



Full length article

Pathways to establishing managed access and networks of reserves

Paolo Roberto Domondon^a, Raquel Sanchez Tirona^b, Steve Box^c, Robert Pomeroy^{d,*}^a Rare, An der Bucht 63, 10317 Berlin, Germany^b Rare Philippines, 3rd Floor Trends Plaza, F. Ramos St., Brgy. Cogonl, 6000 Cebu City, Philippines^c Rare, 1310 North Courthouse Road, Suite 110, Arlington, VA 22201, USA^d Connecticut Sea Grant, University of Connecticut, 1080 Shennecossett Road, Groton, CT 06340, USA

ARTICLE INFO

Keywords:

Managed access
Marine reserves
Fisheries
Laws

ABSTRACT

The specification of user rights and the devolution of fisheries management and allocation decisions to the local fisher and community level has been found to be an effective approach to improved fisheries management. Rare's Fish Forever's policy and governance work supports and strengthens legal and functional community rights-based management and exclusive access rights to coastal fisheries through managed access with reserves (MA+R). This paper presents an analysis of the legal, regulatory and institutional pathways undertaken to establish MA+R in Brazil, Indonesia and the Philippines for local communities to secure and strengthen both legal and functional access rights to fisheries resources. The pathways used involved interpreting and adapting a mix of fisheries, marine conservation, marine protected area and government administrative and legal instruments at national and local levels. Several common pathways to establishing and implementing MA+R were identified including partnerships and engagement with leaders and community members, committed local champions and scaling up from experience.

1. Introduction

Coastal waters sustain life and provide a livelihood for millions of people worldwide, ensuring an essential source of food and income. However, high rates of population growth and rapidly increasing food needs are putting enormous pressures on coastal and marine resources. It is now almost universally accepted that most of the near-shore fisheries globally are overfished and that fishing overcapacity is one of the leading causes of this overfishing [1–6]. Overfishing has resulted in the reduction or collapse of important fishery populations and threatens the oceans and the people who depend on them. If managed more effectively, capture fisheries can continue to provide economic benefits [7]. Better management can also help avoid the continuing collapse of aquatic and marine ecosystems and the loss of associated biodiversity occurring throughout the world's oceans and aquatic environments. The importance of fisheries' future contributions to livelihoods and food security cannot be underestimated.

Rare, an international non-governmental organization, works with fishing communities – fishers, fish buyers and traders, community members, and government – around the world to build and strengthen community-based fisheries management of coastal waters. Fish Forever

is Rare's community-led solution to revitalize coastal marine habitats, including coral reefs and mangrove forests, protect biodiversity, and boost fishing communities' livelihoods [8]. The Fish Forever program engages a scientifically informed, community-driven participatory process to design managed access and reserve areas to manage complex multi-species fisheries in developing nations. The aim of Fish Forever is to enable the effective management of coastal fisheries in an ecosystem context, where the protection of the environment and the use of these natural assets is linked directly to building a resilient rural economy underpinning the well-being and long-term prosperity of coastal communities [9]. Fish Forever operates in eight countries on four continents that together hold a third of the world's coral reefs and nearly half of global mangrove coverage, including Brazil, Indonesia and the Philippines. To date in the eight countries, Fish Forever has worked with 168 local governments and 1017 communities. It has implemented managed access in 3,903,022 ha and worked with an estimated 1,559,091 community members and 157,521 fishers.

The specification of user rights and the devolution of fisheries management and allocation decisions to the local fisher and community level has been found to be an effective approach to improved fisheries management [10–12]. The legitimization and enforcement of user rights

* Corresponding author.

E-mail addresses: pdomondon@rare.org (P.R. Domondon), rtirona@rare.org (R.S. Tirona), sbox@rare.org (S. Box), Robert.pomeroy@uconn.edu (R. Pomeroy).<https://doi.org/10.1016/j.marpol.2021.104580>Received 21 January 2021; Received in revised form 27 April 2021; Accepted 28 April 2021
0308-597X/© 2021 Elsevier Ltd. All rights reserved.

have been one of the critical conditions for success of co-management and community-based management [13,14]. A review of community-based management projects in the Philippines, for example, found that when user rights are specified and secure, there is a change in the behavior and attitude of the fisher towards conservation and a much greater chance that the material intervention of the project will be maintained. In addition, the review showed that government support through legislation, funding and enforcement is crucial to sustaining the intervention. In most cases, local property right institutions require active collaboration with government to enforce user rights [15].

Fish Forever supports the specification of user rights and the devolution of authority over coastal fisheries, from centralized government control to a community-based co-management model [16]. Fish Forever's policy and governance work supports and strengthens legal and functional community rights-based management and exclusive access rights to coastal fisheries through managed access with reserves (MA+R). Through the managed access approach, local fishers are granted exclusive access rights for fishing in defined areas creating community stewardship of the fishery [17]. Fishers participate in coastal management and conservation activities through local fisheries management bodies which are granted the authority to define and enforce fishing regulations including the establishment of no-take reserves.

This paper presents an analysis of the legal, regulatory and institutional pathways undertaken in Brazil, Indonesia and the Philippines for local communities to secure and strengthen both legal and functional access rights to fisheries resources. The paper will examine successes and challenges across the three countries in identifying and navigating these pathways to establish MA+R and how they were dealt with. The paper will conclude with guidance and recommendations on universal best practices for sequencing of the steps for how MA+R can be applied in the context of global implementation.

2. Fish Forever

There are a number of management measures for fishery management such as area closures, limited entry and other input controls (effort limitation) and output controls (quotas) [18]. These approaches address a range of fisheries issues such as: who can fish; where is fishing allowed; what fishing gear is allowed and how much; and how much fish can be caught. Two kinds of 'rights' are important in fisheries: use rights deal with who has the right to 'use' the fishery (i.e., to go fishing), while management rights deal with who has the right to be involved in managing the fishery [19]. Whenever a fishery is managed by restricting who can have access to the fishery, how much fishing activity (fishing effort) individual fishers are allowed, or how much catch each can take, those with such entitlements are said to hold use rights [19]. Use rights are the rights held by fishers or fishing communities to use the fishery resources, as recognized or assigned by the relevant management authority (whether formal or informal). Use rights in a fishery define what particular actions the fishers are authorized to take and a claim to a benefit stream (i.e., fish catch) that is protected, in most cases by the government. There are various forms of use rights, generally grouped into two categories [19]:

- access rights, which permit the holder to take part in a fishery (limited entry) or to fish in a particular location (territorial use rights or 'TURFs');
- withdrawal rights, which typically involve quantitative (numerical) limits on resource usage, either through input (effort) rights or output (harvest) rights.

A rights-based management approach, an application of use rights, provides an entitled entity (e.g., a community or cooperative) with the right to manage its fisheries and resources [20]. There are numerous forms of rights-based approaches to fisheries management, but essentially these approaches confer privileges and responsibilities that define

the appropriate use of a fisheries resource. Rights-based management approaches effectively replace the system dynamics of open access fisheries with a fundamentally different model, that of access privileges. Marine tenure systems, as in Indonesia, involves establishing a set of rights and responsibilities in the marine and coastal environment as to who is allowed to use which resources, in what way, for how long, and under what conditions, as well as who is entitled to transfer rights (if any) to others and how [41]. Developing tenure rules and responsibilities over marine waters creates a common property arrangement governed by a local tenure institution.

