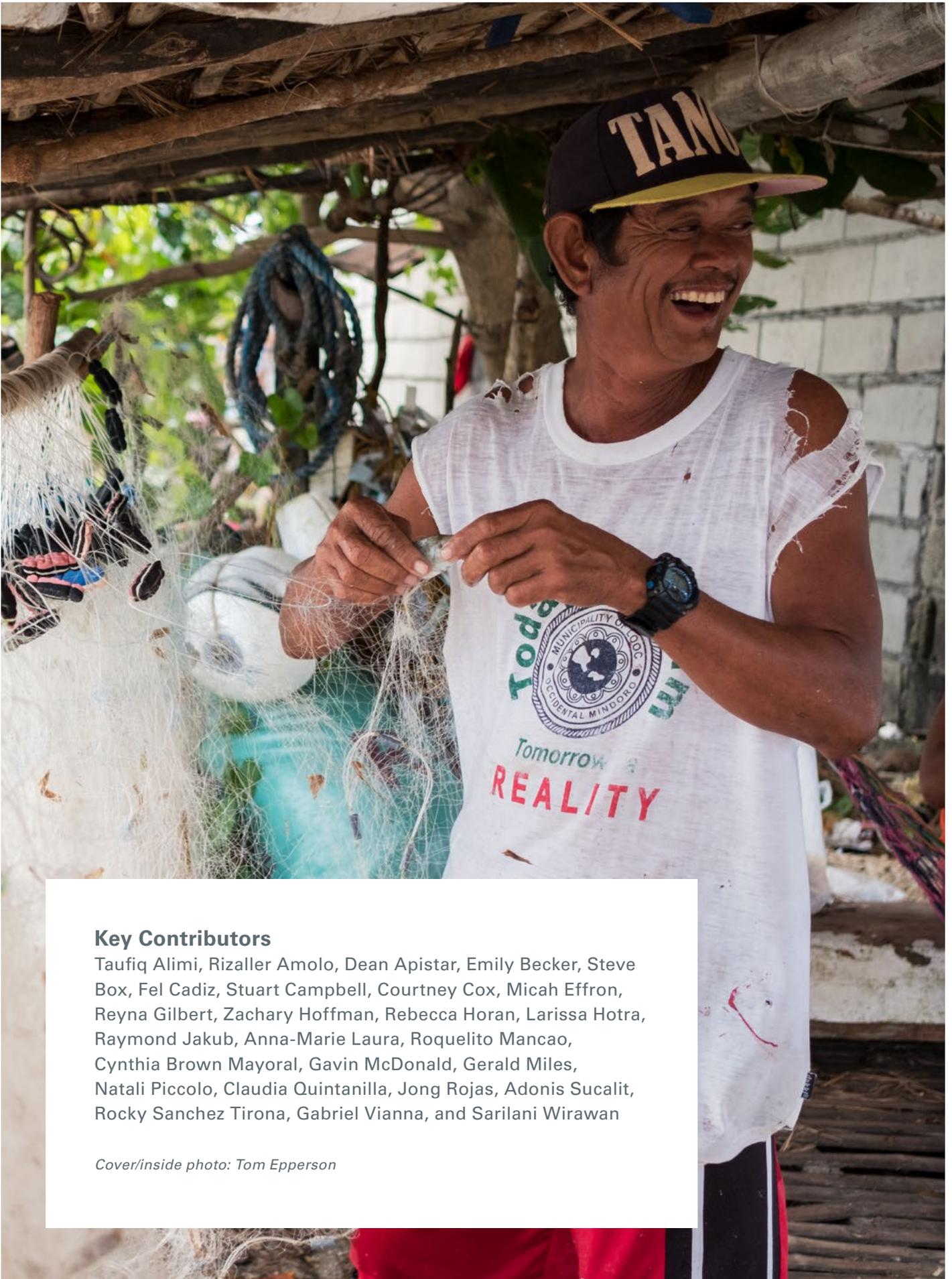


# Stemming the Tide of Coastal Overfishing

Fish Forever Program Results 2012–2017

Full Report, July 2018





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*Cover/inside photo: Tom Epperson*

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The data highlighted in this report result from the partnership of 267 communities in Brazil, Indonesia and the Philippines and 70 Rare staff leveraging 557 non-Rare staff who come from over 80 organizations spanning national governments, local municipalities, NGOs, universities and other civil society groups.

Fish Forever was made possible by the following donors who supported the program between 2013 and 2017: Bloomberg Philanthropies; Bobolink Foundation; The David and Lucile Packard Foundation; Global Environment Facility; The Grantham Foundation for the Protection of the Environment; International Climate Initiative supported by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety; The John D. and Catherine T. MacArthur Foundation; The Lundin Foundation; Rare's Board of Trustees; The Robert W. Wilson Charitable Trust; Scotty Searle; United States Agency for International Development; The Waitt Foundation and anonymous individual donors.

*Photo: Tom Epperson*



Fish biomass inside reserves

**increased**



Fish biomass outside reserves

**increased**



Fishers' sense of equity

**improved**



Fishers **more confident**  
in food and economic security



**Local experience**  
informing national policy



# Report Highlights

Fish Forever is the first global solution that brings together 30-plus years of Rare's experience in community empowerment, social marketing and behavior adoption with the technical, policy and financial skills needed to secure lasting results for people and nature.

This report describes the results of 41 Fish Forever sites, representing over 250 communities across Brazil, Indonesia and the Philippines. It is the first opportunity to analyze the past five years of design (2012–14) and implementation (2014–17). Using a comprehensive monitoring and evaluation protocol, the report synthesizes information from three country learning reports, 2,400 in-water surveys of coral reefs, 15,000 individual and household surveys, and the landing records from nearly 56,000 fishing trips — and represents the work of 70 Rare staff and 80 partner organizations who have committed the time of more than 557 global staff to this project.

Ecological and social responses to three years of program implementation are promising, and importantly, results from the data infer that Fish Forever is working:

- Ecologically, fish are recovering — fish biomass is increasing, both inside and outside no-take reserves;
- Socially, communities are empowered — social resilience, pride and livelihoods are improving;
- 51 legal and functional management bodies were established across the 41 sites;
- 63 managed access areas were built or strengthened, encompassing nearly 600,000 hectares of coastal waters with 27,000 hectares secured in fully protected reserves; and
- Strengthened policies and governance provide a clear path to scale.

The initial implementation period has been an enormously valuable learning experience for Rare and our partners. This report is an opportunity to reflect on Fish Forever's impact and consider our work in the coming years.

# **PART I: PROGRAM FRAMEWORK**



*Photo: Jason Houston*

Overfishing, caused by removing more fish from an ecosystem than can be replaced, is a classic common-pool resource problem. In a competitive environment, where a potentially unlimited number of individuals share access to a resource, each person is incentivized to take as much of the resource as possible. In fisheries, this leads to a “race for fish,” with the driving motivation to catch the next (and maybe last) fish before somebody else does. Conversely, individuals have little incentive to prioritize long-term sustainability — which may require reducing catches and protecting critical areas to sustain a fish population for the “common good” — if no mechanism exists to ensure others also contribute to this improved future.

Inevitably, a vicious cycle ensues, in which fish stocks decline, catches fall and fishers typically see no choice but to increase fishing effort, intensifying pressure on an already declining resource. The core challenge thus becomes how to implement practical strategies that ensure long-term sustainability — such as protecting a proportion of the fish population from capture, managing overall fishing effort and prohibiting damaging fishing gears — under a downward spiral of competitive interactions. One possible solution, fundamentally redesigning the system to ensure that the rewards of good stewardship accrue back to the fishers, is at the heart of Rare’s coastal fisheries program, Fish Forever.

## I. PROGRAM INCEPTION AND DESIGN

In 2011, Rare, in partnership with National Geographic, launched the first-ever Solution Search, a crowdsourcing competition designed to identify the best examples of community-led solutions to the global challenge of coastal overfishing. “Bright spots” sourced from the Turning the Tide for Coastal Fisheries competition helped to outline the basic elements of Fish Forever, and in 2012, Rare assembled a network of experts and institutions to identify overfishing’s drivers and design and broadly prototype a sustainable solution for the world’s coastal fishers and fisheries.

This network, which included the Sustainable Fisheries Group, University of California Santa Barbara (UCSB), the Environmental Defense Fund (EDF), Bloomberg Philanthropies (and Vibrant Oceans Initiative partners Oceana and Encourage Capital), The Waitt Foundation and The John D. and Catherine T. MacArthur Foundation, encountered numerous systemic design constraints:

- ***Slow and nonlinear recovery:*** Marine systems tend to recover, even from severe pressure, if marine habitat is not irreversibly destroyed. Full recovery can require a decade or more. Marine systems are highly dynamic; recovery tends to be uneven, subject to temporary setbacks, and difficult to attribute to specific causes or triggers. Given this timeframe and the lack of consistent feedback, it is difficult to design and maintain a new system of steadily improving management effectiveness.
- ***Tangled governance:*** Coastal fisheries in developing countries are typically governed by a multi-jurisdictional, multi-agency web of land-based institutions applying rules with widely uneven enforcement and portside infrastructures. The rules in place tend to be non-adaptive, focused on fishing effort rather than fish mortality, and are often ineffective due to poor implementation. Governance reforms tend to optimize the rents of commercial fishing businesses rather than local communities.
- ***Daunting scale:*** Coastal fishing is, by definition, highly distributed; thousands upon thousands of fishing communities exist. Piloting a new approach at single sites in the hope that it will be widely replicated rarely, if ever, works — even if the early results are promising. Outcomes at the scale needed, therefore, require designing and testing a replicable “mass prototype” from the outset.
- ***Data holes:*** The basic numbers behind fishing effort, fish mortality and stock status are often unknown. The data that are fundamental to any

systematic management improvement, such as baselines, timelines for fishing effort and catch profiles, must be created from scratch. Many times, the geographic scope of data required extends far beyond the borders of the local communities with which Rare needs to work. On the socioeconomic front, systematic monitoring and evaluation efforts similarly need to start from scratch, with very little baseline data available.

Faced with such a highly distributed, complex, long-term and data-poor systems improvement problem, Rare partnered with UCSB's Sustainable Fisheries Group, (UCSB) and EDF to design and launch Fish Forever, bringing together distinct expertise and experience in fisheries science and population modeling (UCSB), rights-based fisheries management (EDF) and community engagement and behavior adoption methods (Rare) needed to create a framework for a solution. Together, this partnership established the program design and approach (managed access with reserves meets behavior change) and developed the required team, curriculum and scientific tools needed to apply it. The partnership then transitioned to a less formal, collaborative relationship in 2016. While all three organizations continue as thought partners in advancing global coastal fishery reform, Rare now directs Fish Forever with ongoing scientific support from UCSB-SFG.

The program design was based on six primary goals and eight programmatic pillars, from which 29 design specifications were developed and applied; The latter provided a minimum specification for what can be considered a legal and functional managed access with reserves system. This design package was then mapped onto Rare's existing theory of community behavior change, and is now implemented in partnership and collaboration with more than 80 local, national and international organizations. (See Appendices 1-3 for Fish Forever's Program Framework, Main Program Elements, and Design Specifications).

## II. THE APPROACH: MANAGED ACCESS WITH RESERVES MEETS BEHAVIOR CHANGE

The idea of Fish Forever was born through three major realizations: that coastal fisheries were largely unmanaged and in decline; that coastal communities were facing an existential crisis impacting the foundation of their economy, food security, culture and well-being; and that the most widely-used management tool in coastal waters — Marine Protected Areas (MPAs) — were struggling to be effective, given a lack of community support and fisher compliance, among other factors. These realizations sparked the basis for an approach that could link the benefits of marine protection back to local communities, build effective governance and management to deliver sustainable coastal fisheries at a local level, and help local to national government prioritize coastal communities and their fisheries. This approach — managed access with reserves meets behavior change — is community-led and multi-local, designed to address the needs of both people and nature, conservation and development.<sup>1</sup>

### Managed Access with Reserves

Managed access with reserves is a community rights-based fisheries management approach that provides coastal communities with exclusive access privileges for fishing in defined areas, and in which protected areas are established inside or adjacent to these exclusive access areas.<sup>2</sup>

Managed access facilitates tenure and access, provides a mechanism to adjust fishing pressure, creates incentives for fishers to become better stewards of their resources, ensures sustainability by aligning social incentives for fishers with conservation objectives and empowers small-scale fishers to effectively participate in fisheries management. Reserves remove fishing pressure and enable fish to grow, reproduce and recruit — and ultimately sustain the fish population.

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<sup>1</sup> Rare definition of multi-local: An approach that could be adopted at scale by thousands of coastal communities.

<sup>2</sup> For purposes of this report, the term managed access is used consistently instead of Territorial Use Rights in Fisheries ("TURF") to define the approach. Additionally, for clarity in this document, reserves are areas where no fishing is allowed and are synonymous with sanctuaries, no-take zones, fishery replenishment zones or fully-protected areas.

As fish populations recover in reserves and spill over into nearby fishing grounds, fishers with access rights to the area surrounding the reserve can directly benefit from the spillover (in the form of higher catch rates, bigger fish and lower fishing costs). This scenario creates an incentive for fishers to comply with the rules and prevent illegal fishing in the area. Access privileges come with responsibilities, and fishers thus become empowered to control and steward their fisheries through a system of rights, rewards and obligations. The right to fish becomes contingent on good stewardship.

Rare and partners chose to utilize the management approach of managed access with reserves to address the challenges facing coastal fishers and their fisheries for the reasons listed above. Importantly, application of such an approach was, in Rare’s parlance, “community-led”: reflecting our intentional and deliberate process

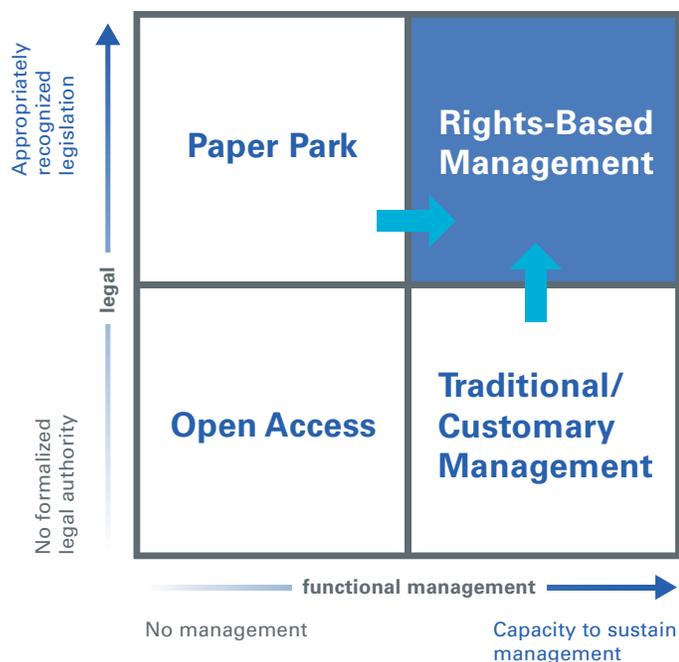


Figure 1: Model exemplifying the transition to legal and functional rights-based fisheries management.

of partnering with stakeholders to create and achieve locally-owned visions and goals and sustained community behavior change.

To complete the transition from an open access system to one that is managed, Fish Forever’s management approach needed to be both legal and functional, and Fish Forever worked across two pathways to achieve this: <sup>3</sup> (Figure 1)

1. Improving the efficacy of already-designated marine protected areas by embedding managed access principles into existing area-based management systems; and
2. Helping to formalize existing customary law and marine tenure by incorporating them into formal governance frameworks at local, regional and national levels, and legalizing them with appropriate legislation.

