

Managed Access: A Rights-Based Approach to Managing Small Scale Fisheries in Belize

¹Virginia Isabel Martinez, ²Adriel Casteñada, ³Mauro Gongora, ⁴Beverly Wade and ⁵Nicanor Requena
1-4. Belize Fisheries Department, Princess Margaret Drive, P.O. Box 148, Belize City, Belize C.A.
5. Environmental Defense Fund, Punta Gorda Town, Belize, C.A.

Abstract

Belize's commercial and subsistence fisheries are important for the livelihoods of approximately 2 800 fishermen, their families and coastal fishing communities. Belize's Fisheries were considered an open access fishery up until 2011. The threat of resource depletion became clear when fishermen's catches gradually declined. July of 2011 marked a turning point in the history of fisheries management in Belize, as the Belize Fisheries Department (BFD) in partnership with Toledo Institute for Development and Environment (TIDE), Wildlife Conservation Society (WCS) and Environmental Defense Fund (EDF) pioneered, at two of its marine reserves, the implementation of a rights-based approach to fisheries management known as Managed Access. The program was designed to empower traditional fishers by ensuring greater participation in the decision-making process which impacts their livelihood, and by improving the benefits to be derived from the fish stocks in terms of increased fish landings, reduction in fishing effort, larger size classes and increased prices and revenues. In addition, in the long term, there will be benefits accrued to the ecosystem, which will contribute to the maintenance of the overall health and sustainability of the Belize Barrier Reef System. Key to the success of this program are several components which include, but are not limited to: improvements in the licensing/registry system and process; a good monitoring and fishery-dependent catch data collection program; a dedicated presence of enforcement personnel and use of new enforcement technologies; and most importantly, the greater active involvement of fishers themselves in the program via fishing area based committees. All of which, coupled with an extensive social marketing campaign and consultation process, has yielded significant success and benefits for the resources as well as the stakeholders. Initially, Managed Access sought to complement Belize's successful marine reserve network with a system of limited access that would allow access to fishing within the general use zone of the marine reserve only to its *bonafide* fishermen. Managed Access eventually metamorphosed, and five years after the implementation at the pilot sites, the positive results and consultation process triggered the expansion of the program beyond just the initial proposal to roll out to the marine reserve network. Thus, in June of 2016, Managed Access was rolled out to the entire territorial waters of Belize and it now secures tenure for fishermen to fish in two of eight designated fishing areas, called TURFs (Territorial User Rights for Fishing), with the additional option of Area 9 that is designated for deep-sea fishing. In the process of the national expansion of Managed Access, The Belize Fisheries Department Managed Access Task Force evolved into the Managed Access Working Group (MAWG), which now incorporates a broader array of stakeholders. The establishment of the MAWG was realized in order to have a better participatory intervention of both stakeholders and technical capacities that would better guide the expansion under an ecosystems based approach.

Keywords: Rights-based management, Belize, Open access, Fisheries Management tool, Managed Access, TURF, small-scale fisheries

1. INTRODUCTION

1.1 Description of the fishery

Belize is located between 15° 52' 9" and 18° 29' 55" N and 87° 28" y 89° 13' 67" W with a territory of

22 965 km², including 688.94 km² of islands and an Exclusive Economic Zone (EEZ) of 35 000 km². Bordering to the north of Belize is Mexico with Guatemala to the west and south and facing the Caribbean Sea to the east (Figure 1). Belize is blessed with the second-longest barrier reef in the world that is approximately 269 km long, with a shallow lagoon between the coast and the barrier reef, which includes three offshore atolls with shallow inner lagoons. Inside the reef, the water is rarely deeper than a few metres, but beyond the offshore areas drop off, it plunges to between 1 000 to 4 000 feet depth. The combination of warm, shallow bays and lagoons, mangrove cayes, barrier reef and abyssal depths form ideal habitats for numerous species of marine life, including the spiny lobster, queen conch and several species of finfish making it one of the more productive fisheries in the region.

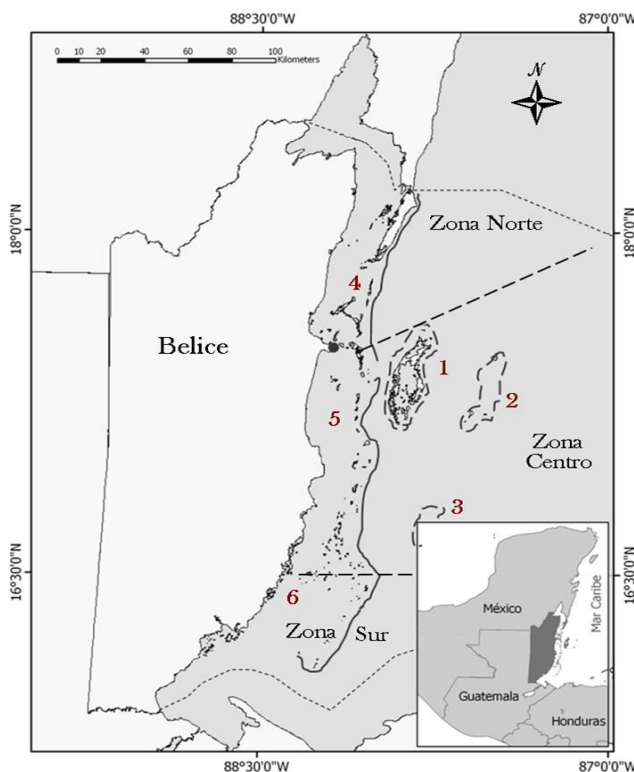


Figure 1. Country of Belize and Management Zones. Bordered by Mexico, Guatemala and the Caribbean Sea.