The Fish Forever program is an application of user rights through a rights-based management approach [21]. Fish Forever delivers a scalable community-focused approach to address overfishing and habitat degradation across the coastal waters of tropical countries through an integrated social, ecological and economic solution. Its delivery method engages communities towards individual and collective behaviors that overcome the "tragedy of the commons".

In every community where it operates, Fish Forever designs networks of marine reserves to be protected [22] (Fig. 1). It uses ecological modeling to identify how fish and coral are connected across the entire coastal zone (Fig. 2). These models allow communities and local governments to see how their fishing areas are linked to other communities along the coast.

Local fishers are given exclusive rights to fish in areas with established limits and fishing regulations around those reserves [23]. These rights, endorsed by local governments, ensure that the benefits of protection and responsible fishing accrue back to their communities, providing clear incentives for compliance. Combining Managed Access with Reserves (MA+R) builds a value proposition for communities to invest in protecting an area and managing their local fishing activities. Fish Forever also helps build communities and local governments' capacity to manage these networks of MA+R and coordinate their efforts across the region [24]. Fish Forever first found entry into the local governments and communities through a selection process that included criteria such as openness and willingness to participate, ecological significance of coastal waters, threats to coastal waters, and food security and then reaching out to the local government and community leaders. Effective local management groups are organized and have transparent, equitable, and representative decision-making and are legally recognized and authorized by governments to grant community-based fishers access rights. Fish Forever then applies insights from behavioral science to help shape community norms, promote sustainable behaviors, build pride in positive actions, and sustain these changes by shifting social norms around communities' role in managing local fisheries (Fig. 3). Fish Forever specifically focuses on four key behaviors of responsible fishers: registering as a fisher, participating in local management efforts, reporting their catch, and complying with fishing regulations. Lastly, Fish Forever helps communities establish savings clubs and access financial services to build their financial security linked to the protection of their natural assets.

Fish Forever partners and works closely with various local, subnational, and national governments to help advance and sustain these coastal nations' vision [25]. The policy work helps create an enabling environment that promotes widespread adoption and community-based approaches, and it also helps mobilize financing for sustainable resource management. It plays a crucial role in achieving priority and preference for small-scale fishers' access to and sustainable use of coastal fisheries. Fisheries management is also a political decision, and so by developing the evidence and reasoning for investing in improved management, policy dialogs happen and drive local, national and international commitments and priorities for the sector. Fish Forever's policy and government engagement work leads to establishing legal pathways for communities to secure access rights and implement managed access and reserves. It works with governments to secure priority and preference for coastal communities in their access and sustainable use of resources. To sustain and scale various efforts, Fish Forever also secures policy and

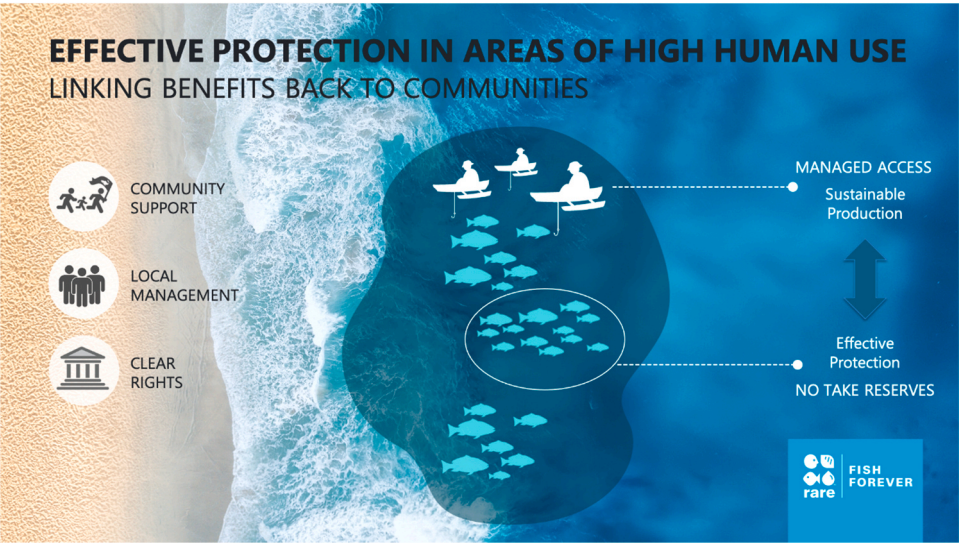


Fig. 1. Fish Forever model.

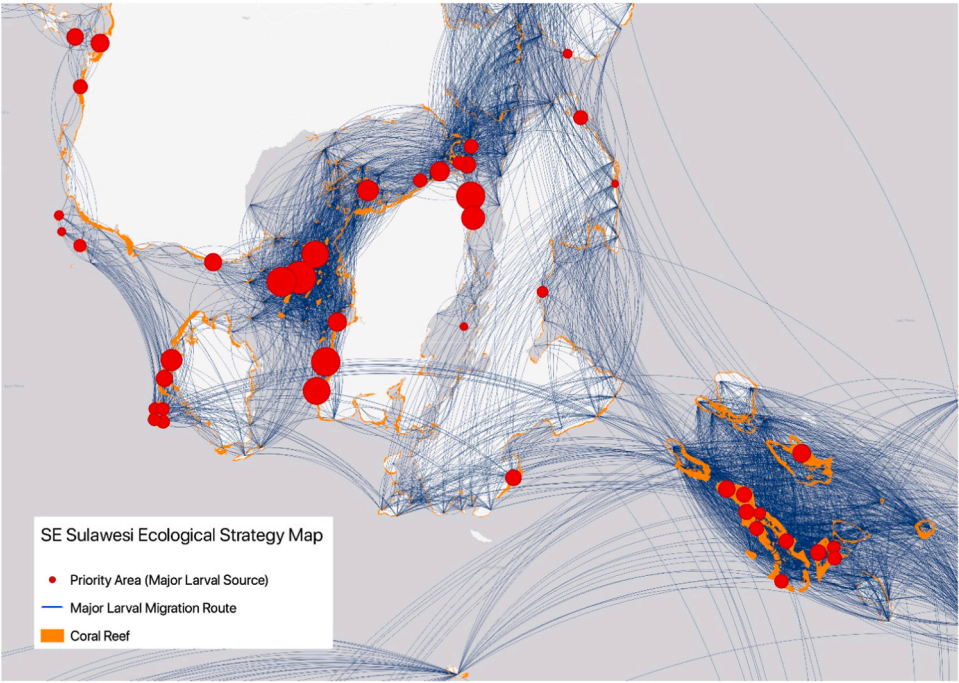


Fig. 2. Example of ecological modeling.

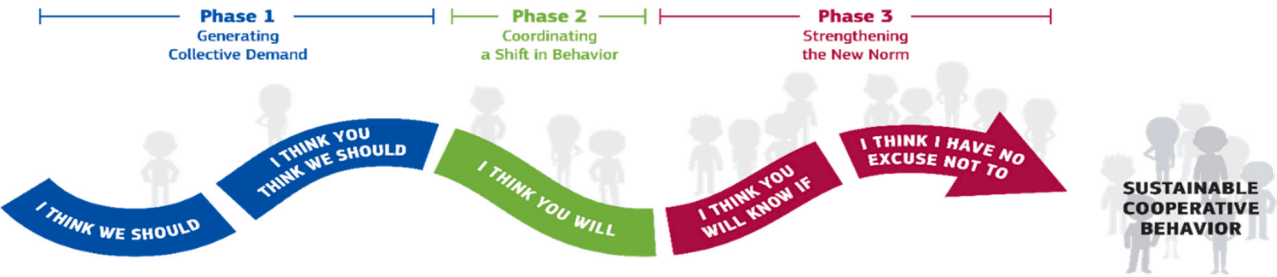


Fig. 3. Rare's cooperative behavior adoption model.

financial commitments towards the approach. The policy work also emphasizes the need to work with local government leaders, being the closest to both the resource and the constituents, in elevating the issues of coastal fisheries and implementing relevant solutions.

