPs") belong either to the social sector (cooperative and social solidarity societies) or to the private sector (public limited companies and self-employed individuals). In turn, UEPs are organised into regional federations. Those concerning the social sector are grouped into two major confederations: The Mexican Confederation of Fishery and Aquaculture Cooperatives (CONMECOOP*) and the National Cooperative Fisheries Confederation (CONACOOP*) (Nenadovic et al., 2018). The "Nautical Committee" is a non-profit body which represents the fisheries sector at the local level; its aim is to participate in and contribute to policies addressing the fisheries sector. Another institution is the "Consultative Committee on Management"; its aim is to achieve sustainable use of certain hydrobiological resources. Members include several government agencies and fishermen; in Yucatan, fishermen utilising grouper and octopus participate in this institution. The largest consulting body in Yucatan is the "State Council for Sustainable Fisheries and Aquaculture", composed of authorities, specialists, and producers. The Council is responsible for the development of public policies that strengthen and manage fishing activities while fighting illegal practices.

Parties involved in the fisheries sector initially met outside organisational structures to address the health and economic consequences of COVID-19. These meetings address issues such as the impact of health measures on the marketing of fishery products; timely financing for the reactivation of the fishing economy; and the health

[2] A measure that differentiates the localities of Mexico according to the overall impact of the population deficits as a result of lack of access to education, inadequate housing, and lack of property (CONAPO, 2013, p. 97). The degrees of marginalisation are very high, high, medium, low, and very low.

of fishermen under the restrictions of the pandemic. As an outcome of these meetings, the parties sent a letter to the federal government, highlighting the fisheries sector's concerns and proposals. No response was received, so the sector faced the challenges of responding to an emerging pandemic without government support.

According to the 2021 National Statistical Directory of Economic Units, Yucatan records some 1074 UEPs. Seventy-six percent are micro-UEPs, i.e., each has between 1 and 10 employees (small UEPs each have between 11 and 30 workers, accounting for 16% of UEPs). Ninety-six percent of micro-UEPs belong to the private sector and are small-scale independent fishermen with fishing licences and their own means of production. The remaining 4% are family-run fishing cooperatives. The advantage of belonging to the social sector is the possibility of participating in government programs for the acquisition of production assets, e.g., replacement of outboard motors for small boats, modernization of boats, and investment projects, among others. However, these programs have been put on hold since 2018.

Given the difficulty in accessing the interest-free credits offered by the large freezing-exporting plants, the smallest UEPs were most vulnerable during the first stages of the pandemic. Medium-sized and large fishing cooperatives, with lobster fishing licences, easily accessed these credits. This was due to the trust inherent in the traditional sale of this high-value product to freezing plants. Access to credits enabled them to face social security payments.

The few existing port facilities, have major deficiencies: continual fluctuations in electrical power, power outages, lack of potable water, poor waste management, and sedimentation. These facilities also generally have a single access road that is vulnerable to hydrometeorological events. Localities with no port facilities land their small boats on the beach (Figs. 8.2 and 8.3). These areas commonly include improvised structures made of unstable building materials to house the personnel in charge of overseeing the production assets of fishermen. During storms, boats are traditionally carried to sports fields, open land, and other private areas for storage. This is essential given the lack of insurance to protect these assets against adverse weather conditions.

Closed fishing seasons need to be considered, as these have been set for all species of high and medium economic value. Lobster catches are prohibited from March 1 to June 30; during the fishing months, the most profitable period covers the first 90 days. Octopus is caught from August 1 to December 15, with peak catches in September and October. Finally, the grouper closed season extends from February 1 to March 31, with profits peaking during Easter and the second half of the year.

Lobster fishing licences are granted to fishing cooperatives: only their members and employees have access to this resource. Those economic units with octopus licences employ day-labourers for only four and a half months. Consequently, fishermen engaged solely in fishing activities will focus on medium—and high-value fish species, which in turn have migratory movements that function as "natural closures". Having a fishing licence for fish species ensures the possibility of earning an income throughout the year.

The savings capacity of fishermen is limited: any income gained during a few months is used for survival over the rest of the year. Fishermen lacking production

Fig. 8.2 Port of Dzilam de Bravo

Fig. 8.3 Las Coloradas Beach

assets such as boats and motors can hardly buy them, so they keep earning their daily income from labour. During the pandemic, day-labourers were economically affected and faced the dilemma of either staying at home or working at any labor options available. The information in this section attests to the marginality of fishermen, localities, and coastal fishing activities in Yucatan.

8.5 Emerging Adaptations of Fishing Localities in Yucatan During the Onset of the COVID-19 Pandemic

This section describes the resilience adaptations that local authorities and fishing organisations adopted to counter the socioeconomic threats arising from the pandemic, and in view of the lack of response from national and regional institutions. The only action taken at the national level was to digitise the Notices of Landing and/or Catches to "ensure the recording of the production and mobilisation of products, thereby warranting the continuity of national fisheries and aquaculture" (FAO & CELAC, 2020, p. 22).