Alone, neither a “paper park” (a marine protected area that exists in decree but lacks sufficient resources to effectively design, manage or enforce it) nor traditional or customary management will guarantee protection of coastal waters or ecological or socioeconomic benefits.

Establishing this management system required enabling conditions: strong community engagement, good governance and effective management.<sup>4</sup> All three required individuals, communities, local government and institutions to shift their attitudes and behaviors toward responsible and sustainable fisheries management and move from individual to collective action. That is, strong community engagement, good governance and effective management required behavior change.

3 Almost all Fish Forever sites selected had pre-existing marine management frameworks in place, such as MPAs, extractive reserves and/or sustainable use areas. Fish Forever was launched in the context of these existing management settings and zonation plans with the goal to improve on these settings.

4 Studies of common-pool resources related to coastal fisheries have found the key determinants of effective fisheries management to be: the quality of local leadership, existence of individual or community access rules to the fishery, level of social cohesion in the community and the existence of no-take zones. Gutiérrez, N. L., Hilborn, R., & Defeo, O. “Leadership, Social Capital and Incentives Promote Successful Fisheries.” *Nature*, (2011) 470(7334), 386.



Figure 2: Pride campaign theory of change logic model.

## Behavior Change

Complex and common-pool resource systems problems, such as overfishing, need to be managed by addressing problems related not only to the resources, but also to the people targeting them.<sup>5</sup> Fisher and fishing community attitudes and behaviors — their trust in each other, sense of fairness of the rules and willingness to resolve conflict rather than revert to old fishing habits — drive efficacy of any long-term solution for coastal fisheries reform. Once we understand peoples' motivations, attitudes and behaviors, we can target the behaviors we want to change. Given that threats like overfishing are, at their core, human behavior problems created by a common-pool resource dilemma, ending overfishing can largely be achieved if fishers and their communities adopt new behaviors and practice more sustainable fisheries management.

Thus, Fish Forever's strategy has been driven by human-centered behavioral design — focusing on users' and other stakeholders' needs and preferences<sup>6</sup> — and a theory of change logic model (Figure 2):

### This theory, in practice, follows these steps:

- **Acquiring new knowledge:** about managing coastal fisheries, the benefits of reserves, and the responsibilities that come with access rights;
- **Changing attitudes:** new knowledge makes it easier to raise awareness and change attitudes about what fishing households can do to adopt sustainable fishing practices;

- **Discussing those attitudes with others:** acquiring knowledge and improving attitudes leads to discussions that are part of everyday life, i.e. interpersonal communication;
- **Removing barriers:** identifying and removing those that lead to inaction; and
- **Changing behaviors:** particularly those that would lead to reduced threats and subsequent conservation, fisheries and social results.

A Pride campaign continues to be Rare's primary tool and existing community engagement approach for employing this theory of change.

**Pride campaigns:** A Pride campaign is a strategic tool designed to inspire people to: 1) take pride in the species and habitats that sustain and differentiate their communities; and 2) develop alternatives to environmentally destructive behaviors. These campaigns, designed with and for the local community, build local leadership and social cohesion for positive behavior change.

In Fish Forever, the campaigns targeted individual fishers, the wider fishing community and local government leaders. They were designed to help fishers and fishing communities adopt sustainable fishing behaviors, particularly fisher/boat/gear registration, participation in management (reporting violations, reporting catch and attendance at community meetings), fishing in the right place using the right gear, compliance

<sup>5</sup> Ibid.

<sup>6</sup> Tantia, Piyush, "The New Science of Designing for Humans," Stanford Social Innovation Review, Spring 2017, [https://ssir.org/articles/entry/the\\_new\\_science\\_of\\_designing\\_for\\_humans](https://ssir.org/articles/entry/the_new_science_of_designing_for_humans)



*Mascot and community members at a Pride campaign launch event in Delta do Parnaíba, Brazil.*

with the local fisheries code and enforcement of the rules. The campaigns also focused on government agencies at various levels, working on the attitudes, opinions and behaviors that make embedding a managed access with reserves approach into existing local and sub-regional governance frameworks possible. These included approving legal instruments (ordinances, management plans, etc.); allocating resources (financial, human and in-kind); and politically sponsoring the idea of managed access with reserves areas. (See Appendix IV for a synopsis of the behaviors targeted and tactics used.)

These behavioral changes served as key messages in the campaigns. Alongside a guiding framework to establish managed access with reserves (the program framework), Rare and local partners (campaign managers) used the theory of change, coupled with behavioral insights, social marketing and barrier removal, to move people along a behavior change continuum:

- **Behavioral Insights:** This behavior-centered design process distilled key behavioral insights into a unique framework of conventional and non-conventional behavioral approaches and messages. These messages were tailored to the current context and adapted to experience, e.g., increasing awareness of overfishing; leveraging emotional appeals, such as pride; changing social incentives, such as the group identity of fishers, and making new behaviors easier to do (i.e., “choice architecture”) by building on existing beliefs and values, rather than changing them.
- **Social Marketing:** Each Pride campaign used social marketing to encourage desired attitudes and behaviors. Rare used specific techniques alongside recognizable narratives and incentives to frame the managed access with reserves management approach to be locally appealing. These techniques included segmenting the audience, using mixed media, developing

persuasive messaging, identifying key influencers for word-of-mouth communication, creating supportive visuals and mascots using the Pride methodology, rigorously measuring new “product” adoption (i.e., new attitudes, behaviors and sustainable alternatives) and systematic research into site conditions.

- **Barrier Removal:** In parallel, each site assessed the most likely barriers to success of the behavior change campaigns and messages most likely to remove them. The Fish Forever design specifications were then employed to address these barriers.

**How we measured change:** As will be discussed in Part II- Results, pre-intervention Knowledge, Attitude and Practice (KAP) surveys helped to reveal a baseline understanding of a fishing community’s knowledge, attitudes, interpersonal communication and practices surrounding fishing. The surveys provide the basis for targeting the multiple behavior changes needed to support a successful management approach.

**Campaign Managers:** In-country Fish Forever staff trained and mentored campaign managers to design and implement the campaigns. A campaign manager is a local leader from Fish Forever’s on-site implementing partner, who may come from the government (such as a natural resource or fisheries officer), a civil society organization or a prominent community group. They are a linchpin of program design and Fish Forever’s programmatic ambassadors: They serve the role of community connector, learning how to identify key influencers and bringing in expertise as needed; their familiarity provides an indispensable level of trust for engaging the community. They received extensive training from Fish Forever staff in social marketing, campaign tactics, local governance and principles of fishery management, among other topics, and master’s degrees in social marketing and communication from the University of Texas at El Paso at the end of the campaigns.

In the Philippines and Indonesia, most campaign managers were selected from local or national government authorities responsible for Marine Protected Areas (MPAs) or other area-based management systems. In Brazil, most campaign managers were community leaders, not government officials, given the communities’ perceived lack of trust in the government.

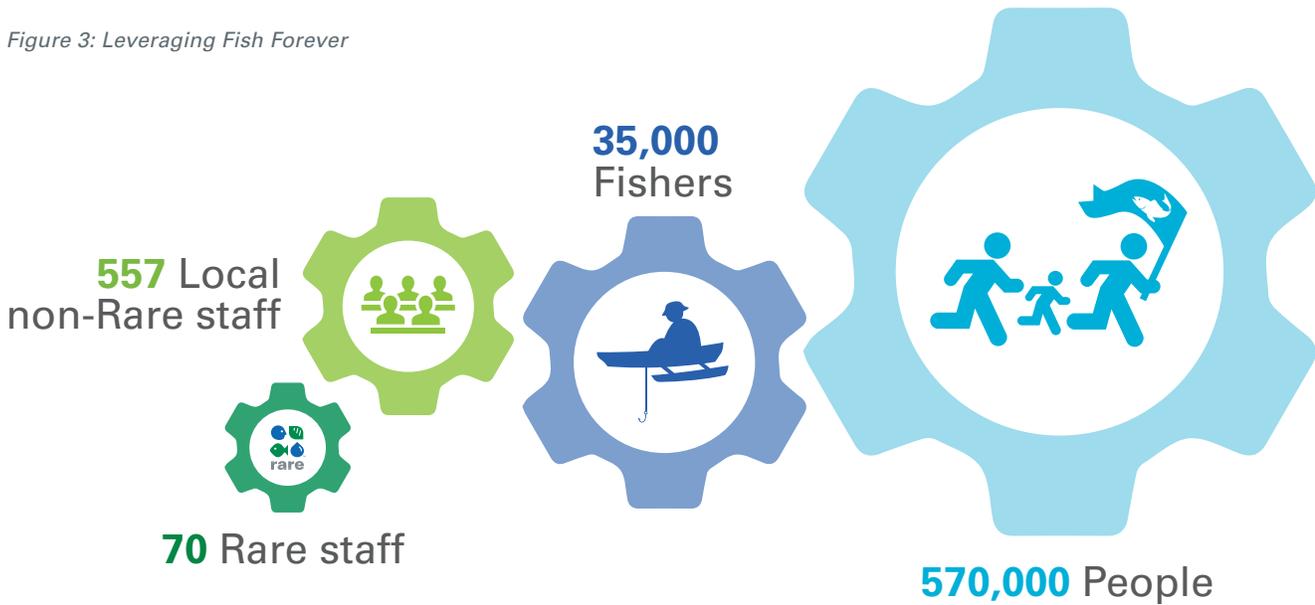
**Capacities Built:** Historically, Rare’s Pride campaigns built the capacities of individuals to be conservation leaders. Through Fish Forever, Rare also focused on building local institutional capacities and community capacity to manage resources. The capacities built in these campaign managers — strategic planning, behavioral interventions, effective communication, skills transference (“train the trainer”), fisher engagement and mobilization, and managed access with reserves design, governance and administration — also served to strengthen their institutions. Such local institutional capacity-building results in better support for management body functioning, facilitating meetings and managing finances, among other skills — and, ultimately, strengthened institutional capacity to undertake robust stakeholder engagement with fishing communities. With the help of campaign managers and their institutions, fishing communities could think more critically about management decisions and co-manage more effectively — and ideally do so more sustainably, beyond the period of Rare’s intervention in a region or site.

Through this work, Rare has acted as a bridging institution between communities and multiple levels of government so that communities’ needs are addressed when decisions about resource management are being made at higher levels. This capacity-building work improves the function of a variety of organizations partnering with Fish Forever, including fishing cooperatives, management bodies, local NGOs, local government units and more.

### III. THE PARTNERS

The extensive partnership network that Fish Forever

Figure 3: Leveraging Fish Forever



**1 Rare staff** : **8,100** Community members

built is essential to a community-led and multi-local approach and has served as a key tactic in paving the pathway to scale. Further, cooperation and collaboration with multifaceted partnerships are necessary to achieve Fish Forever’s goals. Today, Fish Forever functions as a network of 70 Rare staff leveraging 557 non-Rare staff who come from over 80 organizations spanning national governments, local municipalities, NGOs, universities and other civil society groups (Figure 3).

While the program built upon previous Pride campaigns, the fisheries aspects of the program were new to Rare, and Rare relied on this network to complement our behavior change methodology. This network thus provided a wide range of expertise to the program, including fishery science, spatial planning, national policy and planning, social marketing, and replication and scaling approaches, among others. In-country, Rare partnered with fisher organizations, community leaders, local governing authorities and civil society organizations to deliver unified messaging about and advocate for new commitments to small-scale fisheries. Subnational

partnership platforms helped to elevate community-led voices, align on common goals and link local solutions to national policies and networks, e.g., NGOs for Fisheries Reform, a collective of fisher associations in the Philippines.

Rare staff also required new in-country capacity and training on a set of skills covering coastal resource management, fisheries and community rights-based approaches. To operationalize the program, Rare set up an office in Brazil with technical expertise and bolstered existing offices in Indonesia and the Philippines with additional expertise. Country teams were organized into cross-geography management groups that helped to crystallize best practices, spread them across the program and translate them into local action. These groups specialized in:

- **Social change:** implementing Pride campaigns;
- **Cohort development:** revising partner and campaign manager selection criteria;

- **Education and training:** building out the Fish Forever capacities and updating the program’s skills assessment, curriculum and e-courses;
- **Science:** improving managed access and reserve design; and
- **Policy:** engaging with relevant ministries weekly, managing existing and new partnerships with those ministries, embedding into the work streams of national institutions and partnering with them and other key agencies to achieve mutual policy and development objectives.

## IV. SITE SELECTION

To properly test the Fish Forever concept, the Fish Forever partners needed a broad geographic portfolio representing different geopolitical, sociocultural, ecological and economic conditions. The partners used specific criteria to guide country selection, based on the following: ecological significance of coastal waters, threats to coastal waters, legal pathways for managed access with reserves, policies supportive of sustainable management, fisheries dependence of coastal communities, food security and the potential to scale beyond the pilot sites. (See Appendix V for a map of Fish Forever’s countries.) Based on scoring against these criteria, the Fish Forever partners selected Belize, Brazil, Indonesia, Mozambique and the Philippines as pilot Fish Forever countries.<sup>7</sup>

### Starting conditions for Fish Forever in Brazil, Indonesia and the Philippines

Before Fish Forever, Rare had implemented Pride campaigns in Indonesia and the Philippines focused on MPAs (2010–14). The experience, trust and capacity gained in this work laid the foundation for Fish Forever in these two countries; Brazil, on the other hand, was a new country for Rare, having had one-off campaigns but

no larger, fisheries-related cohorts before Fish Forever. Each country featured distinct challenges:

- **Brazil – Lack of trust in institutions:** In 2010, the Brazilian government committed to protecting 10% of its coastal waters; a legal framework for doing so was already in place. In the context of this commitment, Rare partnered with the Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio, Brazil’s national government department in charge of protected areas) to implement Fish Forever. ICMBio has the authority to create Brazil’s area-based management systems—extractive reserve systems called RESEX—and approve management plans developed with the communities for RESEX areas.

The central challenge in Brazil was the lack of trust between communities and government. A series of high-level corruption scandals had destabilized the country, and RESEX management was weak, with low government presence and little community participation. Further, the national fisheries department remained in bureaucratic limbo after a succession of moves to rehouse it within different government institutions. Rural fishing communities’ confidence in the effectiveness of existing government approaches to managing local fisheries was low. Rebuilding that trust would require significant effort.

- **Indonesia – Legal uncertainty:** Article 33 of the Indonesian Constitution states that land, water and other key natural resources belong to the state.<sup>8</sup> Frequently, this article has been interpreted such that the allocation of rights over certain areas of land or water is unconstitutional. On this basis, the allocation or concession of water and coastal areas mentioned in the 2007 Coastal Management Law was challenged by adat (i.e., customary or

<sup>7</sup> Mozambique and Belize are not included in this analysis as data are not yet available or complete for sites in those countries.

<sup>8</sup> Constitution of the Republic of Indonesia (last amended 2002), accessed 17 May 2018 at <http://www.refworld.org/docid/46af43f12.html>



*Representatives from Rare, Ministry of Marine Affairs and Fisheries, Ministry of Environmental and Forestry and Fishers Associations signing commitment to support TURF-Reserve implementation in Indonesia.*

traditional) community leaders from coastal areas, as many feared that the law conceded areas of water to private companies (and prevented community access to those areas). In 2011, the Constitutional Supreme Court annulled the law and in 2014, passed a new Coastal Management Law. This law did not stipulate the allocation of rights to manage water for fisheries.

Introducing a managed access with reserves management approach to the government became challenging against this backdrop. National and state government ministries were reluctant to consider language related to resource access rights when drafting new laws and regulations, fearing the subsequent legislation would be subject to annulments. That said, in July 2016, the Ministry of Marine Affairs and Fisheries enacted a new legal guideline that gives communities living in and around Marine Protected Areas the opportunity to co-manage their fisheries alongside government partners. This national support for a rights-based fisheries management approach by the Government of Indonesia was a promising step toward improving coastal fisheries through community empowerment and improving MPA effectiveness and fisheries management. The first legally recognized managed access with reserve area management networks were subsequently

formalized in 2017 and embedded within both adat and state legal frameworks.