3. Case studies: Brazil, Indonesia, Philippines

The Fish Forever program in Brazil, Indonesia and the Philippines all began utilizing the same Fish Forever model of implementation. However, the socioeconomic, ecological, political, legal and institutional context of each country resulted in different pathways being undertaken to secure both legal and functional access rights to fisheries resources and implement managed access with networks of no-take marine reserves (MA+R). The three country case studies below describe these differing pathways and the opportunities and challenges faced in MA+R implementation.

3.1. Brazil

'Forever Fishing' Program began in Brazil in 2014 [26]. In Brazil, Rare works in protected areas, called Extractive Reserves (*RESEX – Reservas Extrativistas*) and Environment Protection Areas (*APAs – Áreas de Proteção Ambiental*), that are part of the National System of Conservation Units (*SNUC – Sistema Nacional de Unidade de Conservação*). Based on criteria such as the location's suitability, the potential for creating managed access areas and fisheries stock replenishment areas (*ACRES – Áreas de Conservação & Recuperação de Estoques*), and financing opportunities, among others, six conservation units were chosen in cycle 01 (2015–2017) in the States of Maranhão, Piauí, Ceará, Bahia and Santa Catarina. Rare implemented 'Fish Forever' through the "Pride Campaigns" with the support from government partners and local organizations seeking behavior change through generating public awareness and social mobilization for the practice of sustainable fishing management connecting the need for marine reserves and improved local management to fisheries recovery [26]. The selection of cycle 02 implementation areas (2017–2019) was based on lessons from the implementation of cycle 01. Ten marine protected areas were selected to participate in cycle 02, five of which are located in the State of Pará, two in Pernambuco, and three in Maranhão and Piauí. Out of these areas, eight are Coastal and Marine Extractive Reserves (*RESEX*) and two are Environmental Protection Areas (*APAs*). The implementation involved strategic partnerships on a federal level with, ICMBio (Chico Mendes Institute for Biodiversity Conservation, an agency linked to the Ministry of Environment, whose practice focuses on conservation units), CON-FREM (Brazilian Council for Strengthening of Marine Extractive Reserves) and local organizations and campaign coordinators [27].

The current Brazilian legal framework derives from the Federal Constitution of 1988. The Constitution covers a large and complex infra-constitutional legislative framework with federal laws, decrees, different regulations based on ordinances by environmental bodies, normative instructions, and technical notes. The decentralization of environmental policies management in Brazil was consolidated with the 1988 Federal Constitution [28]. It defines the legal basis for the management of fisheries resources and coasts, as well as the creation of conservation units, managed access areas, no-take areas, and joint management initiatives – for instance, fisheries agreements and management plans for conservation units, such as Marine Extractive Reserves, Sustainable Development Reserves, and Environmental Protection Areas.

The National System of Conservation Units (*SNUC*), created in 2000, plays a central role in small-scale fisheries management in Brazil [29]. *SNUC* establish specific institutional conditions aimed at reconciling measures of organization, promotion, and environmental conservation and offering opportunities for decentralized and shared management of natural resources. Conservation Units are legal supported by Decree No. 2519 of March 16, 1998, Enacting the Convention on Biological Diversity; Law 9895/2000 that creates the National System of

Conservation Units (*SNUC*) [29]; and Decree No. 5758/2006, which institutes the National Strategic Plan for Protected Areas [30]. Among the Conservation Units for sustainable use provided for in the National System of Conservation Units, three are important for managed access: Marine Extractive Reserve (*RESEX*), Sustainable Development Reserve (*RDS*), and Environmental Protection Area (*APA*). A *RESEX* and *RDS* must originate from a formal demand from the community (local level) to the environmental department (of any government level). The different categories guarantee differentiated strategies of managed access and, even in a conservation unit of integral protection (i.e., Ecological Station (*ESEC*), it is possible to have exceptions for access for direct use of resources by small scale fishers, based on different legal instruments, such as the Terms of Conduct Adjustment.

The Conservation Units are created by an act of the government and must be preceded by technical studies and public consultation that allows for identifying the most appropriate location, dimension, and limits for the category (*ICMBio* n° 03/2007). The creation of conservation units can occur at all government levels. The management of fishing activity within federal conservation units is carried out by *ICMBio*; while at a state or county level, the creation and management of CUs takes place through state and county environmental departments. Implementation of conservation units is through three tools:

1. Management council. The Council's role is to constitute a democratic forum for dialog, appreciation, participation, social control, and management of the conservation units.
2. Management agreement. The Agreement is regulated by *ICMBio* Normative Instruction No. 29/2012 as a management tool that aims to establish rules for the use of natural resources and land occupation.
3. Participative management plan. This is the main planning tool for Conservation Units as established by *SNUC*. There is the Normative Instruction No. 01/2007 regulation for *RESEX* and *RDS* specific cases. The Participative Management Plan addresses actions, policies, norms, plans, zoning, and monitoring strategies for the CU.

In addition to conservation units, there are a considerable set of policy tools that support managed access:

- Fishing Agreements (*IBAMA* No. 29/2002) are community-based planning measures that define rules for access and use of fishing resources in a given region, developed by the community and other users, and regulated by the public authorities.
- Fishing exclusion zone/area is a planning measure adopted by different departments linked to fishing management in which there is a prohibition of any fishing activity or present specific restrictions on a type of fishing gear or fishing method.
- National Action Plan for Conservation of Endangered Species - *PAN* (*ICMBio* No. 21/2018) consists of a management tool created in a participatory manner, for the planning and prioritization of actions for the conservation of biodiversity and its natural environments that may include some kind of ecological zoning.
- Endangered Species Recovery Plan (*MMA* Ordinance No. 201/2017) is a management tool through which *MMA* can allow the sustainable use of endangered species as established by *MMA* Ordinance No. 73/2018.
- Ecological-Economic Zoning - *EEP* (Decree No. 4247/2002) is a basic planning tool that establishes, after public discussion, the rules of land and sea use and occupation and management of natural resources in specific areas on a county level, based on the analysis of their ecological and socioeconomic features.
- Coastal Ecological-Economic Zoning - *ZEEC* (Decree No. 5300/2004) is a tool that seeks to guide the process of the necessary territorial planning to promote the development of coastal zone sustainability.
- Fishing Forums are formal and local fishing management sites, mainly established in southern Brazil, in order to organize

discussions and deliberate on recommendations for fishing management, including the definition of managed access areas and stock conservation and recovery areas.

The development of strategic partnerships has been a critical element of Fish Forever in Brazil [27]. Strategic partnerships were developed between government agencies ICMBio and the local movement well known as CONFREM (*Comissão Nacional de Fortalecimento das Reservas Extrativistas Costeiras e Marinhas*) and universities, “mother associations” (“associações-mãe”) of extractive reserve, and unions of fishers. ICMBio, through environmental analysts, managers of Extractive Reserves and Environmental Protection Areas, and research centers, contributed technical expertise and knowledge to the implementation process, offering its infrastructure for longer training courses and enabling exchanges between fishers from different conservation units. CONFREM brought an important contribution for the legitimization and credibility of social movements in awareness-raising and mobilization of the leaders, communities, and unions of fishers. In addition to CONFREM, other fishers social movements in Brazil include MPP (*Movimento dos Pescadores e Pescadoras artesanais*), that is strong in the northeast region, and Pastoral Fishers Commission (*CPP - Conselho Pastoral dos Pescadores*), that also support the fishers. Universities contributed to decision making based on relevant information and scientific knowledge. “Mother associations” (“associações-mãe”) of extractive reserve and colonies and unions of fishers engaged in a dialog with new partners.