In 2020, the fishery production of Yucatan amounted to 44,417 t, representing an 8.35% drop relative to the average annual production for the period 2015–2019 (48,465 t). In the first year of the pandemic, the value of production was 85,214,359 USD, i.e., 11.5% lower than the average annual value for 2015–2019 (96,282,434 USD). In 2020, fishermen had no access to specific government programs to face the emerging challenges. The only programs that continued operating were those already in place, such as the so-called Support for the Welfare of Fishermen and Aquaculture Workers (*Bienpesca*)—part of the Program for the Promotion of Agriculture, Livestock, Fisheries and Aquaculture—that provides each fisherman with 7200 Mexican pesos (MXN) [335 USD] per year (Causa Natura, 2020; CONAPESCA, 2020, April 7; Islas, 2021, July 14). Fishermen did receive the support in May, when they normally receive it at the end of the year. In Yucatan, during the grouper closure, fishermen receive 2000 MXN [93 USD] plus two deliveries of food each month (Government of the State of Yucatan, 2020, April 19). Both sources of support are provided to workers organized in legal fishing cooperatives and who are, therefore, registered in the national and regional fishermen's censuses. Thus, between March and May, each legal fisherman received economic support from the government that amounted to 9200 MXN [428 USD] plus two food deliveries. In 2020, the average daily minimum wage in Mexico was 123.22 MXN [5.73 USD] (DOF, 2019, December 23), so the aid provided represented 81% of the minimum wage—clearly insufficient in an emergency situation.

To prevent the spread of COVID-19 along the Yucatan coast, (as in other parts of the country) commercial fishing was halted for 41 days, from March 20 to April 30, 2020. European and Asian markets were also closed from February until the end of June. Although US markets remained open, the cancellation of commercial flights affected exports to that country. Internally, the closure of coastal tourist areas, which are part of a major domestic market for fish and shellfish, caused a pause in sales. Given the lack of trading of seafood products, warehouses and freezers did not open. This led to increased unemployment, affecting both men carrying out harvest tasks and women involved in the processing and marketing of seafood products.

Fishing resumed in May 2020, but the international markets of the most traded products remained on hold. The fall in prices (Table 8.1) and the large number of hydrometeorological events (27 in total) prevented fishing activities from resuming on a regular basis. By the end of 2020, there were a total of approximately sixty

Table 8.1 Minimum/maximum on-beach prices of the fishery products of greatest socioeconomic importance in the state of Yucatan in the 2019, 2020, and 2021 fishing seasons

Species	2019 (USD/kg)	2020 (USD/kg)	2021 (USD/kg)
Lobster	29.60/33.7	16.3/20.9	31.3/38.7
Negrillo grouper	9.9/10.9	6.5/9.3	10.2
Mid-sized grouper [600 to 1499 g]	5.7/6.2	2.8/4.2	4.9/5.9
Grouper (Large, 3–5) [1500 to 2300 g]	7.8/9.3	3.0/6.3	6.7/8.9
Grouper (5 up/Jumbo) [<2300 g]	9.4/10.6	4.2/8.4	8.4/9.9
Octopus	5.2/6.2	1.9/4.2	5.5/6.6
Yellowtale snapper	5.2/6.2	1.9/5.1	4.5/4.7
Hogfish	5.2/6.2	2.8/4.2	5.2/5.5
Snapper	4.1	2.0/3.5	4.5/4.7

Source Data recorded during field work in 2020 and 2021

business days for commercial purposes. On the other hand, fishing activities were only intended to meet the consumption needs of the local population for nearly three months.

Faced with this scenario, fishermen adopted different strategies, which can be grouped into four areas, described below.

8.5.1 Social and Food Revaluation of Low-Value Fish Species at the Municipal Scale

In some municipalities, at the initiative of the town councils, the UEPs, or both, measures were applied such as: payment via supplies to a limited number of boats. These boats went fishing on a rotating basis to catch low-value commercial species (always at short distances from the coastline and using a maximum of two fishermen per boat).

This was supplemented by the use of face masks, hydroalcoholic gel, or hand washing and extreme cleaning of boats and fishing gear.

Due to their abundance, high nutritional value, and low market value (some species normally are of medium economic value but were much cheaper at the time) the species selected were lane snapper, yellowtail snapper, calamus, and crevalle jack. Initially, these fish catches were distributed for free to the inhabitants of fishing villages and some inland localities where fishing day-labourers live. These species are abundant and of high nutritional value, but market prices were low at that time, making them ideal for households with scarce economic resources. The cuisine of the Yucatan coast has created a rich gastronomic culture based on these fish species.

When commercial fishing activities resumed, the capture of low-value spe resumed, supporting local sales. The most common marketing practice was se or delivering to homes, preventing the population from violating confinement r The daily availability of the species caught was advertised through social netw especially Facebook and WhatsApp, for which local online groups were create this way, marketing was facilitated, avoiding the congregation of large grou people at trading centres and saving the expense of cold storage for the produ Thus, the inhabitants of the Yucatan coast joined e-marketing networks.