Source: Adriel Enrique Castañeda 2009. Analysis Bioeconomico de la pesquería de Langosta, *Panulirus argus*, de Belize. Thesis de Maestría, El Colegio de La Frontera Sur.

The Belize Barrier Reef System is divided into three distinct reef zones: a) North Zone, with approximately 46 km of shallow reefs from “Rocky Point” to “Gallows Point” with very developed reef systems that are almost continuous and with canals at certain points; b) Central Zone, with almost 91 km of shallow reefs from “Gallows Point” to “Gladden Spit” with the more developed and continuous reefs; c) Southern Zone, with 10km of shallow reefs from “Gladden Spit” to “Sapodilla Cayes” described by less continuous and developed reefs (Burke, 1982; Mcfield, 2001). Therefore, for management purposes, the coast of Belize is divided into three provinces (north, central and south) and these are subdivided into six fishing areas each with a mosaic of benthic habitats (see Figure 1).

The commercial fishing industry of Belize is characterized as a small-scale artisanal fishery that focuses mainly on lobster (*Panulirus argus*), conch (*Strombus gigas*), and various species of finfish and other emerging fisheries such as sea cucumber, stone crab and sharks. The fishing fleet is composed of vessels of two types: wooden sailing sloops and skiffs. The sailing sloops, mainly with an auxiliary outboard engine

of 40 horsepower (hp), have a capacity of approximately eight canoes and ten divers and are equipped with an icebox to preserve catch. Their duration at sea varies between six to ten days depending on the amount of ice carried, the catch, weather conditions and food supply among others. On the other hand, the skiffs, which are 23-25 feet in length and have crews of one to four fishers, are made of fiberglass and use engines ranging from 15 to 115 hp. Their fishing trips mostly have a duration of one day but might last up to five days for fishers with fishing camps. Fishing for lobster and conch is done with free diving to depths between six to 20 meters. Commercial fishing with the use of SCUBA is prohibited by law.

The Belize Fisheries Department has kept a registry since 1997 of the number of fishermen that engage in commercial fishing. Records indicate a steady rise in number from 1 359 fishers in 1997 to its peak of 2 829 fishers in 2015 (Figure 2). This rapid increase in the numbers of fishers was due to the open-access nature of the fishery, which had limited criteria for obtaining a license and engaging in fishing. However, the numbers of registered fishers have started to decline since the implementation of Managed Access in 2016 at the National level, which instituted measures to ensure that only *bonafide* fishers can obtain a license.

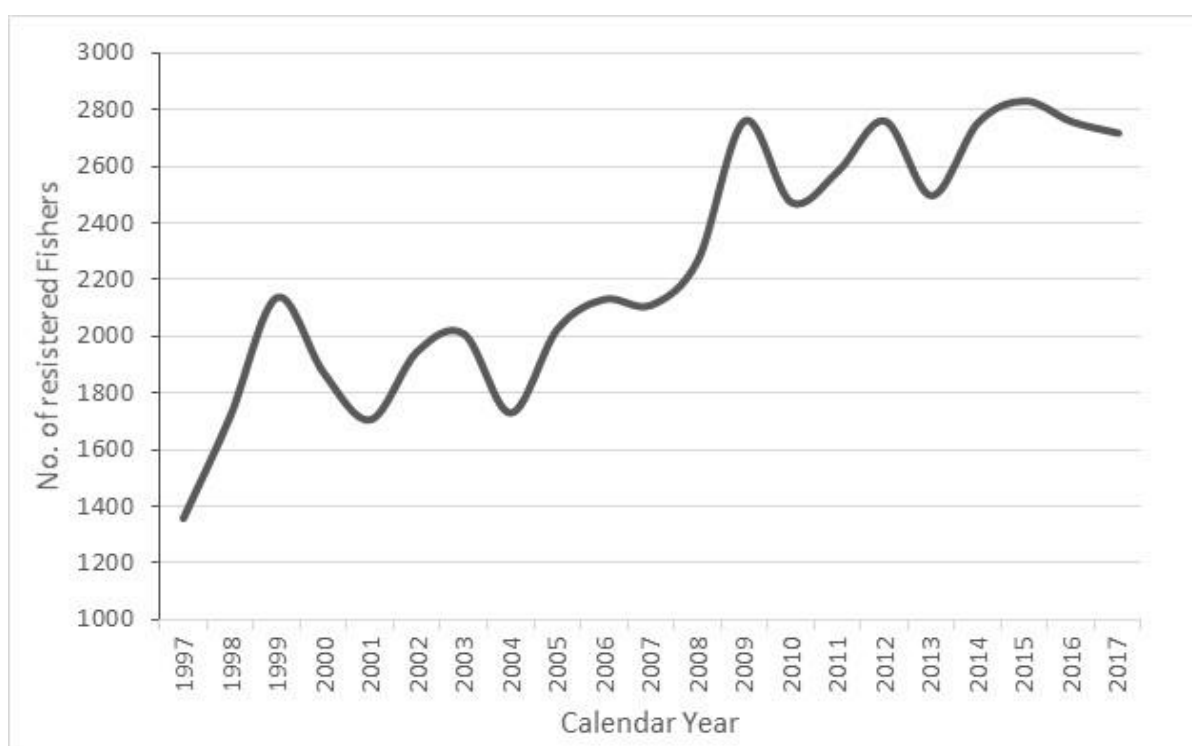


Figure 2. Number of registered fishers in Belize from 1997 to 2017.