There are a number of identified barriers for the establishment of managed access and stock recovery areas in Brazil:

- The national political context is currently unfavorable to the establishment of partnerships by government with the organized part of civil society interested in nature conservation.
- Pressure from a range of economic sectors operating in the coastal and marine environment that view conservation as an obstacle to the full development of their activities [31];
- Dismantling of the government institutional capacity for environmental management including budget cuts, extinction of public departments, reduction in the number of civil servants, limitation on the public servants’ autonomy and discretion in executing environmental inspection measures [32];
- Absence of political will within the legislature for environmental conservation [33,34];
- Environmental deregulation and lack of financial capacity and technical infrastructure for the development of environmental policies at state and county levels [35–37].

3.2. Indonesia

MA+R was first initiated in Indonesia in 2014 in three prototype partnerships [38,39]. Two were in MPAs (Karimunjawa National Park in Jepara Regency, and Mayalibit Bay MPA in Raja Ampat, West Papua) and one in a non-MPA (Betah Walang, Demak Regency, Central Java). All three were undertaken in cooperation with local people and different government organizations (National Park Agency, Ministry of Environment and Forestry (MoEF), Ministry of Marine Affairs and Fisheries (MMAF), and Provincial and District Marine and Fishery Agency). In the same year, a MA+R cohort was launched consisting of 12 government agencies across Indonesia (five in national parks, three in marine national parks and four in provincial waters). In total, MA+R was piloted in 13 regencies and 10 provinces in Indonesia. From 15 pilot partnerships initiated between 2014 and 2017, eight are still running with seven being in conservation areas (five under MoEF, one under MMAF, and one under provincial government) and one under the provincial government in non-MPA waters. Based on the success of the pilot phase, a province-based MA+R program was initiated in Southeast Sulawesi Province at 22 sites in 11 districts (both in and outside of conservation areas). Of the 22 sites, seven are located in MoEF’s jurisdiction, and the

rest are under the provincial government, in coordination with MMAF and district governments. This province-based MA+R program was officially launched in December 2018.

Rare Indonesia’s strategy for MA+R is based on four pillars and activities: (1) legal basis (laws, provincial government authority, marine spatial planning, regulations); (2) development planning (mid-term development plan, small-scale fisheries management plan); (3) institutional set-up (partnerships, working group, management body); and (4) public funding (provincial budget, village fund) [40].

Customary marine tenure systems exist in pockets spanning the width of Indonesia from Aceh in West Sumatra to West Papua at the far eastern edge of Indonesia [41,42]. In each case, customary tenure systems have evolved over generations, and waxed and waned along with changes to the political, legal, and social climate in Indonesia. Despite the many laws and Presidential Regulations, Ministerial Regulations and Ministerial Decrees, and Directorate General Regulations to implement the mandates of the laws, in Indonesia there is limited legal precedence for granting preferential and equitable access and use rights to small-scale fishers [43]. However, there is a provision in the existing laws and regulations of MMAF and MoEF for establishing MPAs that provide for the delineation of exclusive access privileges to fishing grounds for small-scale fishers. This served as the legal foundation for MA+Rs.

MA+Rs have been established in both conservation/marine protected areas and non-conservation areas in Indonesia [44]. The specific legal and regulatory pathways to establish MA+Rs differed by conservation and non-conservation area. MA+Rs in conservation areas are under the jurisdiction of both MMAF and MoEF. Under the jurisdiction of the MMAF, Regulation Number 21/2015 acknowledges the need to engage communities in the management of MPAs and Regulation Number 23/2016 specifies the scope of coastal planning to include strategic plans, marine spatial (or zoning) plans (MSP), management plans, and action plans. Those regulations are complementary to Regulation Number 47/2016 on MPA utilization, including for capture fisheries. Under the jurisdiction of MoEF, Government Regulation Number 28/2011, amended by Government Regulation Number 108/2015, specifies that natural resource use by local communities is allowed in traditional zones or other zones and the empowerment of the communities around the nature sanctuary. Regulation Number 43/2017 provides the guidelines for community empowerment and granting access for natural resources use by local communities. Regulation Number 85/2014 provides the guidance for cooperation in conservation area and Directorate General Regulation Number 6/2018 specifies conservation partnership, the legal basis for MA+R in conservation areas under MoEF.

MMAF suggested that MA+R would work in conservation areas under the scenario of a partnership between the MPA authority and community group to sustainably harvest/utilize fisheries resources within the designated zones for fishing. Based on Regulation No. 3/2016, MA+R could become a fishing sub-zone within the MPA’s sustainable fisheries zone. The establishment of MA+R sub-zone fisheries management involved four phases of: (1) preparation (data collection, partnership preparation, goal setting, boundary designation, identification of species to be managed), (2) management plan preparation; (3) plan assessment, partnership establishment, sub-zone establishment; and (4) implementation (monitoring, enforcement, partnership improvement) [45]. MoEF had a similar approach using a national park-community group partnership mechanism. Based on this experience, the DG Regulation Number 6/2018 on the Technical Guide for Conservation Partnership in Nature Sanctuary and Nature Conservation Area was established and accommodated MA+R in MPAs under MoEF’s authority. Similar to MMAF’s approach, MA+R could only be granted to local community groups, was non-transferrable, and could only be done in traditional zones or other zones which have a similar function to a traditional zone. The process to obtain a conservation partnership involved four phases: (1) planning (socialization, data collection, setting of goals, establishment of community group); (2) partnership proposal

(submission to conservation area agency, approval); (3) sign off (signing and reporting); and (4) assistance to community group (capacity building, economic improvement). MA+R in *adat* areas (traditional village governance arrangements and customary laws) within conservation areas of Raja Ampat district of West Papua builds and strengthens the traditional system of management.

MA+Rs in non-conservation areas in Southeast Sulawesi are based on provincial and national policies [39]. This includes Ministry of Home Affairs (MoHA) regulations on local government related to capture fisheries management and annual work plans and village development plans under the Ministry of Village, Development of Disadvantaged Regions, and Transmigration. In Southeast Sulawesi, MA+Rs is supported by the regional regulation on marine spatial planning (MSP). Article 29 (6) and (7) of the province's regulation on MSP stipulated that MA+R is one of the approaches for providing access to local and traditional fishers within 0–2 nm and will be elaborated in a Governor Regulation. MA+R is also supported by the provincial strategic midterm plan, and a regional fisheries management program. The Southeast Sulawesi Governor Decree No. 117/2017 on MA+R Working Group established a multi-stakeholders' platform to develop a province-based approach for MA+R. The MA+R Working Group serves the fisheries management program at the provincial level and bridges the MA+R at the community level and Fisheries Management Area 714 at the national level. In 2020, a new Governor Decree transformed the Working Group to a Working Team to assess MA+R proposals. MA+R in non-conservation areas in Southeast Sulawesi are regulated by the provincial government in coordination with district governments and national ministries. In the absence of a legal basis for MA+R, the provincial government, through the marine and fishery agency, took the lead in supporting MA+Rs. A Governor Regulation No. 36/2019 on Managed Access Area for Fisheries was established as the derivative from the MSP. The regulation covers the mechanism of establishing and granting MA+R to community groups, institutional arrangements, and funding. This Governor Regulation sets the precedent of MA+R implementation in other parts of Indonesia.