- **The Philippines – High fishing pressure:** The 1998 Philippines fisheries code provided for managed access, with municipalities assigned jurisdiction of coastal waters out to 15km from shore. The law gave “priority to municipal fisherfolk, in the preferential use of the municipal waters,” stating that “preference shall be given to resource users in the local communities adjacent or nearest to the municipal waters.”<sup>9</sup> However, the “priority and preference” for local fishing communities proved hard to operationalize. Local overfishing was widespread and chronic, driven by the locals’ reliance on fish-based proteins. While rebuilding fish stocks was a high priority, few wanted to pay the price of recovery in the form of short-term reductions in fish landings. Fish Forever’s tactic aimed to cushion these recovery costs by taking an incremental approach to improving reserves and local harvest control rules. Coastal communities, in working with municipal government and partners to concurrently target illegal fishing, could more quickly realize the local benefits of improved fisheries management.

<sup>9</sup> Implementing Rules and Regulations: Philippines Fisheries Code of 1998 (RA No.8550). Department of Agriculture, Bureau of Aquatic Resources, Arcadia Building, Quezon Ave., Quezon City. 21 May 1998.



Behavioral Insights Mission, Tinambac, Philippines

## V. THE TOOLS

Fish Forever used behavior-centered design to create a suite of tools to support staff and local fishing communities and institutions in addressing coastal fishing challenges and adopting more responsible fishing behaviors. The resulting Fish Forever Toolkit, built iteratively throughout the program, enabled fisheries data collection, fisheries management body development, fisher and community goal-setting and management plan development, and a process for implementing the Fish Forever approach.<sup>10</sup> The Toolkit included the following:

- **Pride Curriculum:** as discussed above;
- **Fish Forever Curriculum and E-courses:** to support staff and local implementing partners in identifying and prioritizing the actions needed to

implement the main programmatic elements in each country context;

- **Fisheries Landscape and Goal Setting:** to help communities identify fisheries goals specific to their communities' needs and desires;
- **Managed Access with Reserves Design:** to help communities analyze tradeoffs between different managed access with reserve designs (e.g., variables in location and size); those with an existing reserve could use the toolkit to evaluate the effectiveness of their current reserve design. Design forums and community workshops included collaborative work to: define the goals of managed access with reserves and identify priority species and habitats; map the municipal zones relevant to managed access with reserves;

<sup>10</sup> As the tools were released to country teams, they went through a testing phase with different user groups. Given that each country did this process, a range of adaptations was fashioned from the original three tools: Fisheries Landscape and Goal Setting (FLAGS), Managed Access with Reserves Design (originally called TURF-Reserve Design) and Adaptive Fisheries Assessment and Management. The central focus was that the outputs from these tools were useful and user-friendly to solve the challenges at hand.

determine the designated boundaries of the communities' managed access with reserves; and allocate fishing rights and responsibilities within managed access with reserves; and

- ***Adaptive Fisheries Assessment and Management:*** designed by the UCSB Sustainable Fisheries Group to help communities develop adaptive fisheries management plans that estimated fisheries status and selected management measures to achieve fisheries goals.

## VI. THE PATHWAY TO SCALE

Fish Forever was designed as a “mass prototype” model: rather than focus efforts on maximizing testing of individual site-level pilots, Rare chose to test multiple pilots simultaneously. The goals were to understand not only whether managed access with reserves would work at a site, but also if it could 1) make dozens work simultaneously and 2) better understand the key ingredients needed to scale the approach. Further, the model had to be capable of influencing government and private sector/investor agendas, as well as local communities, in parallel rather than sequentially.

As will be evident in the results section, Fish Forever developed a strong footprint for managed access with reserves in each country, building proof points to showcase the success and potential of the approach, e.g.,:

- Over 60 discrete managed access with reserves areas;
- One reserve network of 15 areas; and
- Networks of local leaders and campaign manager alumni with the capacity to sustain the approach after Rare's involvement ends.

The enabling conditions were also codified in the approach, including municipal ordinances, community

support and management based on principles of good governance. Finally, over time, once proof points and ample evidence were in place, Rare could assume a three-pronged strategy for ensuring widespread adoption of the model:

- ***Government adoption:*** developed through legislation, governance, capacity building and sustained financial investment;
- ***A low-cost, highly transferable model:*** one that delivers participatory management function at the appropriate scales; and
- ***Creative financial mechanisms:*** ones that blend philanthropy, government appropriation, public finance and private capital to match the need for building proof points — and ultimately strengthen the capacities of both government and local communities and reduce risks for private investors.

## Part II: Results



*Photo: Nanang Sujana*

## I. THE FISH FOREVER FOOTPRINT

The program grew significantly over three years of implementation to work in 41 sites (in Brazil, Indonesia and the Philippines) comprising over 250 communities and 570,000 people, including nearly 35,000 fishers. By the end of 2017, 51 legal and functional management bodies were established across

the 41 sites. 63 managed access areas were built or strengthened, encompassing nearly 600,000 hectares of coastal waters with 27,000 hectares secured in fully protected reserves (Table 1).

Table 1: General country-level statistics related to Fish Forever for Brazil, Indonesia, and the Philippines.

	<b>Brazil</b>	<b>Indonesia</b>	<b>Philippines</b>	<b>Total</b>
Number of Fish Forever sites	6	15	20	<b>41</b>
Number of communities in site areas	64	55	457	<b>576</b>
Number of communities Fish Forever is engaging	11	46	210	<b>267</b>
Number of people in Fish Forever communities	9,800	78,799	481,545	<b>570,144</b>
Number of fishers in Fish Forever communities	2,148	8,085	24,601	<b>34,834</b>
Hectares of coastal waters in Fish Forever sites	355,400	5,554,734	804,127	<b>6,714,261</b>
Number of managed access areas	6	27	30	<b>63</b>
Hectares under Managed Access	355,400	81,895	151,298	<b>588,593</b>
Number of reserves	13	27	64	<b>104</b>
Hectares in reserves	1,383	22,974	2,669	<b>27,026</b>
Percentage of managed access area covered by reserves	0.4%	28.1%	1.8%	<b>4.6%</b>
Current number of management bodies	6	26	19	<b>51</b>

## II. ENABLING FISH FOREVER THROUGH POLICY, GOVERNANCE AND MANAGEMENT

Coastal fisheries sit at the geographic intersection of coastal development and marine ecosystems, as well as the more figurative intersection of human need and ocean productivity. Therefore, long-term sustainability of coastal fisheries depends heavily on having clear policies and strong governance systems that enable effective local fisheries management—in this case, managed access with reserves with direct benefits to coastal communities and the marine environment.

Weak governance is a primary driver of ineffective management, and when coupled with political instability, is a greater predictor of biodiversity loss than measures of direct human impacts.<sup>11</sup> However, strengthening governance systems does not happen overnight. Even the best-intentioned authorities struggle to balance seemingly opposing conservation and development priorities, evaluate short-term needs of constituents against long-term national objectives, integrate local knowledge and experience into decision-making, and reach solutions perceived as equitable by all involved.

At most Fish Forever sites, the gap between existing and required capacity for effective management was sizeable and stemmed from symptoms of weak governance such as: inconsistent, conflicting, obsolete or poorly-communicated policies; lack of leadership, motivation, expertise, skills and funding at management agencies; and unempowered local communities excluded from or opting out of decision-making. Nesting effective fisheries management in a “good governance” system (one that promotes participation, inclusion, equity, accountability and transparency) became a central component of Fish Forever’s operating model.<sup>12</sup>

The Fish Forever Pride campaigns and local stakeholder engagement processes influenced local management by:

- Creating or improving the governance (decision-making) framework by establishing or strengthening management bodies;
- Improving fishers’ participation in management; and
- Institutionalizing and, in some cases, legalizing the management bodies and processes created to achieve these goals.

Additionally, at the national level, country teams led initiatives to nest local governance in clearer national fisheries policies—to ensure that legal and regulatory pathways give local communities or their management bodies decision-making authority, and to prioritize coastal fisheries against other sectors (such as industrial fisheries, tourism, foreign fleet fishing agreements, and oil and gas).

### Effective Local Governance and Management

Strengthening and legally authorizing local management bodies to design and implement managed access with reserves and their related management plans was a key strategy for Fish Forever; and making them inclusive, participatory, transparent, accountable and equitable was a primary priority. Over the course of three years of implementation, Fish Forever created or significantly strengthened 51 local fisheries management bodies, representing 259 communities, to execute managed access with reserves.

In some cases, representative working groups were initially formed to design the managed access areas and related management plans. Because this design process was inclusive, transparent and participatory (see details below for how Rare facilitated this), these

11 Amano, T., et al. “Successful Conservation of Global Waterbird Populations Depends on Effective Governance.” *Nature*, (December 2017): doi:10.1038/nature25139.

12 United Nations Development Programme, *Governance for Sustainable Human Development: A UNDP Policy Document*, (1997).



Figure 4: Building Legal and Functional Fisheries Management Bodies through Fish Forever

working groups were respected and able to transition into various types of formal management bodies. In other cases, management bodies already existed (e.g., the Philippines’ Fisheries and Aquatic Resource Management Councils) but were not very effective, and Rare worked with the management body leaders to strengthen them; when these bodies were tied to protected areas (reserves or sanctuaries in Indonesia and Philippines, or RESEXs in Brazil), Rare broadened their mandates to include fisheries.

For example, in the Philippines, upon the launch of Fish Forever, reserves at each site had legal but weak management. At nineteen sites, Fish Forever built participatory Design Working Groups within these existing entities to design managed access with reserves placement and associated management plans. After these areas were legally in place and recognized by the community, the final step was to transition this functional management into a legal management body by passing a local ordinance. Nineteen management bodies are now recognized as legal and functional (Figure 4). To achieve this, 30 managed access with reserves local ordinances were passed that either established or

expanded fully-protected areas and wrapped managed access areas around them. These were either new, standalone or comprehensive fisheries ordinances that integrated managed access with reserves into previously established fisheries management plans. Importantly, by including municipal water zoning in the ordinances, municipalities became compliant with national zoning requirements.

In general, housing management bodies within local government proved to be a successful way of mainstreaming community decision-making into existing formal governance structures. Further, involving the community in establishing or strengthening the management body was essential for ensuring buy-in and success from the community.

Pride campaign managers used the Fish Forever toolkit, particularly the Pride campaign methodology, to build the community support necessary for enabling effective and sustainable management bodies: improving the communities’ knowledge about coastal fisheries management, the benefits of reserves and the responsibilities that come with access rights. Rare

and local partners facilitated intensive community engagement, creating myriad opportunities and a platform for community members to provide their unique inputs and perspectives in establishing a management process. These community consultation periods typically lasted six months.

Importantly, the fisheries management bodies were designed to be inclusive, participatory, transparent, accountable and equitable and are comprised of key stakeholder representatives from fishing communities and local government<sup>13</sup> (Figure 5). Including local government representatives ensured that the bodies had the legal authority to design and execute rules for coastal waters and fisheries. Rare strengthened existing and new management bodies' capacities to design the management process, collect data, clearly communicate fisheries regulations, organize a local enforcement system, set priorities and plan zonation, and gather information that would guide collective fisheries planning and decision-making.

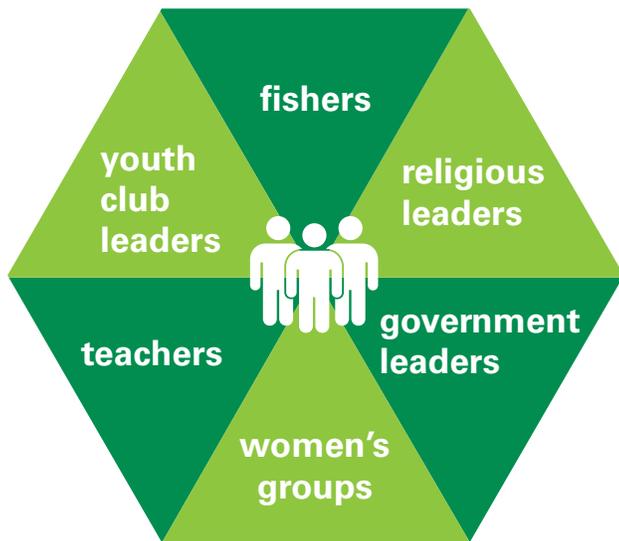


Figure 5: Fisheries Management Body Composition

In addition to improving the management bodies, Fish Forever's community engagement and Pride campaigns promoted adoption of new behaviors, resulting in

significantly more active participation by fishers in management (as discussed in Part I: Behavior Change). As evidenced in Part II: Social Responses to Fish Forever, the data regarding breadth and depth of participation in fisheries management are positive and show significant improvement. Rare recognized that communities did not previously comply with fisheries rules and regulations because the processes to create them had not been participatory, transparent or inclusive; fishing households had not been actively involved in management and decision-making.

Inclusive and equitable decision-making is critical to allowing other marginalized groups, including women, the opportunity to actively participate and provide their valuable input. For instance, in Liya — a community comprised of five villages in the Indonesian province of Southeast Sulawesi — 15 women, three from each of the five villages, now serve on the fisheries management body, based on their influence in the community and management expertise running three small businesses. As part of the body, they have provided unique perspectives on coastal fisheries management and organized important discussions on fisheries and seaweed management, harvesting and processing.

Unfortunately, the situation in Liya is not common. Women face systemic and cultural gender-based biases and discrimination in accessing key fisheries resources and in being involved in their management. For women to fully benefit from improved fisheries management, the small-scale fishing sector needs to recognize the specific challenges that women experience, understand the contexts in which they carry out their fisheries-related activities, and subsequently design fisheries management with this context in mind. While there is more work to be done, Fish Forever has made important contributions to identifying women's key roles in fishing and the value chain — such as in creating or strengthening inclusive management bodies that include women as decision-makers and facilitating savings and loans clubs led by women.

<sup>13</sup> Ibid.



*Liya women sell their catch fish every day in the local market. To keep the freshness of the fish, they immediately market the fish as soon as their husbands return from the sea. Liya women market fish twice a day, following their husbands' fishing schedule.*

## Conclusion

Developing legal and functional management bodies should be initiated in parallel with and not after the managed access with reserves design effort, as inclusive and participatory community engagement is required to achieve both goals. The community consultation process for designing managed access with reserves — which increases respect among stakeholders, surfaces influencers and builds community buy-in for decision-making — is essential to the process of creating a management body. Further, to be effective, local coastal fisheries management must be nested in a system of good governance, and great care should be taken to prioritize the needs and roles of marginalized and vulnerable audiences, including women. These are activities central to an effective management process. Employing such principles helps to build social cohesion, collective efficacy and hope that fishing households can wield a stronger voice and employ greater agency for future management decision-making.

## National Policies and Other Enabling Conditions

National policies can mitigate challenges and promote solutions to sustainable and effective coastal fisheries management at the local level. They also provide the legal and regulatory framework necessary to

implement managed access with reserves, ensuring that communities can secure access to their fisheries resources, devolving fisheries management authority to a local level and requiring or incentivizing participatory management. Fish Forever's experience in creating effective management bodies, successful co-management models and participatory decision-making processes within and across communities informed and strengthened the program's inputs to national policies and dialogues.

At program inception, Rare analyzed each country's laws and regulations to identify the existence and state of enabling conditions for community rights-based fisheries management. This exercise proved to be a multi-dimensional institutional puzzle, as community rights-based management intersects with marine fisheries management, coastal water governance, marine conservation and protection, spatial planning and broader development planning. For example, the entity that manages protected or special use areas (e.g., a marine park authority) may be separate from the one that manages fish caught in the same area (e.g., the fisheries department, a state authority or local government).