Source: Belize Fisheries Department.

Open-access nature of the fishery has led to uncontrolled increase

The Managed Access Program, although expanded nationally in 2016, was initially piloted in July 2011 at Glover's Reef Marine Reserve (GRMR) on Glover's Reef Atoll and Port Honduras Marine Reserve (PHMR) in the southern seas off Punta Gorda Town. These two pilot sites that were identified in 2011 met the following criteria: 1) Site-specific management was in place. 2) Legislative framework existed to allow for a more restrictive form of management. 3) Fishery Dependent and Independent data existed.

1.2 Economic contribution and social implications of fishing activity

“Fisheries, including aquaculture, provide a vital source of food, employment, recreation, trade and economic well-being for people throughout the world, both for present and future generations and should, therefore, be conducted in a responsible manner” (FAO, 1995). Small-scale fisheries contribute significantly to the nutrition, food security, sustainable livelihoods and poverty alleviation of many countries, especially developing ones yet remain poorly understood and valued (FAO, 2004). Oceans and seas cover about three-quarters of our earth’s surface and are hence of vital economic, ecological, political and social importance, providing a myriad of services to mankind. For instance, they provide essential and biodiverse habitat, are a valuable source of protein, minerals and fossil fuels among many others. Fisheries resources were thought to be limitless based on the vastness of the oceans, but this is no longer a common thought; fisheries have declined, and many have been described as being in a state of crisis (Pauly and Zeller, 2003; Pauly, 2009; Defeo and Castilla, 2005; Defeo, 2015; Clark, 2006). Unlike other renewable resources, fisheries resources present unique challenges (Berkes, 2003; García and Charles, 2007; 2008) that have kept many scientists working full time trying to resolve the issues of overfishing. Despite Garret Hardin (1968) describing the underlining culprit, open-access fisheries management still poses many challenges to modern science because traditional management does not address the underlying causes of overfishing – the lack of clearly defined access rights. Traditional command and control approaches to fisheries management have largely failed because they do not provide the incentives for a long term harvesting regime, but rather instill a race to fish leading to the collapse of many fisheries. Moreover, many countries have a *de facto* open-access system provided for by the constitution or by cultural tradition. Hence, fisheries management in developing countries poses an even greater challenge because of the social, environmental, economic, and political challenges (Ostrom, 2009) that these countries face, confounded even more so by the inherent complexities of the resources themselves (Dudley, 2003).

Recent advances in fisheries management have identified that the use of rights-based fisheries could greatly improve management (Enriquez and Camargo, 2000) and ensure the social, economic and environmental outputs sought. In Belize, fisheries used to operate under an open-access regime in which the Government acted as the trustee for the public by managing fisheries in the interest of protecting the rights of future generations. The Government of Belize – The Belize Fisheries Department, and a coalition of NGOs and fisher organizations are now innovating methods of rights-based management appropriately designed and scaled for the unique needs of small-scale fisheries in the developing world. Fisheries are, in many cases, the sole source of income for families and a critical component of community and national economies. Belize’s commercial fisheries contribute to approximately 3.5 percent of the gross domestic product (GDP) and, with 15 000 Belizeans directly dependent on the fishing industry as a means of making a living, the need for a shift in the management regime became imminent. Belize’s National Fishery faced the threat of resource depletion as indicated by an increase in the number of fishers and a decline in their catches especially for the most lucrative species – Spiny Lobster (*Panulirus argus*) and Queen Conch (*Strombus gigas*). Hence, fisheries resources in Belize became increasingly faced with the predicament of too many people chasing too few fish.

This decline occurred despite Belize’s extensive marine protection efforts – MPAs, spawning protections, destructive gear bans. This is because traditional control methods are not sufficient as long as there is a lack of clearly defined access rights, and no controls on landings (Costello, 2008). Thus, Managed Access, as an innovative initiative, seeks to revolutionize fisheries management in Belize by implementing a system of TURFs, combined with rigorous data collection and enforcement, the enhancement of the current licensing system, the empowerment of fishers so that they contribute to management decisions in their fishing areas and the establishment of an apprenticeship program for new entrants to the fishery. This, along with the new markets incentives, value-added and traceability systems, seeks to promote

sustainable fishing and thus ensure that the resource thrives and that the livelihoods of fishermen are secured.