A policy barrier for the establishment of MA+Rs outside of an MPA was the absence of a legal basis at the national level resulting in MA+Rs not being fully recognized by some within and outside of the government at all levels. To address this barrier, the Southeast Sulawesi Government developed a regional regulation for its own jurisdiction in consultation with MMAF and MoHA. Support was obtained from the provincial government as long as MA+R did not contradict any prevailing laws and regulations, and that it supported the improvement of the fisheries sector, as well as community livelihoods. This was still met with reluctance since there is no guidance yet from the MMAF to legally establish MA+R in non-MPAs. Another barrier is related to the management body, one of the critical components of a working MA+R. The term management body is quite sensitive in Indonesia as it implies a management authority for the marine area, be it conservation area or non-conservation area, which in this case is the government. To address this issue, the term community group was used with clear provisions on membership, rights and responsibilities. In conservation areas, the community groups whom the MPA authorities have a partnership that will serve as the MA+R management body. Another barrier was the issue of the full exclusion of outside fishers from the MAR area faced by MA+R management body. This was highly sensitive and triggered community conflicts. A solution was to exclude non-sustainable fishing gears and allow outside fishers to fish in the managed access area with the approved gears.

MA+R functionality has been found to be based on several aspects [39]:

- a. *Size* of both the managed-access area and the reserves. Spatial boundaries are critical for MA+Rs to function. The MA+R size is based on proper scientific evidence to function effectively.

- b. *Resource management* including input and output controls, harvest system, and a management body
- c. *Regulations* that enable both size and resource management to take place
- d. *Data collection* to support fisheries management including digital community-based and mobile phone app-based data recording
- e. *Behavior change interventions* such as local champions and social interventions
- f. *Partnerships* with various agencies at all government levels, NGOs, universities, and communities has been participatory and inclusive.

Key success factors for MA+R in Indonesia have included [39]:

- Landscape analysis or stakeholder mapping was essential in identifying all parties involved in all decision-making process.
- Regular monthly or bimonthly written progress reports sent to all related parties within MMAF and MoEF.
- Consultations on how to best provide support to MA+R and make it both legal and functional, and encourage effective local government leadership in the process.
- Effective means of communication through WhatsApp groups to build strong buy in and along the process
- Adaptability and flexibility to opportunities and challenges

3.3. Philippines

Rare Philippines initiated its first Fish Forever sites in 2013 [46]. It worked with 21 coastal Local Government Units (LGUs) from 2013 to 2017 to incorporate the managed access and reserve (MA+R) approach into their fisheries management programs. The initial Fish Forever sites were mostly municipalities that had previously worked with Rare to run behavior change campaigns (also known as Pride Campaigns) for their Marine Protected Areas. Currently, Rare Philippines is working with 64 local governments to establish MA+R.

The Philippines has ample laws and policies that can serve as frameworks on which managed access areas and reserves (MA+R) can effectively build on [47,48]. The 1987 Philippines Constitution specifically declares that the "State shall protect the rights of subsistence fishermen, especially of local communities, to the preferential use of the communal marine and fishing resources, both inland and offshore..." (Art XIII, Section 7). In 1991, the Local Government Code (LGC) (Republic Act No. 7160) was enacted which devolved the delivery of public services and other administrative activities to local government units (LGU) (province, city, municipality, barangay). In relation to fisheries, the LGC stipulated that the management and protection of the environment within the jurisdiction of the municipality are the responsibilities of the LGU. The LGC increased the municipal territorial waters from 7 kilometers to 15 kilometers from the coastlines and extended the preferential rights to use such not only to the LGU, but also to the local communities as well. In 1998, Republic Act No. 8550 or the Philippine Fisheries Code clarified the designation of municipal waters up to 15 km for shore and the granting of preferential rights to fishing privileges in municipal waters to registered fisher organizations and cooperatives. The Fisheries Code called for the establishment of Fisheries and Aquatic Resource Management Councils (FARMCs) at national and municipal/city levels to provide a structure for public participation in coastal and marine resource management. The authority to establish and manage an MPA is held by three jurisdictions – local government, Department of Environment and Natural Resources (DENR) and the Bureau of Fisheries and Aquatic Resources (BFAR). Both national government agencies have responsibilities for protecting marine environments. Laws for protected areas are the National Fisheries Act of 1998 (RA 8550) and the National Integrated Protected Areas System Act of 1992 (NIPAS-RA 7586). The enactment of the Amended Fisheries Code (RA 10654) in 2015 expanded the role of the LGU in planning and managing protected areas and also mandated them to engage the

participation of the communities.

Rare Philippines decided to treat municipal waters as *de facto* managed access areas, since the law already recognized the preferential rights of local municipal fishers within their municipal waters [49]. This would be in contrast to Indonesia, for example, where all waters were clearly under state ownership. To initially determine whether an LGU was ready for MA+R, a Fisheries Management and Assessment Rating Toolkit (FishMARK) was used which was designed to assess an LGU's capacity to manage its municipal waters [50]. Rare Philippines formed partnerships with the local government units (LGUs) which were formalized through a Memorandum of Agreement (MOA) [49]. Local teams were trained to use behavior adoption and community engagement strategies to increase the community's knowledge about coastal fisheries management and the benefits of having reserves/MPAs. This included orienting communities, establishing working groups, gathering fisheries data and profiling both the habitats and fishing practices.

In most cases in the Philippines, there was a lack of management of fishing activities outside of MPAs, which generally led to a situation wherein fisheries declined [46]. This proved to be a good opportunity to introduce MA+R. Marine resources were assessed and the fishing grounds and territorial water boundaries were identified and mapped, conservation and fishery goals were defined, and the MA+R sites and fisheries management zones were then identified, designed, and delineated [46,51]. Depending on the size of the waters and the number of users, smaller sub-managed access areas were designated for exclusive use of a sub-group of fishers (for example, residents of an off-shore island). These were then integrated/harmonized with the existing fisheries management plans of the participating municipalities. The plans identified areas where fishers with access rights could be allowed to fish subject to regulations (i.e., managed access areas) and areas which were designated as strictly no-take zones. Fishing rights were assigned and fishing access regulated through fishers' registration with the LGU (i.e., providing IDs for fishers, fish buyers and vendors, full- and part-time fishers operating within the municipality); gear licensing (i.e., issuing licenses and permits for fishing gears, accessories, and other fishing-related activities); and boat registration for those using boats of 3 GT and below to fish within city/municipal waters. To establish the legality of MA+R at the LGU level and to ensure that the necessary support was provided to implement it, municipalities enacted a Municipal Fisheries Ordinance specifying the adoption and operationalization of MA+R [46]. The zoning plan served as the basis of the municipal ordinance to legalize the managed access areas as well as the rules and regulations agreed upon by the community. The development of the ordinance was based on a consultative and legislative process with fishers and other stakeholders in the LGU. A draft ordinance was developed and submitted to the Municipal Fisheries and Aquatic Resources Management Council (MFARMC), which reviewed it and issued a resolution endorsing it for passage. The ordinances took on different forms, depending on the status of other policies existing in the LGU, as well as the preferences of local stakeholders. In some cases, the ordinance is a stand-alone ordinance designating a Special Fishery Management Area or SFMA, in others, it is integrated into a Unified Fisheries Ordinance that also clarifies other fishery rules and regulations.