Working across and coordinating among multiple agencies required a flexible and somewhat opportunistic

government engagement approach. Fish Forever built partnerships with communities, national and sub-state actors, ministries and program offices to strengthen, develop and align policies across different levels of government. In some countries, such as Indonesia, exclusive community access to areas (and preference for the use of resources in these areas) represented a significant departure from established “open access” precedence. In this and other instances, specific legislation was needed to clarify the responsibilities for fishery management and to establish a mechanism for managing access.

While originally best known for their strength in community engagement, Fish Forever’s in-country teams provided an invaluable perspective on evaluating policy changes, due to their deep understanding of fishing communities’ social and economic realities. Program staff skilled in stakeholder facilitation and consensus-building proved highly adept at identifying opportunities for progress at different stages of policy development — from defining the problem to setting agendas for high-level discussions, to making policy recommendations that would have broad stakeholder support.

Further, by connecting these policies to work at the site level, Rare provided government officials with real-world examples and clear testimonials about the benefits of community rights-based fisheries management to both fishers and conservation efforts. Local community members told important stories of the impact that fisheries reform was having on their lives — from blast fishers turned marine enforcers in the Philippines to a group of women empowered to manage their oyster fishing grounds in Brazil. The testimonials had a common thread: that people felt transformed, with new understanding and perceptions of their fishing challenges and belief in their agency to solve them. Highlighting these connections elevated coastal fisheries in the context of national development planning and natural resource management.

Fish Forever also strategically engaged policymakers at all levels of government and identified political champions (i.e., key influencers) who could provide government leadership. For example, in the Philippines, Mayor Coro of Del Carmen championed development of the local MPA enforcement network, and Mayor Yap of Bindoy championed more effective MPA management and alliance-building among neighboring municipalities; in Brazil, the Pará state governor, Simão Jatene, and ICMBio president, Ricardo Soavinski, became advocates for protecting mangroves and the communities who rely on them; and in Indonesia, adat leader Pauluis Mambrasar educated his community on the need for marine conservation and coordinated his constituency (in Mayalibit Bay) to establish managed access with reserve areas; further, as a new “local expert,” he proceeded to support and inspire the neighboring Dampier Strait to replicate Mayalibit Bay’s managed access with reserves system.

Ultimately, Fish Forever influenced policies and built enabling conditions for managed access with reserves in numerous ways, including:

- Drafting or providing comments on new and/or existing policies and regulations to enable community rights-based management (by invitation);
- Formalizing customary law and marine tenure by incorporating them into governance frameworks at local, regional and national levels, and legalizing them through appropriate legislation;
- Convening, consolidating, synthesizing and delivering stakeholder inputs for government review and consideration; and
- Connecting government officials with site-level work through official field visits and learning exchanges.

# Bright spots from Indonesia



*Adat Council member, Matius Gaman, Chief of the 'adat' (or customary system) of Waifoi Village, signing this historic agreement for the adoption of 12 managed access with reserves areas.*

- Rare supported the Ministry of Maritime Affairs and Fisheries (MMAF) in developing the national community rights-based fisheries management (RBFM) guidelines approved in 2016; Rare subsequently facilitated partnerships between marine conservation area offices and local communities to employ the new RBFM guidelines and establish managed access with reserves within national parks. The Fish Forever site at Anambas, a regency within the Riau Islands Province, was the first location in Indonesia to officially sign a marine co-management agreement with the local marine conservation area following these guidelines.
- During the 2017 National Parks' annual meeting, the new director general of the Ministry of Environment and Forestry highlighted Fish Forever Pride campaigns as a programmatic role model for the national marine park system, heralding it as an example of successful partnership between the national park authority and fishing communities. Since then, five national park directors, inspired by the director general's support, have signed memoranda of understanding with local fisher groups to co-manage their fisheries in designated park zones.
- In West Papua's Mayalibit Bay, Rare and partners supported communities to establish the first managed access with reserves network; it is also the first customary law network in Indonesia. The Adat Council chief, village leaders, village Adat chiefs and religious leaders achieved consensus for a network of 12 managed access with reserve areas (spanning 11 villages and one sub-village). Mayalibit Bay's success — using a governance system based on customary law to define the rights and responsibilities of villages within a larger network — can now serve as a model for future customary law sites.
- Rare has led a community rights-based fisheries management interest group comprised of NGO stakeholders that provides technical assistance on national fisheries and conservation and development policies.
- Rare will continue to work with BAPPENAS (the Indonesian National Development Planning Ministry charged with formulating plans, budgets, regulations and institutional policies for national development) to: include managed access with reserves in BAPPENAS's Annual Work Plan (2019); integrate RBFM as a development strategy for the marine and fishery sector in Indonesia's Mid-term National Development Plan (2019-2024); and help Indonesia achieve their Sustainable Development Goals (SDGs), particularly SDG-14 (Life Below Water). Rare, as requested by BAPPENAS (which houses the SDG secretariat), will continue to provide inputs on SDG-14.

# Bright spots from the Philippines



*Meeting with the National Economic Development Agency (NEDA) of the Philippines. From left to right: NEDA Assistant Secretary Mercy Sombilla, NEDA Director-General Ernesto Pernia, Rare CEO Brett Jenks, and Rare Philippines Vice President Rocky Sanchez Tirona*

- Rare partnered with the National Economic Development Authority (NEDA) on a collaborative study on strengthening coastal and marine resources management through enhanced development planning at the national and local levels. The NEDA partnership was designed to acquire sufficient and accurate data on coastal fisheries, develop innovative financing models and build political consensus around the results of the analysis. Based on this work and engaging other government agencies, relevant language on behavior change, community fisheries and managed access was included in the Philippines Development Plan (PDP) 2017–22. Since the PDP informs the strategies and investment priorities of all government agencies, its recognition of the municipal fishing sector’s importance is critical to catalyzing additional funding for coastal fisheries. Additionally, inclusion of this language will generate tremendous support from discussions with municipalities eager to improve fisheries management under their jurisdiction.
- Rare facilitated a learning exchange between the Philippines’ and Indonesia’s national planning agencies (NEDA and BAPPENAS, respectively) in mid-2017.
- Rare is heavily involved and has strongly supported various government agencies in developing or contributing to some of the country’s relevant international commitments — including the SDG-14 roadmap, National Biodiversity Strategic Action Plan, and National Climate Change Action Plans, among others.
- As a key thought partner to government, Rare has recently been invited by both Congress and Senate to provide input on various issues affecting coastal communities. Most recently, Rare helped draft a bill to support the Bantay Dagats (or local/municipal coastal enforcement teams), participated as members of the Technical Working Group on several climate change bills, and sat in various Congress and Senate hearings as a technical resource.

# Bright spots from Brazil



*Local woman harvesting clams in the mangroves of Canavieiras, Brazil.*

*Photo: Enrico Marone*

- Fish Forever established a partnership with the Ministry of the Environment (ICMBio) to build support for the effective protection and management of critically important fish habitats, such as mangroves, through improved operations and compliance with sustainable use areas (RESEXs). This engagement inspired Brazil's November 2017 policy commitment to protect 625,000 hectares of mangrove forest and manage them through RESEX, using management councils to link community groups to state government.
- ICMBio is applying Fish Forever's fisheries monitoring protocol to coastal fishing sites throughout the country.

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## Conclusion

Achieving legal recognition for managed access with reserves is critical to ensuring this approach is part of a broader and sustained fishery reform process and not undermined by multi-agency confusion. Meaningful reform also requires that these fisheries are recognized, prioritized and championed at the national government level. Our experience has enabled greater efficiency in replicating this approach and increased stakeholders' trust and confidence in existing government partners.

Fish Forever elevated the importance of coastal fisheries by working bottom up and top down through multiple levels of government. Developing lateral and vertical policy diffusion processes allowed messages to resonate across political contexts, providing a key narrative that effective coastal fisheries management is essential to ensuring food security, rural development, resilient communities and sustainable natural resource protection.



*Fish Catch Monitoring.  
Caringo Island,  
Philippines.  
Photo: Jason Houston*

### III. MONITORING AND EVALUATION OVERVIEW

Fish Forever developed a comprehensive and robust monitoring and evaluation plan to measure the ecological and socioeconomic responses to Fish Forever—a significant undertaking that relied heavily on working with key partners to source the existing best practices advanced by international development agencies and academia. Rare and UCSB-SFG are preparing quantitative and qualitative data on a range of social, ecological, policy and behavior change topics for scientific publication.

#### Data Collection and Analysis

The final monitoring and evaluation plan measured 22 ecological or social indicators, with more than 90 variables, to track and evaluate progress toward our stated goals for the Fish Forever program in Indonesia, the Philippines and Brazil. (See Appendix VI for the monitoring and evaluation plan's performance indicators.)

**Ecological Data:** In Indonesia and the Philippines, Fish Forever conducted more than 1,200 fish and 1,200 coral transects and counted more than 689,000 individual fish to measure the ecological responses to Fish Forever. We used generalized additive and mixed-effects models to assess trends in the ecological responses to Fish

Forever's intervention over time. This model is most appropriate because it does not assume a linear trend in fish population recovery. Underwater visual surveys were not feasible in Brazil due to low visibility and inaccessibility in mangrove habitats. Fishing techniques were used as an alternative method to estimate fish abundance, but since the data obtained were not reliable (due to sampling bias), we relied on catch data to assess the health of Brazil's fisheries. We used satellite imagery to estimate mangrove cover at each site in Brazil.

**Catch Data:** Fish landings monitoring across the three countries documented nearly 56,000 individual fishing trips, recording over 674,000 kilos of fish. Catch data were collected for all target species in Indonesia and the Philippines but were limited to five primary target species in Brazil. Catch data was collected over the course of the program (2015–17), but the frequency of collection varied across the three countries. Due to monthly catch data collection inconsistencies, we compared the median monthly catch per unit effort (CPUE) across sites to assess the fishery's state during program implementation. We did not expect total catch to increase over this period; therefore, these data are baselines for future comparisons.

**Social Data:** We completed more than 15,000 Knowledge Attitude and Practice (KAP) and household surveys at the beginning and end of the Fish Forever

campaigns to measure the social responses to Fish Forever.<sup>14</sup> We used linear regression models to assess trends in each social metric included in these pre- and post surveys across the intervention's timeframe. Linear regression estimates were used to explain the relationship between one dependent variable and one or more independent variables; in this case, the dependent variable was the period (pre- or post Fish Forever intervention), and the independent variable was the social metric.

For both ecological and social analyses, a significance level of 0.05 was used to determine if the trend (for ecological responses) or the pre- and post difference (for the social responses) was statistically significant. In other words, there is a 95% chance of a true correlation between the change in the ecological/social response and the timeframe, and a 5% probability that the difference observed occurred by chance.

## Structural Limitations of the Data and Our Learning

It is important to evaluate the data in the context of their main structural limitations:

- **Limited Time:** Most data are based on a three-year period. Given the natural variability of fish stocks and marine systems in general and the typically slow speed of fishery recovery, this is insufficient time to establish causality between management action and ecological outcome in analytically irrefutable terms. While the results are statistically relevant by themselves, they do not yet provide proof of the efficacy of Fish Forever's management interventions.
- **Lack of control groups:** Most of the ecological and social outcome data do not have control groups from non-intervention sites, and this is due simply to time and resource constraints.

Some control group data do exist, and Rare plans to further analyze them soon. Without them, however, causality becomes more difficult to prove.

- **Complexity Constraints:** Socioeconomic data are notoriously difficult to tease apart regarding causation versus correlation. There is much left to do regarding measurement and analysis before asserting causation.
- **Capacity:** Most Fish Forever staff were occupied full-time with field-based implementation. Until Rare builds comparative data sets, expands analytical partnerships and secures the funding necessary to dig deeper, these findings will remain preliminary.

Optimizing the tradeoff between data resolution and collection frequency, and the scope and scale of the measurement and evaluation (M&E) plan, was, and will continue to be an important challenge for monitoring and evaluating Fish Forever. The ambitious M&E plan called for collecting high-resolution and high-frequency data sets among the three countries. Given the field teams' resource constraints, however, this was not fully achievable; some metrics were incomplete, and inconsistencies among numerous data collection protocols hindered certain analytical capability.

With a revised program scope (see Part III: Next Steps), it will be critical for metrics to be collected consistently across sites and countries. Measurement and evaluation plans should be rigorous enough to track impact using universally-recognized methods and protocols, but should also be designed realistically, given financial and time constraints and the challenging contexts within which field programs operate (compared to fully-controlled academic studies).

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<sup>14</sup> KAP surveys were developed for family planning and population studies in the 1950s, designed to measure the extent of any obvious hostility to the idea of family planning among different populations; the information was then used for program design. Repurposed into a tool for assessing broader community attitudes to a range of issues, KAP surveys are used by Rare to assess initial conditions, with the results helping to inform social marketing campaign design and influence targeted behaviors. At the end of a campaign, they can be repeated to assess the level of improvement against the baseline.

## IV. ECOLOGICAL RESPONSES TO FISH FOREVER

Fully protected “no-take” reserves are an established conservation and fisheries management strategy.<sup>15,16</sup> Their contribution to conservation is straightforward — marine systems recover when left alone at sufficient scales. Their utility for fishery management, however, is more complex; the recovered fish populations must “spill over” into adjacent fishing grounds, either through adult movement or larval dispersal and recruitment, to provide measurable benefits to fisheries.

A no-take reserve that aims to achieve both outcomes must thus balance seemingly opposing priorities: If the reserve retains too many fish, the fisheries production may be limited. Conversely, if too little are protected, then the broader population may not sustain the fishing pressure. These design challenges can be solved through robust scientific methods that quantify both objectives and balance them in an optimal design configuration for reserves at a specific fishing effort.<sup>17</sup>

Effective protection of these reserves is also a challenge, as many protected areas around the globe struggle with inadequate investment and deliver poor results.<sup>18</sup> Fish Forever’s approach empowers communities to increase compliance and provide effective enforcement mechanisms. Surrounding the no-take reserves with

managed access fishing areas gives coastal communities a clear incentive to participate in management and, in so doing, actively fill the capacity gap in management that had previously hindered the efficacy of reserve systems. The ecological results below suggest that reserves are now supporting the recovery of fish populations. The next step for Fish Forever will be optimizing these reserves into effective networks to build ecological resilience and replenish fish populations at larger scales.

### Ecosystem Health – Coral Cover

Coral reefs grow slowly and die quickly. Global coral cover has declined precipitously, with Indonesia and the Pacific losing 50% of live coral cover over the last 40 years.<sup>19</sup> Climate change’s impacts from bleaching and storms have caused acute cover loss in episodic events with increasing severity and frequency.

A three-year global coral bleaching event that began in 2014 was the longest and most damaging event of its kind on record. It followed another severe bleaching event in 2010, leaving little time for recovery. Although these bleaching events devastated reefs globally, there were encouraging signs of reef resilience across Fish Forever sites in the Philippines and Indonesia. While reserves do not provide direct protection against climatic threats, as they cannot prevent storm-induced damage or reduce sea surface temperature, there is clear evidence that eliminating other anthropogenic stressors, such

Table 2: Coral cover changes inside and outside of reserves in Indonesia and the Philippines

Time period (yrs.)	Total Number of sites	Inside or Outside Reserve	Increased cover	Maintained cover	Decreased cover
3	20	Inside	4	12	4
3	22	Outside	3	14	5

15 Roberts, C.M., Bohnsack, J.A., Gell, F., Hawkins, J.P. & Goodridge, R. “Effects of Marine Reserves on Adjacent Fisheries.” *Science*, 294, (2001) 1920-1923.