Before Managed Access, fisheries and fishermen faced the perpetual pressure of increasing numbers of fishermen in a mature fishery. The challenge was that, under the current management framework, any Belizean over 18 years old is qualified to obtain a commercial fishing license upon making payment of a prescribed fee, which is very minimal. The requirements for obtaining a license were also minimal and thus easily met. This allowed for a drastic increase in the number of fishers, for example, from 2004 to 2008 the number of licensed fishermen increased from 1 731 to 2 267, representing a cumulative increase of 30 percent. The number of fishing vessels also increased from 621 to 643 during the same period showing an overall increase of over 8 percent. Despite the increase in fishing effort, however, catches increased by only 2.42 percent when compared to 2007. Lobster landings declined by 24 percent from 277 tons in 1999 to 211 tons in 2009. Another issue faced at the time was that fishers and stakeholders complained about illegal fishing and uncontrolled harvest by “nontraditional fishers” and trans-boundary fishers.

2. MANAGEMENT OF THE FISHERY AND RIGHTS-BASED APPROACH

2.1 Management of the fishery

In order to address the issues caused by the then open-access nature of the fishery, the Managed Access process began in early 2008 with a scoping exercise. This was followed by the development of a framework and design for the pilot sites, which was introduced on 1 July 2011. The national expansion of Managed Access took effect on 13 June 2016. In this paper, we attempt to show the process followed by the Belize Fisheries Department, partner NGOs and fishermen organizations that led to the adoption of the national rights-based fishery management program, which is also a form of catch shares. This case study will allow participants to understand the process for developing a strong stewardship program that improves partnership amongst managers and stakeholders and promotes the fair, transparent and equitable distribution of fisheries resources backed up by a robust science program.

An intensive consultation and education and outreach process was carried out by a Managed Access technical team for a year before implementation at the pilot sites, but this was limited to the stakeholder communities of the two marine reserves where implementation would occur. In the following three years, in preparation for the national expansion of the program, the same technical team embarked on an extensive consultation process with key stakeholders of the fishing industry to guide the development of the design framework for the national roll-out of Managed Access in Belize involving all licensed fishers. The work was done through a series of workshops, surveys, technical consultations, focus group sessions, community-wide meetings, one-on-one sessions, forums and participation in education & outreach activities in these communities. The consultations, surveys, and meetings were deployed in order to ensure that the policies developed and promulgated by the Department had the support of fishers and would be successfully implemented. These sessions had direct input from fishers on the key components of Managed Access including: eligibility for Managed Access license; area allocation; catch data collection and submission; compliance with Managed Access conditions; and the Managed Access Committees. More than 2 000 fishers were contacted, and all 15 major fishing communities were reached, plus outlying areas with smaller numbers of fishers. The Managed Access technical team employed highly participatory techniques, which ensured that fishers were able to provide their input to the process adequately. In addition to sessions with the general population of fishers, the technical team held a series of meetings with fishermen organizations such as the fishermen cooperatives, the fishermen associations and umbrella organizations such as the Belize Federation of Fishers, and the Belize Fishermen Cooperative Association. The technical team also received input from key staff members from the Belize Fisheries

Department, the marine reserve staff, and co-management organizations of marine protected areas. Fishers across Belize were familiar with Managed Access and expressed a general consensus that Managed Access would be beneficial to them as users of the marine resources. The feedback and consensus from the consultation process is reflected in the recommendations for the policies, design, and roll-out of Managed Access. This consultation process that was carried out was perhaps one of the most extensive to ever engage Belize's fisher community.

As a result of the consultation and extensive social marketing campaign, stakeholder buy-in increased significantly leading to the national expansion of the program, to the point where all fishermen organizations expressed their formal support for the program via endorsement letters to the fisheries authorities. The positive results seen in the different components of the program also garnered the support of the fishing communities.

In order to ensure the better tracking of licenses issued and that the process was legitimate, the licensing database system was upgraded and has been continuously worked on and improved since 2011. The licensing hardware and software infrastructure were updated to a system that can store information from all fishers, including coding according to the area of fishing and the incorporation of the legal history of each fisher as well as information of all fishing vessels. Said registry has been fundamental in the implementation of Managed Access as it has allowed Fisheries Authorities to have a better understanding of the users of the resource, to keep a record of them and subsequently to provide structure in the allocation of licenses. The licensing system also provides for new protocols for the issuance of licenses that involves more checks and balances and the reconciliation of data that is input by specific users. The fisherfolk and vessel licenses began to be printed on PVC cards instead of only being laminated, which ensured the integrity of the licenses. During the first four years of implementation, fishers at the pilot sites were asked to fill out a socio-economic survey when they renewed their license at the end of each calendar year. The data obtained from these surveys over those years helped to provide the Department with a clear understanding of the fishers' perspective of the program. One of the results indicated by said surveys and also by enforcement records was the decrease of illegal fishing at the pilot sites by foreigners from neighboring countries. There was considerable flexibility in the issuance of licenses for GRMR and PHMR in 2011 and 2012, as fishers transitioned to the Managed Access system, with over 250 fishermen having access to each of these fishing areas. Now in 2016, five years after implementation at these pilot sites, the requirements and criteria have resulted in approximately 140 fisherfolk licenses issued for Glover's Reef Marine Reserve and 130 fisherfolk licenses issued for Port Honduras Marine Reserve. This has ensured that the persons that obtain access to these areas are *bonafide* users of the area.