After a review of Fish Forever in 2017 [49], the program was refined to work at the appropriate ecological scale in order to ensure optimal fisheries benefits for the participating communities. This meant that networks of reserves would need to be designed to match species home ranges and connectivity, covering areas greater than most municipal waters. Rare expanded its activities to engage with all LGUs in a bay or seascape and worked with them to establish managed access areas in combination with networks of marine reserves.

The MA+R ordinance includes a provision for the creation of a Management Body (MB) comprised of key stakeholder representatives from the fishing communities (such as fishers, women's groups, youth club leaders, teachers, and religious leaders), the different offices of the LGU, the academe, and the NGOs operating in the area. It usually

stipulates that the Municipal Mayor acts as the chairperson, while the Municipal Agriculturist and the LGU Committee Chair on Agriculture and Fisheries act as the vice chairperson and co-vice chairperson, respectively. The local ordinance grants clear legal authority to the MB to define and enforce fishing regulations. Among the functions of the MB are to design the management process, gather data, communicate fisheries regulations, organize the local enforcement system, plan zonation, collect information for collective fisheries planning and decision-making, develop proposals for funding, and manage the special trust fund. Many of the functions overlap with those of the Municipal FARMC, and LGUs differed in how they aligned the functions of the MB with existing organizations (e.g. in some sites, the MFARMC became the MB).

In some sites, a special trust fund was set up to ensure continuity of the efforts being undertaken. Funds were received as a subsidy from the LGU and the shares of the MB from the collection of registration fees, fishery fees and charges pursuant to a revenue sharing scheme stated in the ordinance and pooled. In most sites, the LGU also allocated budget support to the operation of the MA+R.

A number of conditions in the Philippines supported the institutionalization of MA+R [46]. While the existing legal frameworks in the Philippines provided the foundations for the adoption of the MA+R, the operationalization of such at the local level required some level of adjustment, negotiation and compromise. The translation of the provisions of the laws into local ordinances required a process of consultation, awareness building, groundwork and partnership building. The national laws and the implementing guidelines on fishery management all promoted community participation. Community organizing efforts, identifying and training local community champions, and social marketing approaches served to structure the institutionalization of MA+R.

Because of the devolved nature of Philippines local governments, how the MA+R is operationalized at the local level can look very different across LGUs. While municipal waters are *de facto* managed access areas, the size and scale of sub-Managed Access areas within these waters will vary depending on geography, size of the area of waters, and what communities are ready for. The legal instrument formalizing them may also take different forms, from stand-alone ordinances, or folded into comprehensive fisheries ordinances, or even as part of the broader management plans of large national protected areas. The designated management body may be newly constituted, or folded into an existing FARMC, or expanded from a MPA Management Committee, or a sub-committee of a broader Coastal Resource Management Council.

Despite these variances, some critical factors remain consistent for success [46].

- The local ordinance must be harmonized with the governing national laws.
- Continuing support of local leaders is critical.
- The support and engagement of the local communities and fishers. Success starts and ends with the buy-in of these primary stakeholders.
- Given limited resources at the local level to pursue the implementation and operationalization of fishery management, forming alliances among local stakeholders and with other municipalities proved to be helpful. Inter-LGU partnerships allowed for the sharing/pooling of financial resources and manpower for fisheries management.
- Continued networking and engagement with policymakers at all levels of government is crucial to ensure MA+Rs functionality at the local level.

4. Discussion

The legal, regulatory and institutional pathways used to establish MA+R across the three countries involved interpreting and adapting a mix of fisheries, marine conservation, marine protected area and government administrative and legal instruments at national and local

levels. In Brazil, MA+R pathways were focused primarily on the National System of Conservation Units (SNUC) (Law No. 9.985/2000) which supports the participation of local communities in the creation, implementation, and management of conservation units. Implementation of MA+R required utilizing a wide range of management and policy tools administered by different federal and local government agencies. Identified success factors for MA+R include the mobilization of the community to participate in conservation, utilization of local knowledge about the resource for planning, a feeling of belonging by the community to the environment and establishment and maintenance of strategic partnerships. The existence of this complex legal and institutional structure in Brazil, on various governmental levels, creates an overlap of competencies, inefficiency and instability for small-scale fisheries management. It has also led to a lack of understanding and respect for these legal and institutional structures by fishing communities and other stakeholders and a general lack of confidence in them by fishers.

In Indonesia, as in Brazil, there was no legal mandate for MA+R. However, Indonesia has a long history of *adat* laws supporting customary marine tenure systems. The establishment of MA+R was initially in conservation areas or marine protected areas under the jurisdiction of two national government ministries, Ministry of Environment and Forestry and Ministry of Marine Affairs and Fisheries. A range of national laws and regulations from these two ministries, plus other ministries, were utilized to support MA+R establishment. In both cases, the administrative structure was a partnership between a government management authority and the community in a traditional use zone. Provincial government supported MA+R in non-conservation areas through interpretation and innovation of traditional and new laws and regulations. Identified success factors included keeping the central government informed and an active partner, strong partnerships with different stakeholders, communication and consultation among stakeholders, taking adequate time to establish functional community organizations, and use of local champions at fisheries offices for capacity development and establishment of trust with the community.

The Philippines had existing laws and regulations, such as the revised Fisheries Code and Local Government Code. These laws and regulations served as a strong legal foundation for MA+R, providing preferential use for small-scale fishers in municipal waters, devolution of authority and control over local coastal and marine resources to the local government, and community participation through the fisheries aquatic and resource management councils (FARMC). Working through a process of negotiation and compromise with local government units, partnerships were formalized with Rare through a Memorandum of Agreement (MoA). The local MA+R ordinance allowed for institutionalization of the MA+R with the local government unit and the harmonization of laws and clarification of the authorities and responsibilities of the co-management partners. Although the legal pathway was clearer in the Philippines than in Brazil or Indonesia, the national laws and regulations still required interpretation and implementation through local municipal ordinances to support MA+R. The local MA+R ordinance served as the legal basis for establishment of a Management Body with the authority to develop and enforce fishing regulations. As in the other countries, community organizing efforts, alongside social marketing and identifying and training local community champions, served to build community mobilization to support these efforts.

Key challenges still exist for MA+R in each country. Long-term sustainability and effectiveness of MA+R in Brazil is challenged by a lack of political will to support environmental conservation and lack of government institutional capacity and support. Addressing these two challenges involved joining and increasing the visibility of social movements committed to sustainable small-scale fisheries management; identifying and partnering with community leaders, politicians, and public officers committed to small-scale fisheries management; and advocacy work in favor of strengthening the public management of small-scale fisheries. In Indonesia, long-term sustainability is challenged by the absence of a legal basis at the national level that has caused

MA+R to not be fully recognized by some within and outside of the government at all levels, as well as changing national regulations utilized to support MA+R. Addressing these two challenges involved communicating MA+R success to decision-makers and public officials and working with policy-makers to ensure that regulatory support for MA+R is not diminished. In the Philippines, long-term sustainability is challenged by changes in local government leadership through elections every three years. This strongly impacted MA+R implementation and, in some cases, shifted the priorities of the administration. Committed and cooperative local government leadership is crucial element of MA+R sustainability. To some extent, this was addressed by creating a Unit within the LGU's Municipal Agricultural Office to assume the tasks of fishery management as part of the local ordinance. However, for the most part, while such a unit might assume a certain level of regularity and permanency, in some cases, dynamics within the LGU can also result in such unit being marginalized due to changes in leadership. This, in turn, was partly addressed by efforts from an engaged community.