16 Gaines, S.D., White, C., Carr, M.H., Palumbi, S.R. & Simon, A.L. “Designing Marine Reserve Networks for Both Conservation and Fisheries Management.” *Proceedings of the National Academy of Sciences*, (2010) 107, 18286-18293.

17 Chollett, I., Garavelli, L., O’Farrell, S., Cherubin, L., Matthews, T.R., Mumby, P. J. and Box, S. J. (2017), “A Genuine Win-Win: Resolving the ‘Conserve or Catch’ Conflict in Marine Reserve Network Design.” *Conservation Letters*, (2010) 10: 555–563. doi:10.1111/conl.12318.

18 Gill, D., et al. “Capacity Shortfalls Hinder the Performance of Marine Protected Areas Globally.” *Nature* (2017) volume 543, pages 665–669. doi:10.1038/nature21708.

19 “Coral Bleaching During & Since the 2014-2017 Global Coral Bleaching Event: Status and an Appeal for Observations,” NOAA, Jan 16, 2018, [https://coralreefwatch.noaa.gov/satellite/analyses\\_guidance/global\\_coral\\_bleaching\\_2014-17\\_status.php](https://coralreefwatch.noaa.gov/satellite/analyses_guidance/global_coral_bleaching_2014-17_status.php).

as fishing and pollution, greatly enhances coral reefs' resilience to climate stressors.<sup>20</sup>

Coral cover inside reserves was maintained or increased at 80% of the sites. Similarly, coral cover outside the reserves was maintained or increased at 75% of sites (Table 2). These results may suggest that effective protection of fish life in water slows local-level decline in coral cover — even in the face of global change. However, Rare's sites are subject to complex dynamics, and longer-term data will be needed to prove causal relations between Fish Forever-driven fishery recovery and coral resilience.

## Ecosystem Health – Mangrove

In Brazil, mangrove is the primary habitat at five of six sites and is critical for sustaining healthy fish populations. Across five sites, mangrove cover ranged from 708 ha to 49,432 ha. Habitat within the last site was dominated by beach rather than mangrove. The data collected in Brazil serves as a valuable account of the status of habitat extent at the close of the program.

## Fish in Water

During fish recovery, populations will first stabilize, maintaining biomass (the total weight of fish counted in the water during our surveys);<sup>21</sup> subsequently, the sustained protection of the population will provide time for fish to reproduce and recruit. As populations within protected reserves increase, they should start to spill over through movement of adults or larval dispersal into surrounding areas, leading to measurable biomass increases outside reserves.

Across the 30 sites in Indonesia and the Philippines where in-water surveys were conducted, fish biomass of target species was maintained or increased at 97% of sites inside the reserve and in the surrounding managed access area.<sup>22</sup> Statistically significant decreases in target

fish biomass were observed only inside the reserve at one site and outside the reserve in another. The results suggest that reserves provide effective protection to fish populations — i.e., a real reduction in fishing pressure sufficient to allow fish recovery at these sites.

Fish populations naturally fluctuate across years, and multiple data points through time are required to have confidence in the trajectory of change. Rare's work on MPAs preceded Fish Forever in the Philippines and Indonesia, where campaigns focused on improving community understanding of and compliance with MPA regulations. These locations, which have up to seven years of in-water survey data, demonstrate a significant trend: After three years, there is no significant change

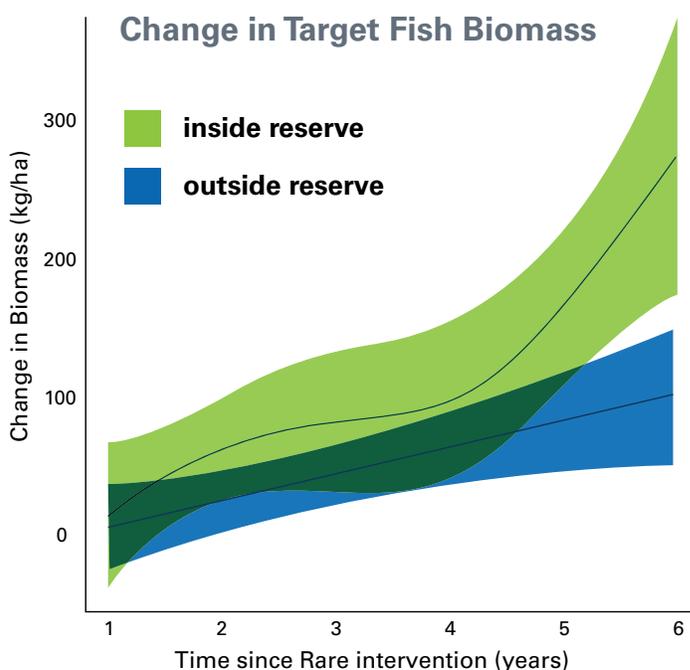


Figure 6: Change in target fish biomass over time since the first Rare campaign at 30 coral reef sites in the Philippines and Indonesia. Inside fully protected reserves (green) and outside reserves (blue). Solid lines are the mean across sites with variance as shaded area.

20 Hughes T., et al (2017). "Coral Reefs in the Anthropocene," Nature. 546, 82–90.

21 Monitoring surveys collect data on the number and length of individual fishes by species. Fish biomass is then calculated through the allometric weight-length relationship,  $W = aTL^b$ , where  $W$  is the weight of each individual (in grams),  $TL$  is the length of each fish (in cm) estimated from visual surveys, and the parameters  $a$  and  $b$  are species-specific constants.

22 Target fish species were identified by program staff as those families that included commercially and ecologically important species. This included 26 families in the Philippines and 10 in Indonesia.

in fish biomass at most sites; after five years, significant increases in fish biomass at two of five sites are evident; and after seven years, significant increases in all four sites (where longer-term data is available) are evident (Figure 6 and Table 3).

The data show evidence of significant increases inside and outside of the reserves, suggesting that recovery and spill over occur. After seven years, mean target fish biomass significantly increased by a mean of 390% inside of the reserves and 111% outside of the reserves (Table 3).

Further analysis indicates that herbivorous fishes (rabbitfish, parrotfish and surgeonfish) are largely driving these changes. While the change in biomass of predatory fish families (snappers, groupers and fusiliers) also significantly increased inside reserves, the magnitude of that increase was much greater in herbivorous fish (Figure 7). Note that the mean change in herbivorous species is approximately 500 kg/ha while the mean change in total fish biomass is approximately 300 kg/ha. On coral reefs, small fish with short life cycles and rapid growth (typically small herbivorous fish such as surgeonfish and parrotfish) recover more quickly than other species when protected — and significant change in the population should be detectable in two to five

years. Larger predatory fish that grow more slowly, reach maturity later and reproduce less frequently take longer (five to seven years) to show signs of recovery when protected from fishing pressure.

Data analyses on herbivorous fish are typically conducted to assess their role in an ecological context. Fish Forever also considers their benefits to fisheries. While the herbivore biomass increase was more substantial inside the reserves, targeted herbivorous fish biomass also increased outside the reserve, and this distinction matters. Such increases inside the reserve provide primarily ecological benefits — improving reef health — whereas those outside provide both ecological and fisheries benefits. Thus, stable or increasing herbivore numbers inside and outside reserves indicate a positive response to fisheries management and multiple benefits to people and nature.

More time is needed to link biomass recovery to Fish Forever’s interventions in a statistically irrefutable way. Further, while the biomass increases are statistically significant, more data across further years against control groups will be needed to prove causality. Nevertheless, these results are highly promising and should give communities hope that recovery is possible.

Table 3: Summary of changes in target fish biomass in Indonesia and Philippines.

Years Since First Rare engagement	Inside or Outside Reserve	Total Number of Sites	Target Fish Biomass			
			Number of Sites that Increased	Number of Sites that Maintained	Number of Sites that Decreased	Mean Percent Change in Biomass <sup>a</sup>
3	Inside	20	2	17	1	26%
3	Outside	21	4	16	1	23%
5	Inside	5	1	4	0	79% *
5	Outside	6	2	4	0	4%
7	Inside	5	4	1	0	390% *
7	Outside	5	3	2	0	111% *
<b>Total</b>	<b>Inside</b>	<b>30</b>	<b>7</b>	<b>22</b>	<b>1</b>	
<b>Total</b>	<b>Outside</b>	<b>32</b>	<b>9</b>	<b>22</b>	<b>1</b>	

\* Significant change

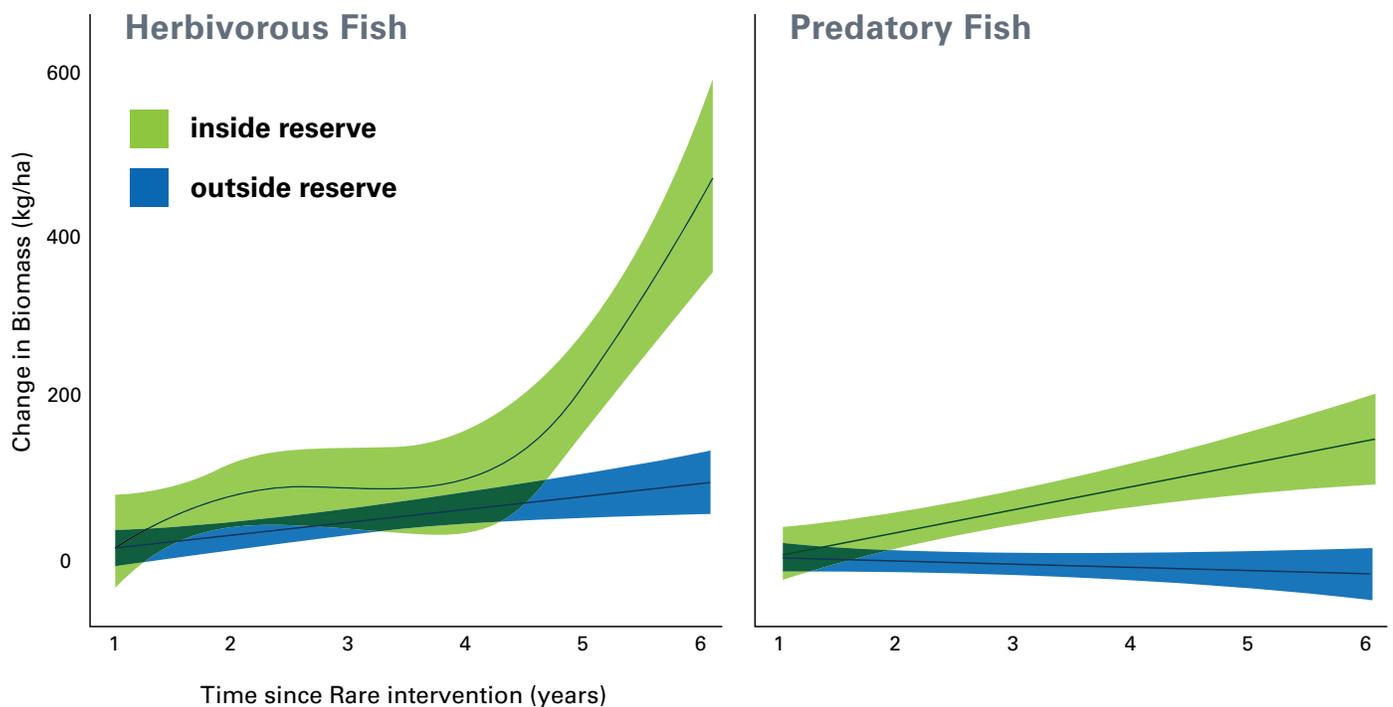


Figure 7: Change in herbivorous and predatory fish biomass over time since the first Rare campaign at 30 coral reef sites in the Philippines and Indonesia. Inside fully protected reserves (green) and outside reserves (blue). Solid lines are the mean across sites with variance as shaded area. Predatory fish biomass did not significantly change over time outside of the reserves.

It is important to note that these results do not confirm stock recovery. A stock of fish is a population of the same species that live in the same geographic area. The contributions of these protected fish to the wider population cannot be estimated until further work is completed on target fish populations' geographic ranges and what proportion are protected within the reserves. In other words, broader population (stock) recovery cannot yet be inferred based on the results of the localized population (reserve) recovery.

### Catch Data

Information on fish landings allows communities to recognize patterns in their catches, show successes and failures, and adjust their decision-making accordingly. Changes in species or size distributions provide warning signs, such as looming crashes of species with vulnerable life histories (e.g., slow growth, low

reproductive output and high age of sexual maturity). These data-driven conversations are essential to help shape local dialogue about stewardship, underpin the development of regulations, and enable fishers to understand the reasons and benefits behind the rules. Simply put, data are the foundation of good management.

Working across 267 communities, Fish Forever did not have the option of using professional observers to collect catch data; instead, the program taught fishers to maintain catch log books. Substantial effort was invested in this endeavor with variable success. In some areas, fishers started and sustained collections; in others, the barriers (including literacy, motivation, prioritization or process issues) simply could not be overcome efficiently. The program, however, did collect significant amounts of catch data that can be used to characterize the local

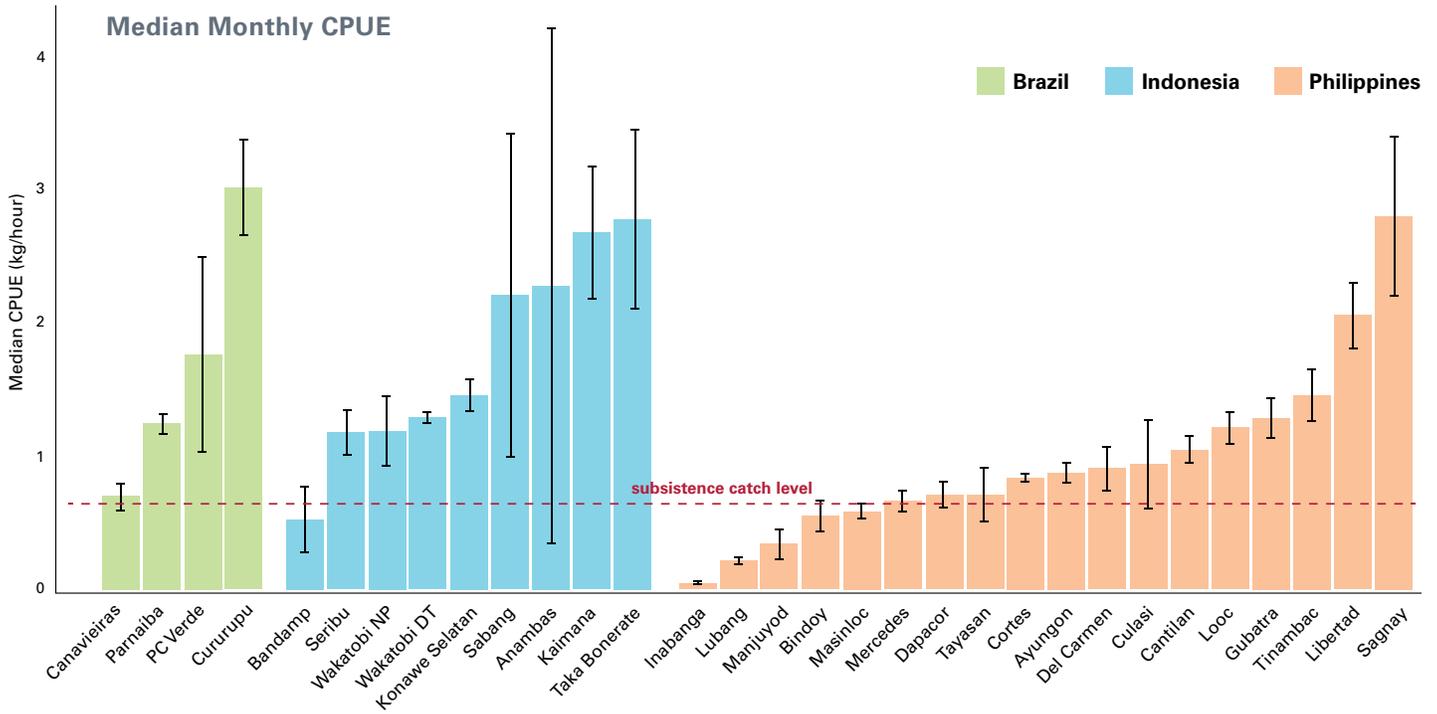


Figure 8: Median monthly catch per unit effort (CPUE) in Indonesia (2016–17), the Philippines (2015–17), and Brazil (2015–17). Error bars are variation across monthly CPUE. In the Philippines, three sites fall below the national subsistence catch level, with an additional five being at or close that threshold. In Indonesia, using the same threshold, one site is at or below that level. Large error bars in two Indonesia sites are due to small sample sizes. No sites in Brazil fall below that threshold. Catch data figure shows only the sites with finfish as the primary fishery.

fisheries. For many of these locations, these data are the first insight into their fishing activity ever collected. Although the time series is too short to provide evidence of change, it provides an essential benchmark.<sup>23</sup>

The top 10 fish families recorded in catch data accounted for approximately 55% of the catch in the Philippines and 87% of the catch in Indonesia. Catch data in Brazil were limited to the primary target species. The catch monitoring has now set a baseline for the communities across the program, including estimates of standardized catch per unit effort.