The data collection component began on 15 June 2011 in order for it to coincide with the opening of the lobster season of that year. Fishermen were expected to provide reports of their catch as part of the criteria for renewal of their licenses. During the first years, there was a lot of leniency with said catch data requirements. Presently, under national roll-out, there is a 100 percent catch data submission by fishermen from the pilot sites and the Department is in the process of distributing catch logbooks and carrying out training sessions with fishermen from the other fishing areas for them to also be able to begin submitting their catch data. Over time, the catch data showed that fishermen reported higher catches and their willingness to submit said data to help inform management decisions also increased.

The formation of area-based committees, called Managed Access Committees, was integral to the licensing process. Applications for Managed Access licenses were submitted to the Committees that were responsible for vetting them— the first time fishers were involved in decisions on who could fish by making recommendations to the Belize Fisheries Department. The Committees were and continue to be key in ensuring transparency in the licensing process. The Managed Access Committees are composed primarily

of elected affiliates (part of a fishermen organization) and independent fishermen from each stakeholder community. The elected members are tasked with making management recommendations for their respective area(s), vetting applications, representing fishermen from their community that are users of said area(s) and providing feedback to their fellow fishermen in their communities. These Committees also include co-management partners of the marine protected areas and representative(s) from the Belize Fisheries Department. Each committee is guided by a specific terms of reference.

Infractions and violations declined significantly at the pilot sites since the implementation of Managed Access, whilst the intensive education and outreach efforts and increased stewardship encouraged an increase in compliance. The “race to fish” during the opening of the conch and lobster season was considerably less at these sites. Traditional fishers were content to see that “opportunistic” fishers were not present in their fishing areas, and they did not have to compete for fishing grounds and product. Generally, fishers were satisfied with the implementation of the Managed Access program. Fishers also began to cooperate more by reporting infractions via telephone calls to the fisheries authorities. Improvements in the use of enforcement technologies, such as the piloting of unmanned aerial vehicles (drones) and the future piloting of vessel monitoring systems (VMS) as a mechanism for surveillance and reporting, has yielded and is expected to further yield positive enforcement results. It is highly important to note that the road to national expansion was and continues to be a learning and adaptive process.

2.2 Rights-based approach: allocation and characteristics

Managed Access deploys a set of policy interventions that are related and mutually dependent. As an integrated program, these elements will improve fisheries management, empower fishers, and employ the use of scientific and economic tools to ensure benefits accrue to livelihoods, social conditions, and biodiversity. To achieve these objectives, the National Expansion of Managed Access has a framework based on:

2.2.1 Zoning of TURFs and Boundaries

Managed Access establishes nine fishery management areas allocated to fishers through a process managed by the fishers themselves. Eight areas are the nearer-shore region and atolls, where the vast majority of fishing occurs. A ninth deeper-water area is also delineated for expansion and diversification into deeper slope fisheries that will add production and revenues for the industry, and alleviate pressure on the lobster and conch fisheries. The Minister and Fisheries Administrator are authorized to declare these areas in that they enable the stewardship of resources for the benefits of the Belizean people. The Fisheries Act, Chapter 210 of the Laws of Belize under section 13 (1) C. authorizes the Minister responsible for Fisheries to enact regulations “for prohibiting the taking of fish at such times and within such areas as may be defined in the regulations.” During the community consultations, the zoning was not a major area of contention largely because it requires minimum change for how fishers currently operate – it was developed based on their historic fishing patterns. According to research conducted in the development of Managed Access, a vast majority of fishers do not use more than two of the demarcated areas. The goal is not to exclude nor displace fishers from fishing in their current areas, but rather to stop the unsustainable growth in the number of fishers; and empower existing users to steward the resource, and make sure they are rewarded for their stewardship with better catches.

2.2.2 Characteristics of the Managed Access License

Fishers select their two main fishing areas during the annual licensing process in December and January. The fisherfolk license issued to fishers thus indicates the areas selected by the fishers. It is the mechanism through which both rights and responsibilities are established. Fishers are empowered by having Managed Access privileges to fish in the TURFs, and in turn, have a responsibility to steward the areas. Licenses are established through a rigorous process that verifies the legitimacy of the residency of the applicant.

Licensed fishers are also subject to background checks by officials of the Fisheries Department. In doing so, it greatly reduces the illegal expropriation of Belizean natural resources to neighboring countries and illegal trans-boundary use of Belize's waters. Teams of Fisheries Department staff are available for every licensing period to assist fishers in filling out renewal application forms. The Fisheries Administrator has the ultimate authority to determine allocations of licenses, including considering any appeals from fishers on whether they meet the criteria. A provisional license is issued for fishers under appeal. Fishers who hold licenses are assured renewal unless they have committed infractions or are non-compliant with regulatory conditions of license. The Managed Access Committees for each TURF collaborate with the Fisheries Department on the renewal process.