5. Conclusions and recommendations

The use of rights-based fisheries management has gained more attention in recent years as a way to address the negative consequences of open access fishing. Managed access is a spatial form of user rights in which individuals or a group of fishers are granted exclusive access privileges to harvest resources within a geographically defined area. When managed access is combined with marine reserves, there are many potential benefits for sustainable fisheries management [52–54]. Fish Forever is Rare's community-led solution to balance habitat conservation with human use and puts fishers at the center of the solution. The program works to establish managed access areas that provide fishing communities clear rights to fish in certain areas and create networks of fully protected and community-led no-take marine reserves to replenish and sustain fish populations and protect critical habitat.

Fish Forever was established in 2014 in Brazil, Indonesia and the Philippines. The Fish Forever program utilized a common roadmap for country level design and implementation. Each country adapted the roadmap based on social, economic, institutional and political context; program maturity; and resource conditions. Each country also followed different legal, regulatory and institutional pathways for local communities to secure both legal and functional access rights to fisheries resources and implement managed access with networks of no-take marine reserves (MA+R).

Several common pathways to establishing and implementing MA+R were identified that are felt to be applicable to utilizing rights-based management approaches for fisheries management:

- Development of partnerships with fishing communities, government decision-makers and agency staff at all levels, NGOs and universities is crucial for improving understanding, strengthening mutual respect and trust, sharing information, advocacy and sharing/pooling resources.
- Engagement with leaders, policy-makers and community members, based on a strategy and policy landscape and stakeholder analyses, to build understanding and support to establish legal and functional user rights and secure long-term sustainability.
- Identifying, analyzing and interpreting the range of legal and policy frameworks and institutions that exist within a country, within and outside the fisheries sector, that can support MA+R.
- Harmonizing local initiatives, such as ordinances, with national legal and policy frameworks.
- Committed leaders and 'champions' at national and local levels to provide support, inspiration and continuity to the MA+R establishment and implementation process.
- Scaling up, in terms of space (geographic), governance, function and time; from smaller to larger scales based on experience, understanding, support, capacity and resources.

Acknowledgments

This project was undertaken by Rare with funding support from the Bloomberg Philanthropies Vibrant Ocean Initiative, United States. The authors thank the following authors of the country case studies Liza L. Lim, Samantha Mae M. Poblete, Kayla Marie I. Castro, Arum, Siti Indriasari Galuh Sekar, and Davi Rodrigues. The authors thank the following people for their review and support Monique Baretto Galvao, Simone Madalosso, Arwandrija Rukma, Tanmatra Bhanti, Dennis Calvan, Joyce Barafon and Roquelito Mancao.