**Catch per unit effort:** Catch per unit effort data can identify sites in which people may be fishing at or below the “poverty line.” This information is essential because

poverty deeply skews a community’s ability to accept tradeoffs. When fishing below the poverty line, fishers may have very few options on how to absorb the “cost” of changing their behavior. In the Philippines, the national government estimates that a fisher needs to catch 5 kg of fish per day to support his or her household for food and income. Assuming an eight-hour fishing day, that is a minimum threshold catch averaging about 0.6 kg/hour. Three of Rare’s sites fall below that threshold in the Philippines, with an additional five being at or close to this minimum subsistence level; One site in Indonesia (assuming a similar threshold for comparison) is at or below that level, with no sites in Brazil falling below the threshold (Figure 8). While behavior change at this level may be more difficult, Rare will endeavor to prioritize fishing communities in critical need.

23 Catch data were recorded at 10 sites in Indonesia, 18 sites in the Philippines, and five in Brazil. Eighty-eight fish families were recorded in the Philippines, including the most common: mackerels (Scombridae), rabbitfishes (Siganidae) and jacks (Carangidae). Thirty-six target families were recorded in Indonesia; the most common were snappers (Lutjanidae), fusiliers (Caesionidae) and mackerels (Scombridae). In Brazil, specific species were targeted as opposed to entire families; the primary target species across the six sites were mangrove oyster (*Crassostrea rhizophorae*), snook (*Centropomus paralellus* and *Centropomus undecimalis*), weakfish (*Cynoscion acoupa*), blue runner (*Caranx crysos*), lane snapper (*Lutjanus synagris*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus brasiliensis*) and the venerid clam (*Anomalocardia brasiliensis*).



*Collecting data. Banda Island, Maluku, Indonesia. Photo: Nanang Sujana*

## Conclusion

Our coral cover results suggest that effective protection of fish life in water slows local-level decline in coral health due to exogenous threats. Our fish in water data show evidence of significant increases inside and outside of the reserves, suggesting that recovery occurs under changed fisheries practices. Further analysis indicates that herbivorous fishes (rabbitfish, parrotfish and surgeonfish) are largely driving these changes and that stable or increasing herbivore numbers represent a positive response to fisheries management and multiple benefits to people and nature. Fish Forever is

exploring the drivers behind biomass increases to try to better understand which components of the Fish Forever intervention have been the most effective. This information will influence future site selection and program design, improving our ability to facilitate fish recovery.

As will be evidenced in the following section, while it is too soon to show causality between shifts in social norms and changes in coastal ecology, the positive outcomes in each of these data sets are promising.

## V. SOCIAL RESPONSES TO FISH FOREVER

Fish Forever’s Pride campaigns are primarily focused on accelerating local adoption of managed access with reserves for coastal waters. The solution parameters (e.g., how to manage fishers’ access rights, where to place reserves, how to control fish mortality) are developed with communities, and the design process is inclusive, cutting across gender, economic classes, ethnicities and affiliations. This joint effort is essential to building consensus through shared discovery, and infusing fishing households with agency and a sense of optimism — the belief that fisheries problems are not intractable, that fishers’ lives can be improved and that individual involvement is respected and meaningful and leads to collective outcomes.

The Knowledge, Attitude and Practice (KAP) surveys, administered to the fishers targeted by Rare’s campaigns, were used to measure relatively immediate campaign impacts: increasing awareness (Knowledge), shifting viewpoints (Attitudes), more frequent discussions (Interpersonal Communications) and adopted behaviors. For longer-term impacts, i.e., conservation, fisheries and overall social results, the program adapted the widely used Sustainable Livelihoods Framework, which is structured around six types of capital (natural, physical, human, social, political and financial), to guide the design of social metrics collected through household surveys to adults.<sup>24,25</sup> For purposes of this analysis, we group metrics from the household survey into two categories: Social Cohesion (the measure of how connected members of a group feel to one another and the group as a whole) and Well-Being (determined by pleasure attainment, pain avoidance, self-realization and achieving meaning in one’s life). The KAP and household surveys assess trends across the 16 social metrics collected (Figure 9).

The following social results infer that important social change is occurring in coastal communities and their interaction with the marine environment. They provide important insights into 1) the value of the managed access and reserve approach; 2) community participation in management; and 3) compliance with and attitudes toward fishing regulations. These results are illustrative of Rare’s work, as peer-reviewed articles are being prepared with academic partners using in-depth analysis on the full data sets.

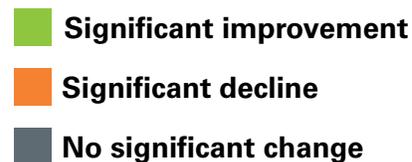
Statistically significant improvements were observed in 54% of the social metrics measured in Brazil, 77% in Indonesia and 80% in the Philippines. Only one metric showed a statistically significant negative trend (political trust in the Philippines) with the remaining data showing no significant change. Figure 9 shows country-level pre- and post-survey results, by metric, as well as the percent change in mean response for the survey questions associated with each metric. The narrative text that follows explains the results.



24 Scoones, I. Sustainable Rural Livelihoods: A Framework for Analysis (Sussex: Institute of Development Studies 1998).

25 Serrat, O. "The Sustainable Livelihoods Approach," Knowledge Solutions (pp. 21-26). (Springer, Singapore, 2017)

## Results From the Country-Level Pre and Post Survey Results, by Metric, as Well as the Percent Change in Mean Response for the Survey Questions Associated with Each Metric



Metrics	Brazil	Indonesia	Philippines
<b>Knowledge</b>	n=6 42%	n=13 100%	n=13 7%
<b>Attitudes</b>	n=6 89%	n=13 65%	n=13 74%
<b>Communication</b>	n=6 62%	n=13 42%	n=12 55%
<b>Participation: Catch Reporting</b>	n=3 60%	n=12 33%	n=13 40%
<b>Participation: Surveillance</b>	n=1 N/A	n=12 24%	n=N/A
<b>Participation: Fisher Registration</b>	n=N/A	n=N/A	n=13 32%
<b>Participation: Management Participation</b>	n=6 -5%	n=13 21%	n=13 19%
<b>Reserve Compliance</b>	n=N/A	n=12 77%	n=12 45%
<b>Managed Access Compliance</b>	n=4 13%	n=13 20%	n=13 8%
<b>Social Cohesion</b>			
<b>Political Trust</b>	n=6 11%	n=4 6%	n=6 -1%
<b>Social Trust</b>	n=6 1%	n=4 0.3%	n=6 0.1%
<b>Social Equity</b>	n=5 14%	n=N/A	n=6 92%
<b>Collective Efficacy</b>	n=6 10%	n=N/A	n=6 0.3%
<b>Well-Being</b>			
<b>Overall Well-being</b>	n=6 -1%	n=4 -6%	n=6 23%
<b>Livelihood Stability</b>	n=6 50%	n=4 8%	n=6 10%
<b>Food Security</b>	n=5 2%	n=4 3%	n=6 37%

Figure 9: In this bar plot, the bar size represents the percent change in the mean response, and the color of the bar represents statistical significance of that change. n= Number of sites contributing data to each metric assessed by before and after studies.



*Fernando Nogales, Barangay Chairman of Caringo Island, on patrol for illegal fishing. San Miguel Bay, Philippines. Photo: Jason Houston*

## Knowledge, Attitudes and Communication

These metrics, which track progress through the stages of behavior change (as per Rare's theory of change), improved across all countries. Throughout the campaigns, Rare has consistently observed that when fishers gain knowledge about sustainable management, realize how they need to modify their behavior and discuss these changes with others, they are primed to adopt new practices that foster fisheries recovery.<sup>26</sup>

## Participation

Good governance relies on participation and representation. If fishers can see positive impacts from supporting the implementation of key management activities, then these behaviors are more likely to become self-reinforcing.<sup>27</sup> Rare measures participation using four metrics: catch reporting; surveillance (participation in fisheries monitoring); fisher/goat/gear registration; and management participation (which includes attending meetings and belonging to fisheries management organizations). In Indonesia and

<sup>26</sup> Day, B. A., DeWan, A., Cadiz, F. C., Jakosalem-Balane, J., Dueñas, V., & Trinidad Jr, P.M. "Rare Social Marketing for Sustainable Fishing in Cortes, Surigao del Sur, Philippines. Applied Environmental Education & Communication, 2014, 13(1), 56-65.

<sup>27</sup> Tyler, T.R., & Jackson, J. "Popular Legitimacy and the Exercise of Legal Authority: Motivating Compliance, Cooperation and Engagement." Psychology, Public Policy and Law, (2014) 20(1), 78.

the Philippines, each of the metrics collected follows a strong positive trend. These findings indicate that fishers are becoming more involved in key management activities than they were before the program.

## Compliance

Motivating fishers to comply with regulations is a major focus of Fish Forever's campaigns. Rare believes that the best way to accomplish this is by creating a social norm around legal fishing practices. Social norms are established once enough fishers demonstrate responsible fishing behaviors and are willing to pressure others to do the same (the latter measured through the communication metric previously discussed).<sup>28</sup> Rare measures compliance using two metrics: compliance with managed access regulations (which include applying minimum size limits and gear restrictions, respecting managed access boundaries and obeying seasonal and species-specific closures) and reserve compliance (no fishing in reserve areas). We observed improvement in compliance for both metrics in Indonesia and the Philippines, with no change in Brazil. Although these results are self-reported, the positive trends indicate that campaigns are promoting a willingness to respect the rules and regulations associated with managed access areas and, consequently, that social norms and responsible fishing behavior are changing.

## Social Cohesion

Social cohesion is fundamentally important for collective fisheries management reform.<sup>29</sup> The results provide evidence that Pride campaigns have increased important dimensions of social cohesion. These include the following:

**Political Trust:** Indicators measuring political trust in government show significant improvements in Indonesia and Brazil. Although Rare observed an overall decline in political trust in the Philippines, two of six sites showed significant improvements. Growing political trust appears correlated to Fish Forever's strong attention to building capacity in local leaders and their institutions and increasing a community's participation in management (these together reinforce the importance of co-management and partnership with government). This sense of trust should advance cooperative management efforts.

**Social Trust:** Indicators related to trust in other community members did not produce a significant change in either direction. Social trust drives cooperative behavior, so while Rare did not observe a positive change, it is promising that, based on survey responses, baseline levels were already quite high in many communities before Fish Forever's campaigns began (average social trust scores were 3.1, 3.6 and 3.8 out of 5, for Brazil, Indonesia and the Philippines, respectively).<sup>30</sup> Although Rare's campaigns can increase trust by providing individuals opportunities to interact, discuss issues, air grievances and constructively work toward a long-term solution, it would not necessarily be expected for trust to increase in such a short timeframe.

**Social Equity:** The perception of fairness is critical to fishery reform. Many studies have shown that even the perception of unfairness can precipitate a rapid return to the race for fish.<sup>31,32,33</sup> The program's intensive community engagement at all stages of design and management allowed time for deliberation and transparency, which in turn allowed communities to recognize that fishery reform benefits would be

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28 Ibid.

29 Gutiérrez, N. L., Hilborn, R., & Defeo, O. "Leadership, Social Capital and Incentives Promote Successful Fisheries." *Nature*, (2011) 470(7334), 386.

30 Adger, W.N. "Social Capital, Collective Action, and Adaptation to Climate Change." *Der Klimawandel* (2010) pp. 327-345. VS Verlag für Sozialwissenschaften.

31 Grafton, R.Q., Arnason, R., Bjørndal, T., Campbell, D., Campbell, H.F., Clark, C.W., ... & Kirkley, J.E. Incentive-based approaches to sustainable fisheries. *Canadian Journal of Fisheries and Aquatic Sciences*, (2006) 63(3), 699-710.

32 Arlinghaus, R. "Overcoming Human Obstacles to Conservation of Recreational Fishery Resources, With Emphasis on Central Europe." *Environmental Conservation*, (2006) 33(1), 46-59.

33 Pretty, J. "Social Capital and the Collective Management of Resources." *Science*, (2003) 302(5652), 1912-1914.

shared equitably. The development of comprehensive and clear rights provides greater certainty of benefits and incentivizes sustainable resource management. Results in Brazil and the Philippines demonstrate a significant improvement in social equity related to fisheries benefits, providing evidence that Fish Forever's campaigns are perceived as promoting just outcomes that benefit all fishers and not just a select few.<sup>34</sup>

**Collective Efficacy:** Pride campaigns aimed to increase people's sense of collective capability to organize for positive change and improve how their fisheries are managed.<sup>35</sup> Empowering communities to believe that they possess and can use the necessary knowledge, skills, decision-making authority and resources needed to steward their fisheries, even in the face of great environmental, financial and political uncertainty, is a major challenge that Rare's campaigns are designed to tackle. An improvement in perceived collective efficacy was observed in Brazil. No significant change was detected in the Philippines, and this was not explicitly measured in Indonesia. However, metrics on fishers' active participation in management presented earlier reflect that this sense of community empowerment is strengthening across all of Rare's geographies.

## Well-Being

Well-being is measured by economic and social dimensions. Economic measures are mostly driven by an increase in fish abundance, profitability and equitable profit-sharing. Social aspects of well-being include greater community cohesion and increased trust and levels of cooperation.

Although increases in fish abundance occurred at Fish Forever sites, most recovery is yet to come: Recovery curves are non-linear and sharply increase after three to four years. Thus, there is not a widespread and significant

increase in individual fisher incomes, and future tracking of catch and fisher income will be very important. Moving forward, Fish Forever is also pioneering financial literacy and financial inclusion initiatives such as village savings and loans clubs and conservation enterprises — initiatives that will allow communities to maximize their abilities to retain and build wealth and assets accrued through fisheries recovery. Initial improvements in the perception of well-being, livelihood stability and food security can reinforce support for new fisheries management measures.

**Overall well-being:** It is notoriously difficult to shift people's overall happiness or satisfaction with their lives.<sup>36,37</sup> Rare did not expect to shift people's perceptions of well-being in the two to three years since Fish Forever began. As expected, no change was observed in Brazil or Indonesia. However, an improvement in well-being was observed in the Philippines. Rare hopes that Fish Forever will be able to help communities meet their fundamental needs over time (most directly through greater food and financial security), leading to a corresponding improvement in well-being. As noted above, the program is developing new initiatives to target financial literacy and security in the communities where Fish Forever works.