2.2.3 Transferability of Licenses and New Entrants

Licenses are transferable to a next of kin or other recipient indicated by the fisher on the license application but must be taken to the Managed Access Committee of that respective TURF, which taking into account science-based assessments of the resource, and social considerations will pass on a final recommendation to the Fisheries Department. The Fisheries Department retains the final authority to approve transfers of licenses and new entrants. One of the components which will be phased in soon is that new entrants will be required to go through a fishers apprenticeship program in which new fishers are mentored by certified, experienced fishers and pass through a government-led fishing education program. This program will be established by and governed by the Belize Fisheries Department in collaboration with the Managed Access Committees, fisher associations, and other civil society organizations.

2.3.4 Data Collection

The Fisheries Department and its partners already conduct an extensive data collection process to assess the status of the fisheries. The Managed Access program adds to that with a system of logbooks in which fishers are required to record their catch per-trip. The value of this data is incredible. For fishers, it provides the information they can use to manage their fishing business. For managers, it is a key source of data to assess whether or not the fisheries are responding to the management measures. Most fishers do not have objections to submitting data but have expressed the continuous need for feedback regarding the results of the data that is analyzed. Based on this, the Department and Managed Access Working Group partner organizations conduct annual forums where these results are presented to the stakeholders of the different fishing areas. Currently, there are efforts by the MAWG partner organizations and the Fisheries Department to make the collection of data more efficient by using electronic systems that will also provide the basis for the implementation of traceability systems.

2.3.5 Governance and Monitoring

Managed Access uses two powerful elements for monitoring and enforcement – incentives for compliance and robust, modernized enforcement. Managed Access seeks to obtain voluntary compliance via stewardship and community participation in the management of the resources. As seen at the pilot sites, the number of infractions declines significantly once there is an allocation to fish in a specific area(s). Fishers become active participants in the protection of their resource. Simultaneously, there needs to be a strong and effective enforcement presence at sea to prevent, deter and reduce illegal fishing. Under Managed Access, fishers and managers work together to integrate a robust monitoring and enforcement regime established as part of its National Enforcement Strategy that includes:

- a) A thorough training and capacity building program for rangers and other staff present on the water.
- b) The color coding of fishing vessels. Certain parts of the vessels are being distinctly colored per fishing area so it is easy to identify whether the vessel is authorized to fish in the area.

- c) The three-strike rule pioneered in the pilot sites has been continued with national roll-out. The three-strike rule provides provisions for the suspension or removal of license for repeated infractions, depending on the severity of the infractions.
- d) A “crime stoppers” system is also applied to fisheries so that fishers may anonymously report violations to authorities. Fishers have demonstrated an eagerness to participate in enforcement, but they want the security that they will not be identified.
- e) SMART patrol information, utilizing electronic tablets, is currently being used to better plan and coordinate patrols. Infractions are immediately uploaded to the licensing system to allow managers to have more readily accessible information regarding offenders.
- f) Unmanned aerial vehicles (UAVs) have been piloted and strategically deployed in certain areas to assist with the surveillance at sea. This has yet to be used in other areas outside GRMR but is recommended as a valuable tool for efficient monitoring and enforcement.
- g) Co-managers and marine reserve staff based at the ranger stations in the various marine reserves play a crucial role in monitoring the entire fishing areas.

2.3.6 Managed Access Committees

Managed Access Committees are a crucial part of enacting effective management of fisheries in a way that empowers fishers. The committees are primarily made up of representatives of fishing communities, selected by fishers; as well as from Fisheries Department officials and co-managers. The purpose of the committees is to empower fishers and to establish a platform through which fishers and managers can constructively collaborate. During the consultation process, fishers were very supportive of the establishment of the committees. There is one Managed Access committee per area, with the exception of Area 4 & Area 5 that merged together because the users are the same. Thus, there is a total of 7 Committees. The Managed Access Committee representatives serve for a two-year term and are eligible for reelection if that is the will of his/her fishing community. An alternate representative is also elected along with the main representative in order to ensure that there is always community representation at committee meetings in the event where the designated representative is unable to attend. These Committees meet on a quarterly basis, or as frequently as necessary. Managed Access fishers from the community have the right to remove and replace representatives that are not fulfilling their role, particularly in keeping open and timely communications with the fishers they represent and similarly ensuring that fishers are kept fully informed of the activities and functions of the Managed Access Committees.

2.3.7 Strengthening of Cooperatives and the Industry to Access Premium, Higher-Revenue Market Opportunities

The national roll-out of Managed Access creates new economic opportunities for fishers. The most direct and obvious value is that over time, the biomass of fish will grow and fishers will have more product to sell. However, even more value can be derived from linking Belize’s sustainable fisheries to premium markets. This includes access to higher-value retailers in global markets, developing a domestic demand for sustainable products for tourists, specialized processed products, and preferential labelling. Therefore, in parallel with the national roll-out, the MAWG is implementing a market and finance strategy. The MAWG and other partners have conducted several studies to analyze this market opportunity. These include an analysis of local and global demand for Belizean seafood and a value-chain analysis for lobster and conch. As a result of these studies, several conclusions can be reached:

1. The transformation to sustainable fisheries can double the value of Belize’s fisheries industry through a range of market diversification opportunities and more productions.
2. Market reforms and supply chain reconfigurations can be leveraged to strengthen Belize’s system of cooperatives, including ending the cycle of debt.

3. Expanding and diversifying Belize's fisheries to include deep-water stocks that will generate more revenue for the industry, as well as alleviate the pressure on traditionally targeted stocks in shallower waters.