References

- [1] R. Metzner, J.M. Ward, Report of the Expert Consultation on Catalyzing the Transition away from Overcapacity in Marine Capture Fisheries, Rome, FAO, Rome, Italy, 2002. FAO Fisheries Report No. 691.
- [2] J.M. Ward, I.E. Kirkley, R. Metzner, S. Pascoe, Measuring and Assessing Capacity in Fisheries: Basic Concepts and Management Options, FAO, Rome, Italy, 2004. FAO Fisheries Technical Paper No. 433/1.
- [3] S. Sugiyama, D. Staples, S.J. Funge-Smith, S.J. Status and potential of fisheries and aquaculture in Asia and the Pacific. RAP Publication 2004/25. 2004. FAO Regional Office for Asia and the Pacific, Bangkok. Thailand.
- [4] SEAFDEC, Regional Technical Consultation on Management of Fishing Capacity and Human Resource Development in Support of Fisheries Management in Southeast Asia, Southeast Asian Fisheries Development Center, Bangkok, Thailand, 2006. Phuket, Thailand.
- [5] G. Morgan, D. Staples, S. Funge-Smith, S. Fishing capacity management and IUU fishing in Asia. RAP Publication 2007/16. 2007. Asia-Pacific Fishery Organization, UN Food and Agriculture Organization, Regional Office for Asia and the Pacific, Bangkok, Thailand.
- [6] N.L. Andrew, C. Béné, S.J. Hall, E.H. Allison, S. Heck, B.D. Ratner, Diagnosis and management of small-scale fisheries in developing countries, *Fish. Fish.* 8 (2007) 227–240.
- [7] R. Hilborn, R.O. Amoroso, C.M. Anderson, J.K. Baumb, T.A. Brancha, C. Costello, C.L. de Moord, A. Faraje, D. Hivilya, O.P. Jensen, H. Kurotag, L.R. Little, P. Macei, T. McClanahan, M.C. Melnychuk, C. Mintok, G.C. Osiol, A.M. Parma, M. Ponsa, S. Segurado, C.S. Szuwalskic, J.R. Wilson, Y. Yeq, Effective fisheries management instrumental in improving fish stock status, *Proc. Natl. Acad. Sci. USA* 117 (4) (2020) 2218–2224.
- [8] Rare, Fish Forever, 2021. Retrieved January 15, 2021 from Rare Website: (<https://rare.org/program/fish-forever/>).
- [9] Rare, Program Strategy, 2021. Retrieved January 15, 2021 from Rare Data Portal Website: (<https://portal.rare.org/en/get-support/strategy/>).
- [10] J.P. Cancino, H. Uchida, J.E. Wilen, TURFs and ITQs: collective vs. individual decision-making, *Mar. Resour. Econ.* 22 (2007) 391–406.
- [11] L. Evans, N. Cherrett, D. Pems, Assessing the impact of fisheries co-management interventions in developing countries: a meta-analysis, *J. Environ. Manag.* 92 (2011) 1938–1949.
- [12] J.E. Cinner, T.R. McClanahan, M.A. MacNeil, N. Graham, T.M. Daw, Co-management of coral reef social-ecological systems, *Proc. Natl. Acad. Sci. USA* 109 (2012) 5219–5222.
- [13] R.S. Pomeroy, B.M. Katon, I. Harkes, Conditions affecting the success of fisheries co-management: lessons from Asia, *Mar. Policy* 25 (3) (2001) 197–208.
- [14] R.S. Pomeroy, J. Cinner, J.R. Nielsen, Chapter 7: Conditions for successful co-management: lessons learned in Asia, Africa, the Pacific and the wider Caribbean, in: R.S. Pomeroy, N. Andrew (Eds.), *Small-scale Fisheries Management: Frameworks and Approaches for the Developing World*, CABI Publishing, Oxfordshire, UK and Cambridge, MA, USA, 2011.
- [15] R.S. Pomeroy, R.B. Pollnac, C.D. Predo, B.M. Katon, Impact Evaluation Of Community-based Coastal Resource Management Projects In The Philippines, *Naga ICLARM Q.* 19 (4) (1996) 9–12.
- [16] Rare, Program Delivery, 2021. Retrieved January 15, 2021 from Rare Data Portal Website: (<https://portal.rare.org/en/get-support/program-delivery/>).
- [17] Rare, Managed Access Area Design, 2019. Accessed January 15, 2021 Rare Data Portal Website: (<https://portal.rare.org/wp-content/uploads/2019/07/Managed-Access-Area-Design.pdf>).
- [18] FAO, Fisheries management. 2. The ecosystem approach to fisheries 4, UN Food and Agriculture Organization, Rome, 2003. FAO Technical Guidelines for Responsible Fisheries, Suppl. 2.
- [19] A.T. Charles, Use rights and responsible fisheries: limiting access and harvesting through rights-based management, in: K. Cochrane (Ed.), *A Fishery Manager's Guidebook - Management Measures and their Application*, Food and Agriculture Organization, Rome, 2002, pp. 131–157. FAO Fisheries Tech. Paper #424.
- [20] A.T. Charles, Rights based fisheries management: the role of use rights in managing access and harvesting, in: Kevern L. Cochrane, Serge M. Garcia (Eds.), Chapter 10 in *A Fishery Manager's Guidebook*, 2nd ed., The Food and Agriculture Organization of the United Nations and Blackwell Publishing, 2009, pp. 253–282.
- [21] Rare, Building Effective Management Bodies, November, 2019. Accessed on 15 January 2021 from Rare Data Portal Website: (<https://portal.rare.org/wp-content/uploads/2020/05/Building-Effective-Management-Bodies.pdf>).
- [22] Rare, Establish a Network of Marine Reserved (n.d.), 2021, Accessed on 15 January 2021 from Rare Data Portal Website: (<https://portal.rare.org/en/make-decisions/network-of-marine-reserves/>).
- [23] Rare, Marine Reserve Design, October, 2019, Accessed on January 15, 2021 from Rare Data Portal Website: (<https://portal.rare.org/wp-content/uploads/2019/10/Marine-Reserve-Design-October-2019-1.pdf>).
- [24] Rare, Build Effective Management Bodies, 2021, Accessed on 15 January 2021 from Rare Data Portal Website: (<https://portal.rare.org/en/make-decisions/build-effective-management-bodies/>).
- [25] L. Hotra, Coastal Mayors Meet COVID-19 on Their Terms. August 2020. Accessed on January 15, 2021 from Rare Website: (<https://rare.org/story/coastal-mayors-meet-covid-19-on-their-terms/>).
- [26] Rare Brazil, Fish Forever, 2018. Report on Lessons Learned 2015–2017. 23p.
- [27] Rare Brazil, Fish Forever, 2020. Report on Lessons Learned 2017–2019. 72p.
- [28] Brasil, 1988, Constituição da República Federativa do Brasil: promulgada em 5 de outubro de 1988.
- [29] Brasil. 2000. Lei n° 9.985. Sistema Nacional de Unidades de Conservação. Jul 18. 2000.
- [30] MMA, Ministério do Meio Ambiente. Plano Estratégico Nacional de Áreas Protegidas, 2006.
- [31] N. Valencia. Pescadores artesanais no contexto brasileiro: nexos entre conflitos, crises hídricas e outros desastres – Waterlat-Gobacit Networks – Tematic Area Series – SATCTH TA6 Basins and Hydrosocial Territories – Working Paper Vol. 2 N° 4 – Inequality, Injustice and social change: the fate of artisanal fishing communities in Latin America. – Newcastle upon Tyne, UK, September 2015.
- [32] ASCEMA, Cronologia de um desastre anunciado: Ações do governo Bolsonaro para desmontar as políticas ambientais de meio ambiente no Brasil, 2020. Brasília, 2020. Downloaded on January 13 2020at: (http://www.ascemanacional.org.br/wp-content/uploads/2020/09/Dossie_Meio-Ambiente_Governo-Bolsonaro_revisto_02-set-2020-1.pdf).
- [33] M.J. Pontes, 2020, Flexibilização da Legislação Socioambiental Brasileira e de Proteção de Direitos Territoriais. Grupo Carta de Belém, FASE, Heinrich Boll Stifund.
- [34] A.C. Figueiroa, Avaliação da efetividade da integração das Unidades de Conservação federais marinho-costeiras de Santa Catarina, *Desenvolv. Meio Ambient.* 38 (2016).
- [35] I. Stenger No Tempo das Catástrofes, Editora COSACNIAFY, São Paulo, 1999.
- [36] H. Acselrad, Vulnerabilidade social, conflitos ambientais e regulação urbana – Revista O Social em Questão – Ano XVIII – N° 33 p. 57–68, 2015.
- [37] J.N. Galassi. Desmantelamento como estratégia: a desregulamentação ambiental no estado do Paraná, Universidade Estadual de Londrina, 2018. Dissertação (Mestrado em Administração).
- [38] Rare Indonesia, Rare Indonesia Annual Report for the Government of Indonesia, 2015, Bogor. Not published.
- [39] Arum, A Policy Review of Managed Access and Reserves Establishment in Indonesia, 2020, Rare Indonesia, Bogor. Not published.
- [40] Rare Indonesia, Rare Indonesia Policy Strategy, 2017. Bogor. Not published.
- [41] I. Novacek, I.H.T. Harkes, J. Sopacua, M.D.D. Tatuhey, An Institutional Analysis of Sasi Laut in Maluku, Indonesia, International Center for Living Aquatic Resources Management, Penang, 2001, p. 327.
- [42] A. Satria, Y. Matsuda, M. Sano, Contractual solution to the tragedy of property right in coastal fisheries, *Mar. Policy* 30 (3) (2006) 226–236.
- [43] A. Halim, N.R. Loneragan, B. Wiryanan, R. Fujita, D.S. Adhuri, A.R. Hordyk, M. Fedi, A. Sondita, Transforming traditional management into contemporary territorial-based fisheries management rights for small-scale fisheries in Indonesia, *Mar. Policy* 116 (2020), 103923.
- [44] Rare Indonesia, Bogor 6 Operational Plan, 2014. Bogor. Not published.
- [45] Ministry of Marine Affairs and Fisheries, Director General of Marine Spatial Management Regulation Number 3/2016 on the Guide of the Use of Sustainable Fisheries Zone of Marine Protected Area for Local and Traditional Community Fishing Activities. Jakarta, 2016.
- [46] R. Tirona, R. Mancao, D. Calvan, J. Barafon, L. Lim, S. Poblete, K. Castro, A Case Study on the Establishment of Managed Access and Reserves, Rare Philippines, Cebu, 2020.
- [47] A.G.M. La Viña, J.L. Kho, M.J. Caleda, Legal framework for protected areas: Philippines, 2010. IUCN-EPLP No. 81. 29p. Downloaded on 12 January 2020 from (<https://www.iucn.org/downloads/philippines.pdf>).
- [48] R. Pomeroy, L. Garces, M.D. Pido, G. Silvestre, Ecosystem-based fisheries management in small-scale tropical marine fisheries: emerging models of governance arrangements in the Philippines, *Mar. Policy* 34 (2) (2010) 298–308.
- [49] Rare Philippines, Stemming the Tide of Coastal Overfishing: Fish Forever Program Results 2012–2017, 2018. Unpublished report. Cebu.
- [50] Rare Philippines, FishMARK manual, 2017. Unpublished report. Cebu.
- [51] Rare Philippines, Marine Reserve Design: Marine Reserve Network Design Guidelines, 2019. Unpublished report. Cebu.
- [52] C. Costello, D. Kaffine, Marine protected areas in spatial property-rights fisheries, *Aust. J. Agric. Resour. Econ.* 54 (3) (2010) 321–341.
- [53] S. Gaines, C. White, M. Carr, S. Palumbi, Designing marine reserve networks for both conservation and fisheries management, *Proc. Natl. Acad. Sci. USA* (2010) 18286–18293, <https://doi.org/10.1073/pnas.0906473107>.
- [54] S. Poon, K. Bonzon, Territorial use rights for fishing, in: *Catch Shares Design Manual*, Environmental Defense Fund, Washington DC, 2013, p. 161.