**Livelihood Stability:** Most coastal households are highly dependent on fishing for their livelihoods, so this metric should closely track with fisheries trends. The fact that all countries experienced an improvement in livelihood stability shows that communities are more positive in the trajectory of their fisheries than before. Importantly, the more financially secure community members feel over the longer term, the more willing they may be to absorb shorter-term costs associated with reductions in catch to enable fisheries recovery.<sup>38</sup>

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34 Social equity was not measured in Indonesia.

35 Jentoft, S. "Fisheries Co-management as Empowerment." *Marine Policy*, (2005) 29(1), 1–7.

36 Diener, E., & Biswas-Diener, R. "Will Money Increase Subjective Well-being?" *Social Indicators Research*, (2002) 57(2), 119–169.

37 Kahneman, D., & Krueger, A.B. "Developments in the Measurement of Subjective Well-being." *Journal of Economic Perspectives*, (2006) 20(1), 3–24.

38 Marshall, N., & Marshall, P. "Conceptualizing and Operationalizing Social Resilience Within Commercial Fisheries in Northern Australia." *Ecology and Society*, (2007) 12(1).



*Betty Garcia (left) works with the Caringo Island Women's Organization harvesting seaweed and also serves as its treasurer. Her husband, a lifelong fisherman, recently lost his sight, requiring Betty to step in and become the primary wage earner for the family. Caringo Island, Philippines. Photo: Jason Houston*

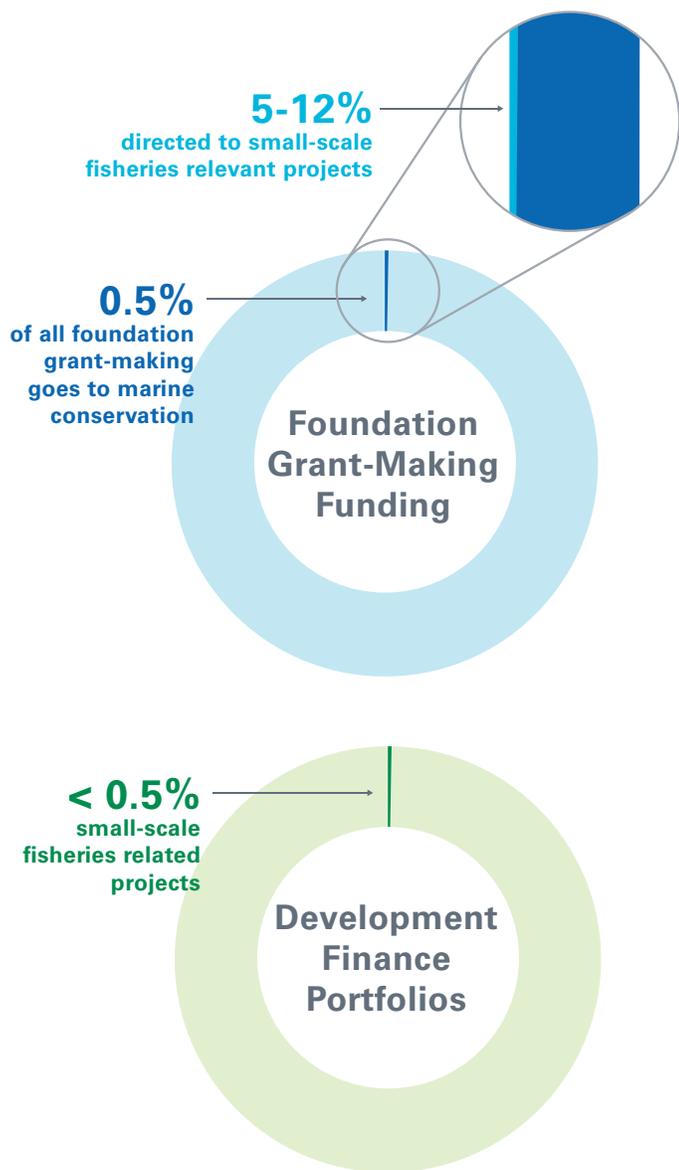
**Food Security:** Although catch data identified that three Philippines sites and one Indonesia site were potentially fishing at or below the poverty line none of the selected Fish Forever sites was identified as being on the brink of food insecurity. Therefore, Rare did not anticipate major improvements in perceptions around food security. In both Brazil and Indonesia, perceptions of food security were unchanged, while in the Philippines they increased. This perceived improvement in the Philippines may indicate that people are more confident that their food and livelihood source is becoming more secure against outside threats such as illegal fishing or the problems of weak governance in coastal waters.

## Conclusion

Through evidence provided by the pre- and post surveys, Rare can conclude that 1) Fish Forever's campaign intervention led to improvements and behavior change across all three countries; and 2) The campaigns contribute to greater social cohesion and well-being in all three countries. Although the data demonstrate increasing community support and increased participation in management, other indicators — such as improved livelihoods and profitability — are too early to call statistically significant. That said, while the social results vary widely across countries and sites, as would be expected for social research due to the diversity of human society, they include statistically significant

results that provide encouraging signs of progress toward behavior change and support many of the program’s core hypotheses.

Greater community cohesion and life satisfaction not only represent a “social spillover effect” of Pride campaigns beyond the direct target of fishers, but also foster the social conditions needed to support collective action for sustainable natural resource use.



## VI. CATALYZING A GLOBAL MOVEMENT

Sustainable small-scale fisheries deliver on global development targets by improving food security, providing livelihoods and alleviating poverty, reducing impacts on critical marine habitats, and improving social and ecological resilience to climate change. Despite their critical importance, coastal fishery reform receives comparatively little public policy or funding support: Approximately 0.5% of all foundation grant-making goes to marine conservation, and an independent study Rare commissioned estimates that between 5-12% of that is directed to small-scale fisheries relevant projects; further, small-scale fisheries related projects makes up less than 0.5% on average of development finance institutions’ portfolios.<sup>39</sup>

For this to change, the global conservation, development and financial communities must recognize how sustainable small-scale fisheries serve as a critical pathway to protect food supply and nutrition for millions of people, increase the environmental and social resilience of coastal communities, and reduce the biodiversity loss that underpins coastal ecosystems and the productive economy. To align with the Sustainable Development Goals (SDGs), for example, Fish Forever focused particularly on linking the program’s activities to specific targets in the following six categories: Poverty Alleviation (1); Zero Hunger (2); Gender Equality & Empowerment (5); Climate Action (13); Life Below Water (14); and Peace, Justice & Strong Institutions (16). In doing so, Fish Forever has continued to elevate the importance of small-scale fisheries in national dialogues and at international forums. Rare convened a major event at the 2017 Ocean Conference on SDG-14 — which included ministers, presidents, and a multifaceted audience comprised of bilateral and multilateral funders (such as Sweden, Norway and the World Bank) — and made the case for small-scale fisheries’ contributions to the SDGs.

39 From research commissioned by Rare and completed by California Environment Associates in September 2016.

# SUSTAINABLE DEVELOPMENT GOALS



In parallel to implementing Fish Forever in target countries, Rare set out to build support among U.S. and international foundations, bi/multilateral funders, and global policy leaders to create a movement around this sector. For example, Rare launched the Financing Small-Scale Fisheries dialogue at Our Ocean 2017 in Malta, and will expand on this initial dialogue during Our Ocean 2018 in Indonesia and Our Ocean 2020 in Palau. Rare also provided expert input on the creation of the Blue Action Fund<sup>40</sup> and promoted small-scale fisheries as a viable pathway to conserving marine biodiversity through the Fund's investments. We are inspired by the support of our partners: Since 2012, public funders, including Germany's International Climate Initiative (BMUB- IKI) and Blue Action Fund, Sweden's International Development Cooperation Agency, the Global Environment Facility, the World Bank/Nordic Development Fund and Nordic Climate Facility, and the United States Agency for International Development have committed \$27.5 million to Fish Forever.

The opportunity exists to significantly improve the way small-scale fisheries—dubbed “the Forgotten Fisheries” at Rare's side event at the 2017 UN Ocean Conference — are represented and financed by the

international community. Rare continues to work with partners in highlighting bright spots for coastal fisheries management on the international stage to inspire others to adopt our approach. Additional global forums that have featured Fish Forever include Our Ocean 2017 (hosted by the European Union), The Economist's World Ocean Summit, KfW Development Bank's Ocean Finance Summit and the UN Framework Convention on Climate Change Conferences (2015–17), among others.

With the international community's heightened interest in oceans, the universality of the United Nations' Sustainable Development Goals (SDGs) (goals previously within national jurisdiction now seen as critical to global development outcomes) and adoption of FAO's Voluntary Guidelines on Securing Sustainable Small-Scale Fisheries, the opportunity exists to generate meaningful high-level commitments that support a transition to sustainable small-scale fisheries.<sup>41</sup> We are confident that linking coastal fisheries' myriad benefits to global targets will result in the sector's prioritization and unlock political and financial support for global coastal fisheries reform.

40 The Blue Action Fund is a funding platform established in December 2016 by the German Ministry for Economic Cooperation and Development (BMZ) and KfW Development Bank (with initial funding of EUR 24 million from BMZ) to enable those national and international NGOs who are working to redouble their marine conservation efforts.

41 The Guidelines, created by FAO in 2014 through global consultation and as a result of a bottom-up participatory development process, is the first internationally agreed instrument that provides consensus principles and guidance on addressing the small-scale fisheries sector.

## Part III: Key Takeaways



# I. LESSONS LEARNED

The initial three-year program implementation period has been an enormously valuable learning experience for Rare and our partners. These lessons include:

## **1. The Fish Forever approach works under a variety of settings.**

Fish Forever achieved remarkably consistent results across a wide range of communities, geographies, ecosystems and cultures. Being able to drive change in places with complex geopolitics and other externalities shows that a consistent program model works, despite the inherent heterogeneity of coastal fisheries and the communities that depend on them. Fish Forever's successful implementation in these contexts has led to a robust approach that can be widely adopted and scaled.

## **2. The program needs to build in greater flexibility and patience for empowering communities to co-manage their fisheries**

Fish Forever endeavored to address this inherent complexity by creating a programmatic framework with explicit design specifications. Once implementation began, however, the need for flexibility in applying the approach, creating the pathway to adoption and adapting the timeline became apparent. Enabling community-led governance requires creating and strengthening legal and functional decision-making and moving decision rights from centralized systems within national governments to localized systems that directly involve communities. Co-development — in which communities self-identify as needing to address overfishing — brings an implicit commitment to adoption. The time needed to enable such governance is often hard to estimate. Historically disempowered from decision-making, communities need time to build their awareness and understanding of the problems affecting their coastal resources and the skills to confidently manage data and decisions about them.

## **3. Community engagement is central to change and sustainability.**

Human behavior is arguably the single greatest driver of biodiversity loss, and changing behavior should be central to conservation efforts. The program's intensive use of community engagement provided time and space for deliberation and transparency. Communities could begin to trust in the benefits of cooperative behavior and recognize that fishery reform benefits could be shared equitably. Social trust and equity are critical for empowering communities and defining how they ultimately choose to adopt managed access with reserves (and remove barriers to that change).

While there are no useful benchmarks for acceptable levels of outreach, education or community engagement costs, Fish Forever prioritized investing resources in a deliberate, long-term effort to change the norms governing institutional, community and individual behavior — a valuable investment in people that we believe, and our evidence infers, is worth the effort. The financial leaders and legislators with whom Rare is now working agree, and Rare will continue to work with partners to prove the efficacy and return on investment of our approach.

## **4. Peer-to-peer networks increase demand for the approach.**

The increasing number of peer-to-peer networks, such as mayors' networks and fisher associations and federations, have intensified demand for the Fish Forever approach. In the Philippines' Tañon Strait, for example, the "BATMan"<sup>42</sup> municipal partner alliance has increased management effectiveness of its coastal waters, and that effectiveness has also inspired neighboring municipalities to create or consider similar alliances. Throughout Fish Forever, local leaders have often cited such positive examples of the

intervention as their inspiration to act. Generating these networks can also generate social, political and ecological resilience in the system, incentivizing mayors and local leaders to join. Rare will continue to develop champions for managed access with reserves among subregional and local political and civil society leaders, influencing them at the beginning of the intervention (important for ultimate buy-in) and empowering them to be effective messengers in existing or new peer-to-peer networks. This precedent further facilitates horizontal scaling and widespread adoption and ultimately creates a more resilient constituency with aligned activities.

#### **5. Subnational (provincial) engagement and support are essential to scale.**

Working at the community level, while effective, is a slow route to large-scale impact. Fish Forever initially targeted communities and national governments, aware that community-led implementation had to inform and be supported by national policy and programs (and vice versa). The importance of engaging subnational government became clear once these conditions were in place and the program began expanding in the Philippines and Indonesia. Subnational government units provide existing networks of local government leaders to engage in decision-making and resource allocation across larger scales. By connecting communities, local government units and mayors with existing subnational authorities, Fish Forever can begin to scale impact across entire districts and provinces. Working at the subnational level makes sense politically and ecologically: Communities are already networked together through these larger political boundaries, and expanding to these larger boundaries matches more closely to the ecological scale necessary for preserving habitats and species. Further, local government within

these larger political boundaries are accustomed to accessing resources from the subnational level and already have a sense of belonging to this provincial/state/district unit. Moreover, we can continue to leverage geographic pride in a province, just as we have done in communities for the last 25 years.

#### **6. Reserve networks and connectivity in network design are needed to optimize both governance and ecology.**

Over time, as Fish Forever expanded, it became clear that future sites must be selected and reserves designed to optimize not only the level of governance at which impact and scale would be greatest but also the necessary ecological scale. Fish Forever's first sites were selected to allow for testing the approach across a variety of ecological, social and political settings. Recognizing the importance of resilience achieved by managing access with reserves at the appropriate ecological scale, we have been advancing connectivity and reserve network design over the past two years, and we will further apply this learning to our expanded work in Indonesia, the Philippines and beyond.

#### **7. Alternative livelihoods and value chain enhancements must be carefully planned and correctly sequenced.**

While developing "profitable fisheries" among targeted community-based fisheries was an initial goal of Fish Forever, the program's experience and approach proved that longer-term assessment is required to do this; thus, we cannot yet show measurable change. In part, this is simply because fish population recovery (especially resulting from spillover from reserves) is non-linear, increasing significantly after three to four years of improved management and conservation. Additionally, the program quickly recognized the need for careful

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42 BATMan is the acronym for the municipal partner alliance that includes the Philippines' municipalities of Bindoy, Ayungon, Tayasan and Manjuyod in the Philippines' Tañon Strait.

design and caution when looking at opportunities to add value in fish products — especially those that form a part of the rural diet. On the latter, for instance, an intervention designed to increase ex-vessel price may improve fisher household income, but could also adversely affect non-fisher households dependent on affordable protein sources. Fish Forever intentionally delayed investing in processing, branding and other value-added activities, given concerns that doing so in the absence of well-accepted fishery reform would likely result in increased effort and overfishing as people move into the fishery because its value has increased. In the case of alternative livelihoods, many fishing households have already diversified their livelihoods with supplemental income (from farming, day labor or small trade), and conservation and development practitioners' investments in specific alternative livelihoods projects have had varying degrees of success (often achieving short-term gains that do not stick). While Fish Forever attempted a few supplemental livelihood pilot projects, such as farming seaweed in Indonesia, they did not sustain yields when external technical capacity was discontinued.

Fish Forever's markets-based approach has therefore progressed cautiously, step by step, focusing first on simple mechanisms to help community financial management, such as village savings and loans clubs. As the work advances and we begin to sequence in alternative livelihoods, we will rely on the right partners with specific experience to help us craft projects that can be sustained.