2.3.8 Adaptive Management Framework

Since mid-2013, the Belize Fisheries Department convened a team of fisheries scientists to develop a science-based process for analyzing the status of fisheries and determining a total allowable catch (TAC). The Department is developing an adaptive management framework (AMF) that builds on existing data collection and analysis conducted by the Department. As a first step, the AMF is being used to develop a national assessment and fisheries management plan for lobster and conch. Over time, the AMF will be applied to each TURF to ensure that each Managed Access area is fished within sustainable limits. Belize is already collecting significant and valuable data to populate the adaptive management framework, and this data can be used to inform and compare indicators within this framework in lieu of conventional stock assessments and still result in valid science-based management decisions. The AMF empowers Belize's fishery managers to make fishery management decisions based on science, even when data and capacity are limited.

2.3.9 Education & Outreach

All of the above-discussed components have been socialized to stakeholders. Most of the concepts resulted from recommendations made by fishers during the consultation process and all were adapted to meet the needs of Belize: of fishers, the resource and management authorities. On the road to national expansion, additional staff was hired to develop a social marketing and branding campaign to garner the support of the fishing communities. Numerous education and outreach efforts carried out by the Managed Access technical team, along with these campaigns, yielded positive results and allowed for a smooth transition from an open access system to a Managed Access system. There were many lessons learnt along the way, but perhaps the most important was that the management approach being adopted has to be flexible and adapted to the needs of the country, its fishery and its people.

3. CONTRIBUTION OF THE RIGHTS-BASED APPROACH TO ACHIEVING SUSTAINABILITY

3.1 Sustainable use of the resources

The primary successes of the Managed Access program include:

- A reduction in fishing effort;
- Increased food security and territorial integrity;
- Use of a special licensing system that is managed by the stakeholders via the Managed Access Committees with oversight from the Fisheries Department;
- Sustained and increased catches of lobster, conch and finfish and an increased CPUE recorded for lobster and conch (although it is recognized that other factors could also have contributed to these increases);
- Improved data collection with good estimates of total catch available for the pilot sites; this has enabled analyses to be initiated to determine the sustainable level of catches for lobster and conch and post-national expansion will enable the same to be done for all other fishing areas nationwide;
- A decline in the number of infractions due to improved surveillance and enforcement efforts and increase compliance as well as a growing sense of stewardship by fishers; and
- Overall strong support for the program by fishers.

3.2 Economic viability of the fishery

This rights-based program has involved most of the elements necessary to foster sustainable fisheries, such as managing access, managing fishing effort, involving stakeholders in management, developing a culture of compliance, improving data collection and having effective monitoring and enforcement all of which strongly align with the small scale fisheries guidelines (FAO, 2015) and the Code of Conduct for responsible Fishing (FAO, 1995). There is currently a lot of ongoing work within the program and a lot more work to be done. One of the elements that is still in its developmental phases is the economic aspect, for example, market-based incentives are in the process of being developed to ensure better prices for the sustainable-fished products, thus providing direct and tangible benefits to the fishers. The Managed Access program is not intended to be a panacea for all fisheries problems, but we strongly believe that this management approach, which has been rolled out nationally in Belize, is an excellent example of the potential for developing a sustainable small-scale fisheries management model for the region.

3.3 Social Equality

Trends in social organization, social behaviour and gender roles significantly influence fishery and other activities in small-scale fishing communities. In Belize, fishing has traditionally been and remains a male-dominated and family-oriented activity where the older males are the boat owners, and crew members and the male children are expected to follow in their elders' footsteps once they become 18, which is one of the requirements for obtaining a fishing license. Women in these communities play no active role in the actual fishing activities; their primary role is managing all aspects of the household. This could be due to several factors such as the high degree of fisher mobility and short closed seasons that shorten the time the males spend at home; to even cultural factors where males are considered the breadwinners and females as housewives. This mainly occurs where fishing is the main source of livelihoods, and only a few alternative livelihoods options exist within the community. As such, this scenario is less evident in areas where alternative livelihood options are readily available allowing women to play a more prominent role in the community and income generation - this is normally observed in communities where tourism occurs. Furthermore, fishing is mostly artisanal, and the living conditions may become too adverse and inappropriate for females- living conditions on board the sailing boats, for example, are rustic (no bathrooms, extended hours of fishing at sea (average of 8 days), limited freshwater, etc.). Nonetheless, there are approximately 30 fisherwomen mostly in the southern part of Belize who engage in fishing for lobster, conch and finfish on a daily basis using skiffs. Administratively, both males and females have the same right to become fishers or participate in the process. Managed Access has supported the inclusion of women in the area based Managed Access Committees and in all other aspects of the program. In fact, both fisherwomen and fishers' wives were actively involved in the consultation process. Managed Access will seek to further empower women's groups and youth groups currently in existence within each fishing community as a basis for further expansion and development. As the main household managers, it is likely that future projects and grants will be more successful with the enhanced participation of women and youth in their implementation. As such, it is recognized that there are clear and diverse social-role expectations for women, men, children, adults and elderly along gender, age and class lines.