8.5.2 *Opening of Exchange Routes Between Coastal Fishery Products and Inland Farming Products*

The closure of international ports and airports beginning in February 2020 led fall in markets. UEPs used their savings to support their workers and alleviate consequences of the economic standstill.

In coastal localities, fishing is the driving force of the economy. Productio supplemented by processing, storage, and distribution processes requiring wor for commercial activities such as the sale of ice, fuel, and fishing gear; repair of b and motors; maintenance of port and industrial facilities; transportation of goods, other services.

Fishing involves the participation of inland residents of the Yucatan penin (normally living within a maximum of 50 km) who, through commuting, w in fishing activities. The intensity of commuting by day-labourers increases in octopus's season as catch volumes increase. The link that has been established the years between inland labourers and coastal fishermen has benefited both has been reinforced in the face of critical situations such as the one experience 2020. Fishery products were transported to isolated inland locations where they w distributed free of charge; in exchange, trucks were then loaded with farming pr ucts, which were transported to coastal communities in exchange. These commu initiatives took place with no money involved, contributing to the resilience of th who lacked a monetary income.

8.5.3 *Proposed Agreements with National Institutions to Ensure Sales by Increasing Seafood Consumption*

Fisheries organisations resolved to promote domestic seafood sales due to conce over international trade closures in 2020.

Mexico ranks among the top 20 countries in fish and seafood production, annual per-capita consumption by the Mexican public is below the global aver (FAO, 2020b). In view of this fact, fishermen are trying to encourage dome

consumption, facilitating alternatives to increase domestic sales. The actions undertaken include agreements with hospitals, schools, penitentiaries, the army, and others, to directly purchase fresh seafood with no brokers involved, thus avoiding any detrimental marketing practices.

Representatives of fisheries confederations have also presented proposals to the Secretariat for Agriculture and Rural Development (SADER*) and CONAPESCA to implement coordinated actions. They understand that it is essential to invest in the processing and conservation of products through canning, not only to increase profits but also to increase the number of female workers, which would improve the distribution of benefits within families. Another outcome of the coordination between public institutions and fishing organisations would be to support the availability of canned fish in rural areas, as it is precisely in these places where the highest malnutrition indices are recorded. These organisations are also focusing efforts on disseminating information on the various ways of cooking seafood, broadening the cooking options of local consumers.

8.5.4 Expansion of Communication Channels Across Members of the Fisheries Sector Through Social Networks

Beyond the cooperative federation structures, the lack of communication among fishermen had been a constant that has changed since the pandemic. Digital communication underwent a boost during the lockdown (Cobi, 2020a, 2020b, December 7). Inhabitants of the Yucatan coast needed to stay informed about events in neighbouring localities, which involved personal communication systems, particularly mobile phones and their associated applications (INEGI, 2020b).[3] The dissemination of news at the local level was important, followed by the participation of fishermen in virtual sessions convened by the fisheries authorities. During the pandemic, the predominant communications were horizontal, which favoured governance (Sowman et al., 2021).

After fishermen became aware of shared concerns and proposals, they steadily created groups and networks through which they could keep in touch with their peers located in other latitudes. One of the WhatsApp groups that experienced rapid growth was called *Pesca y Pandemia* (Fisheries and Pandemic). The pre-pandemic lack of communication or its unidirectional broadcasts were left behind; fishermen were now receiving and broadcasting information through multiple channels. The topics covered were diverse: weather conditions affecting the Yucatan Peninsula and the Mexican Caribbean, government notices, sale of products, protocols implemented by populations for self-care, etc. Digital gaps still persisted and continued affecting

[3] In Mexico, Internet users account for 78.3% of the population in urban areas and 50.4% in rural areas.

the most vulnerable individuals: the elderly, women, and people living in areas with unstable connections to the Internet (López et al., 2021).

8.6 Conclusion

Commercial coastal fishing in the state of Yucatan has shown its capacity for resilience in the face of the COVID-19 pandemic. Having overcome the problems related to production, markets, and local food, it still faces pending issues that underpin the socioeconomic marginality and vulnerability of most fishermen. The most pressing issues are the harsh working conditions, lack of social security, insufficient healthcare network, lack of consideration for women, and the need to incorporate the gender perspective into government programs and actions. It is also necessary to recognize fishermen as individuals and citizens who are eligible for credit from financial institutions, as well as needing improved and safe port infrastructure, land communication routes, broader Internet coverage in rural areas, and the inclusion of actions to mitigate the issues arising from climate change.

Economic stagnation during the early months of the pandemic allowed for revaluation of the most low-value fish species from a food perspective, focusing on the local level, promoting the exchange of food items and home sales, and strengthening communication through social networks. Collective community actions demonstrated a greater capacity for the economic sustainability of fishermen and their families than government initiatives. Fishermen learned that individual, family, and community resilience extended well beyond purely economic considerations.

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