4. MAIN CHALLENGES AND WAY FORWARD

4.1 Challenges for the fishery

Some of the challenges faced in the implementation process include:

- Illegal fishing by fishers from neighboring countries pose significant challenges to the sustainability of the fishery resources;
- Insufficient budgetary support does not allow for effective law enforcement;
- Initial resistance from fishermen for implementation of Managed Access;
- Skepticism from Fisher Organizations (Cooperatives & Associations);

- Availability to meet and influence key decision makers;
- Initial minimal participation of fishers;
- Initial lack of organization and limited capacity of fishing communities;
- Limited human and financial resources;
- Limited legal framework for national expansion; and
- Institutionalization of the management tool.

4.2 Improving fishery sustainability in the future

The future sustainable use of fishery resources in Belize will highly depend on continued and greater political commitment from decision-makers and increased funding for data collection, as well as research and law enforcement activities from both government and external sources.

The lack of effective fisheries law enforcement may discourage good fishers from continuing to respect fisheries regulations when they witness illegal fishing activities in “their” fishing areas, and law enforcement is minimal.

In addition, increased institutional support to maintain fishers’ participation and ownership of the management tool is extremely important. Fishers need to be fully convinced that “their fishing areas” are secure and that those management decisions for these areas are based on sound science and not just hypothetical scenarios. For example, field research is badly needed to gather sufficient fish biomass data to support the establishment of appropriate fishing effort in each fishing area. In the absence of such information, management may not be necessarily justified in blocking additional fishing effort in a particular fishing area.

Fishers’ participation in the fisheries management decision-making process needs to be further strengthened so that the Manage Access community committees truly represent the interests and wishes of fishers.

4.3 Lessons learned

Involvement of fishers in decision making is key for the implementation of TURFS. The presence of a competent monitoring and control authority is essential for the success of rights-based systems, as it ensures that fishers know that their rights are being respected and that illegal fishing is not occurring. The implementation of closed areas for fishing does not necessarily affect fishing activities negatively, provided the decision on where to put the limits is discussed and agreed upon with all stakeholders.

REFERENCES

- Berkes, F.** 2003. Alternatives to Conventional Management: Lesson from small-scale fisheries. *Environments*, 31(1).
- Belize Fisheries Department**, 2010. Glovers Reef June to September Quarterly Report 2010.
- Belize Fisheries Department**, 2011. Glovers Reef June to September Quarterly Report 2011.
- Burke, R.B.** 1982. Reconnaissance study of the geomorphology and benthic communities of the outer barrier reef platform, Belize. In K. Rutzler and I.G. Macintyre (eds.) *The Atlantic barrier reef ecosystem at Carrie Bow Caye, Belize, 1: Structure and communities*. Smithsonian contributions to the Marine Sciences 12.
- Clark, C.W.** 2006. Fisheries bioeconomics: why it is so widely misunderstood? *Population Ecology*, 48(2): 95–98.
- Costello, C., Gaines, S.D., and Lynham, J.** 2008. Can Catch Shares Prevent Fisheries Collapse? *Science*, 321(5896), 1678-1681.
- Dudley, R. G.** 2003. A Basis for understanding fisheries management complexities. Presentation at the 21st International Conference of the System Dynamics Society, New York.

- Defeo, O., and J.C. Castilla.** 2005. More than one bag for the world fishery crisis and keys for co-management successes in selected artisanal Latin American shellfisheries. *Reviews in Fish Biology and Fisheries*, 15(3):265–283.
- Defeo O.** 2015. Enfoque Ecosistemático Pesquero: conceptos fundamentales y su aplicación en pesquerías de pequeña escala de América Latina. FAO Documento técnico de pesca y acuicultura Roma. 72p.
- Enríquez, R. and Camargo, B.G.** 2000. Perspectives of rights-based fisheries management in Mexico. IIFET Proceedings.
- FAO.** 1995. Code of Conduct for Responsible Fisheries. Rome, Italy.
- FAO/RAP/FIPL.** 2004. A research agenda for small-scale fisheries. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand. RAP PUBLICATION No. 2004/21 and FIPL/C 10009 (En).
- FAO.** 2015. Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the context of Food Security and Poverty Eradication. Rome.
- García, S. M., and Charles, A.T.** 2007. Fishery Systems and Linkages: From Clockwork to Soft Watches. *ICES Journal of Marine Science*, 64(4):580-587 .
- García, S.M., and Charles, A.T.** 2008. Fishery Systems and Linkages: Implications for Science and Governance. *Ocean and Coastal Management*, 51(7): 505-527.
- Hardin G.** 1968. Tragedy of the Commons. *Science*, 162(3859): 1243-1248.
- McField, M. D.** 2001. The Influence of Disturbances and Management on Coral Reef Community Structure in Belize (PhD Dissertation). College of Marine Science, University of South Florida, 155 p.
- Ostrom, E.** 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* 325(5939): 419-422.
- Pauly, D. and Zeller, D.** 2003. Part 1: Fisheries Trends - The Global Fisheries crisis as a rationale for improving the FAO's database of fisheries statistics. Fisheries Centre Research Reports, Vol. 11(6): 1-9.
- Pauly, D.** 2009. Beyond duplicity and ignorance in global fisheries. *Scientia Marina*, 73(2): 215-224.