**8. Any new country launch must be contingent on the availability of sufficient financial, operational and political resources.**

Fish Forever is committed to long-term investment in community-led coastal fisheries recovery and reform, but scaling the program and creating a

global movement for securing coastal fisheries requires early, real and actionable commitments of support from public and private partners. For any new countries, Rare has identified that a lower-cost launch model, in which national authorities are partners from the outset for early investment and national scaling plans, is required; and that influencing institutional agendas is critical to the widespread uptake of a rights-based fisheries management model. Further, sustained investment in the shared services needed to ensure effective program execution, training and ongoing learning and design will be critical for long-term sustainability.



Woman holding passbook at savings club meeting in Lubang, Philippines. Photo: Tom Epperson

## II. NEXT STEPS

The following next steps for Fish Forever are based on the evolution of work related to small-scale fisheries and how Rare envisions focusing future efforts for greatest impact.

### 1. Including women and empowering them as decision-makers

A formal gender inclusion strategy will guide the program's next phase. A thorough analysis of the gendered division of labor in fisheries, access and control over key coastal resources, differences in decision-making and norms, and values at household and community levels will identify the priority entry points for the strategy.

Using a community-led and participatory approach, we will engage women alongside other coastal fisheries stakeholders to ensure inclusivity, transparency and equity in program design, develop partnerships to leverage resources and build momentum for change. In particular, strategy implementation will target Pride campaign managers and local government representatives, who already design and implement social marketing campaigns that encourage sustainable fishing and livelihood practices in local communities.

### 2. Enhancing fishing households' financial inclusion and providing financial identity

Rare will assist fishing communities with

financial inclusion. Financial inclusion for small-scale fisheries is designed to support willing communities with financial behavior change and align fishing households' finances with conservation and community development planning horizons. Rare's social marketing and behavior change methodology, coupled with activities for building financial literacy, can help accelerate fishers' transitions from the informal to the formal economy; this is fundamental to their economic resilience and the overall success of coastal fisheries reform. As individuals save money and build financial identity, they can invest in their families, homes, education and businesses. For example, Rare has helped fishing communities to form and launch savings clubs — low-cost mechanisms that help to change financial behaviors within fisher households and expand fishers' planning horizons. These clubs have proven effective in accelerating growth and building local capacity. In the Philippines, Rare has piloted more than 100 savings clubs for over a year, saving more than \$125,000. Recognizing the similar and parallel nature of "saving" something — whether through resource management or financial management — Rare aims to leverage these similarities to create complementary and mutually reinforcing actions.

### **3. Building resilient coastal communities and climate-smart reserve design**

Although building climate change resilience in fishing communities and their coastal fisheries was not an explicit initial programmatic goal, implementation drove Rare to evaluate the potential for community-led, climate-smart development across the program. This evaluation has helped us identify the numerous ways that the program contributes to climate change adaptation (including Ecosystem-Based Adaptation (EbA), mitigation and achievement of local development goals. It also provided the basis for defining how and where to layer climate-smart

program design in the program's next phase. (See Appendix VII for two examples of Climate Compatible Development for Fish Forever). Going forward, Rare will incorporate climate-smart metrics into program design to estimate ecological resilience to climate change. We will also integrate climate modeling into management planning and reserve network design; the latter needs to account for climate change's impacts on reserve placement, habitat condition, target species distribution and communities' ability to access fishing grounds over time. Alongside these efforts, we will prioritize building effective and adaptive capacities in the communities; this includes using an EbA approach to governance and management, working with communities to collect basic slow-onset metrics (which can help them to see gradual climatic changes and take appropriate preventative actions), and informing national adaptation plans and Nationally Intended Contributions under the Paris Agreement.

### **4. Creating proof points at provincial (subnational) scale**

To remain a relevant and scalable solution for small-scale fishers, Fish Forever will build on the initial mass prototyping model by implementing a replicable approach that reaches more communities at lower cost. To achieve this, Rare is evolving the original approach: We will work in geographic clusters and connect communities and districts to provincial fisheries management plans and coastal and marine spatial plans, and explicitly build horizontal and vertical links among practitioners, decision-makers and champions to diffuse our human-centric approach and encourage its wider national adoption. This provincial-level scale also places the intervention at an ecological scale more appropriate to impacting species populations and ecosystems. We have already begun to implement this subnational scaling model in Indonesia and the Philippines, focusing implementation in provinces where government

support is already confirmed and which contain clusters of districts whose constituent communities are interested in reforming their local fisheries. Further, subnational-level campaigns will present a unified behavior change message that reinforces and leverages local campaigns; they will also help to create a global network of leaders. Working at subnational scale will provide a strategic platform from which to continue highlighting and convening municipal leaders, or networks of leaders, that can inspire local action and align on global development commitments.

## **5. Stimulating investment in small-scale fisheries**

Rare will continue to ensure that communities are ready to receive, manage and benefit from investments in the small-scale fishing sector. While Fish Forever has focused on building enabling conditions for a sustainable sector, we are also developing the financial mechanisms to connect communities to sustainable markets and investments. For example, the Meloy Fund for Sustainable Community Fisheries incentivizes the development and adoption of sustainable fisheries by making debt and equity investments in fishing-related enterprises that support coastal fisheries recovery in Indonesia and the Philippines. We will also build capacity for value chain improvement and ways to improve fisher access to both private investment capital and public infrastructural investment (e.g., strengthening enforcement capacity for managed access). Simultaneously, we will continue to conduct analyses that quantify the true contributions of small-scale fisheries to national fisheries production and provide the external validation and potential pathways needed to stimulate sectoral investment (e.g., create financial implementing bodies that attract private investments to finance activities in coastal fisheries management). Important strides have been made in generating the cost-benefit analyses needed to build government support for including the sector in national budgets and creating access to loans and other financing measures.

## **6. Supporting participatory data collection and use**

Reporting program results is both a responsibility of our work and a commitment to the communities that have trusted us in supporting them. As a learning organization, Rare will report data back to communities and local leaders, share our data sets with partners, submit papers for scientific peer review to be “pressure-tested”, and make our data and learning available in the public domain. This data will continue to empower local leaders and increase their ability to participate in and make decisions about fisheries management and stewardship. Furthermore, we will continue to leverage digital data collection technology to decrease the time it takes to collect and collate data and increase time spent on analyzing and sharing our data across multiple user groups.

## **7. Downscaling elements of The Guidelines for local government implementation**

The Voluntary Guidelines on Securing Sustainable Small-Scale Fisheries are designed to encourage national government implementation; they do not prescribe activities for implementation at the local level. Rare has identified the need to downscale The Guidelines from internationally agreed principles to actions that can be applied locally. We are currently evaluating Fish Forever’s progress in implementing core parts of the guidelines by building local governments’ capacity and inspiring those governments to take ownership of them. Based on this evaluation, we will identify specific activities that communities, municipalities and provincial governments can employ to help in securing the sector. While we have focused more intensively on some principles over others, namely securing community access to their fisheries and moving toward sustainable fishing, we plan to intensify our program of work in other areas, especially financial inclusion and value chain development, as well as build innovative partnerships to better incorporate gender inclusion and social protections for fishing households.



*Kolono Bay, Indonesia*

### III. FINAL CONCLUSIONS

Fish Forever was effective at mobilizing communities to improve local fisheries management, driving creation and adoption of rules and regulations and explicit protection of reserve areas. Fishing pressure has consistently decreased within the reserves, overall biomass decline has halted, and numbers of fast-growing species have increased. Communities have consistently adopted Fish Forever’s fundamental tenets — community rights, managed access and long-term behavior change — and these have been refined into locally appropriate fishery management concepts that involve spatial and effort-based controls. Strong evidence infers that the program effectively changed attitudes and shifted behaviors, including the crucial ones around protecting no-take reserves. Fish Forever’s collective management approach appears to have contributed to a newfound sense of community optimism and commitment to change. These results confirm that an inspired and engaged community can establish and manage sustainable fisheries bringing benefits to the local economy, environment and culture.

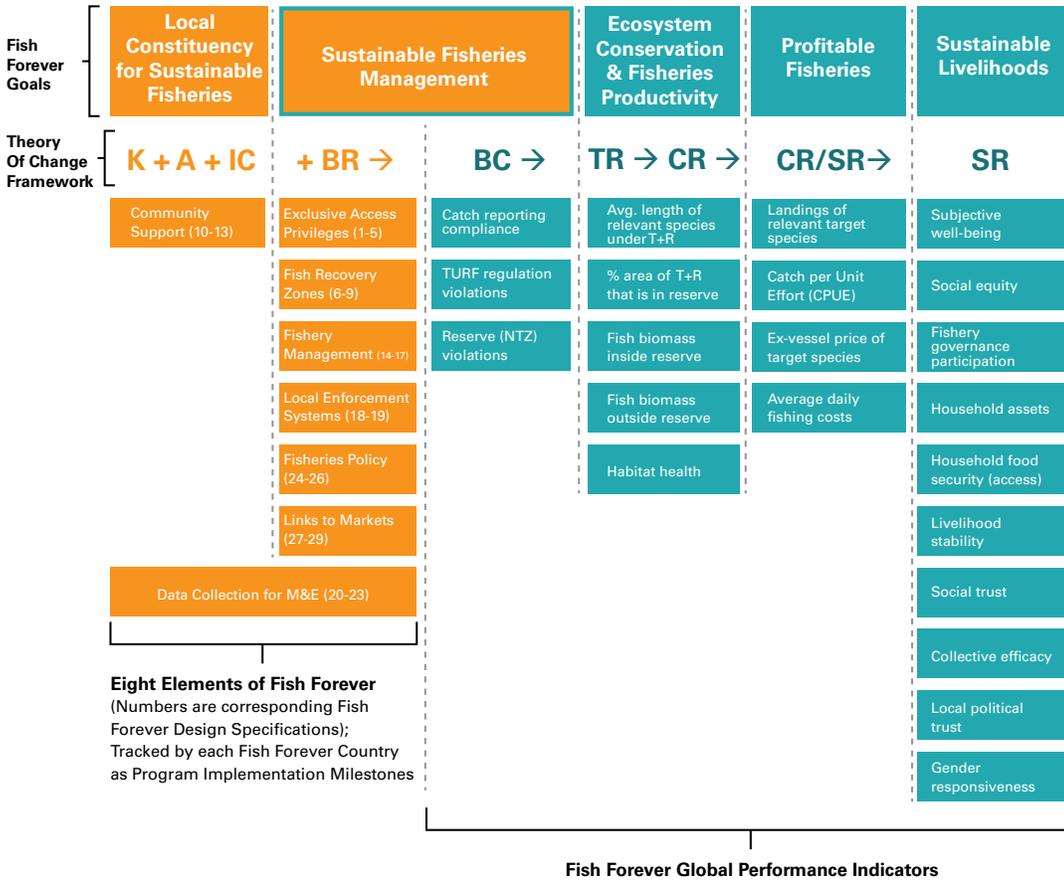
Ultimately, this intensive learning process is providing the evidence to refine, improve and evolve the strategy and implementation for the next phase of Rare’s coastal fisheries program. Fisheries are complex adaptive socioecological systems, and we have learned a great

deal from these 41 sites by adapting our niche to employ a unique approach to solving coastal fishing challenges. We are using lessons from this first phase to improve the efficiency and replicability of the next phase and applying these lessons to improve local level implementation of FAO’s Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries.

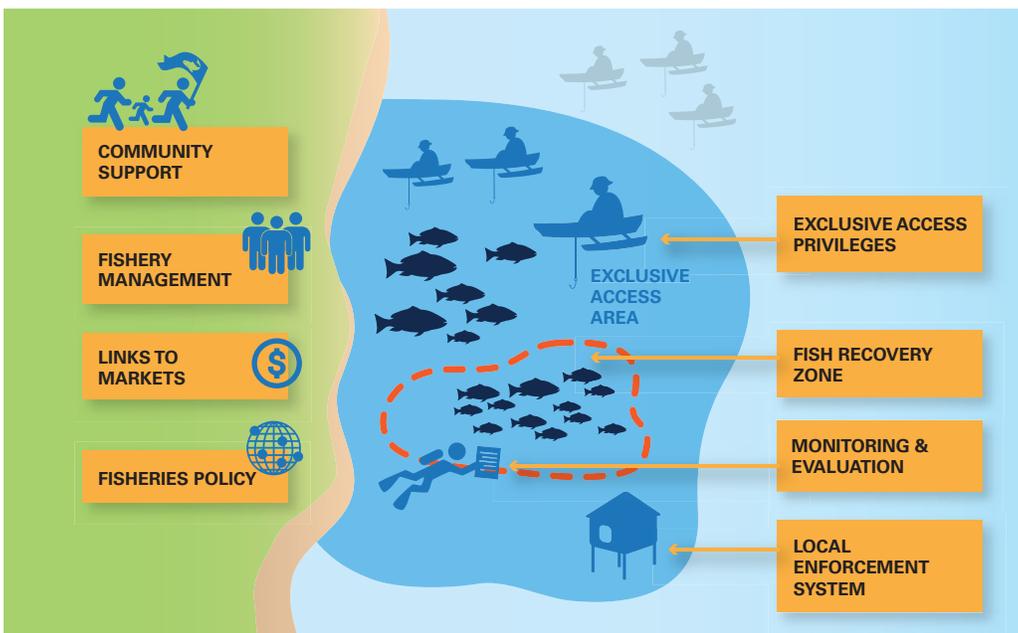
Taken together, Rare’s aspirations for Fish Forever and the Vibrant Ocean Initiative’s next phase are critical for scaling the solution. Rare will address them with one eye on the emergent data from the initial 41 sites, and the other on the growing array of government and private-sector relations in the field. In two to three years, Rare will have made available a world-class, robust data set on coastal fisheries reform, based on internationally accepted monitoring, evaluation and reporting standards — an essential pre-condition for broad adoption. Fish population recovery in existing sites accelerates significantly after approximately three years of protection, likely providing strong data on rising yields and incomes. These data sets will be backed by proof points across highly diverse fisheries, geographies, ecosystems and cultures, and supported by a team of local and international practitioners prepared to teach, inspire and practice. In this time frame, at least one Fish Forever country program in a top 10 fishing country, will be financed at national scale. The impact of sustainable coastal fisheries will be measurable across a range of development objectives reflected in the SDGs, including food security, resilience to climate change and marine biodiversity. To achieve these goals, Fish Forever will rely on continued and new partnerships with communities, governments, philanthropists, development organizations and academics. If this progress continues, within five years, Rare will have supported 10 of the world’s highest marine biodiversity and fish-dependent countries on a path to nationwide coastal fishery reform.

With the results of the first phase of work fresh in our minds, Fish Forever and partners will persevere in stemming the tide of coastal overfishing.

# APPENDIX I: FISH FOREVER PROGRAM FRAMEWORK



# APPENDIX II: FISH FOREVER MAIN PROGRAM ELEMENTS



# Overview of Minimum Specifications\*



## Exclusive Access Privileges

- (1-2) TURF is designed based on socio-economic and ecological community goals and established corresponding to political and legal context.
- (3-4) TURF boundaries are indicated on maps and by Buoys/Landmarks.
- (5) System for secure rights is in place.



## Fish Recovery Zones

- (6-7) Reserve(s) are designed based on ecological rationale and the community's ability to enforce the area, with the aim of covering 20% of TURF area.
- (8-9) Reserve boundaries are indicated on maps and by Buoys/Landmarks.



## Community Support

- (10-12) Fishing community and decision makers agree about T-R design and understand its benefits. Social norm is forming geared towards good management and self-compliance.
- (13) Fishers are organized in some way. They are involved in TR management and with fisheries management as a whole.



## Fishery Management

- (14-15) Multi-Stakeholder TURF-Reserve Management Body is put in place, with participation of Fishing community and legal authority to manage and enforce the T-R area.
- (16-17) Management plan is in place, taking into consideration TURF-Reserve characteristics and banning extractive and destructive activities within Reserves.



## Local Enforcement Systems

- (18) Local enforcement system is established, functional and legally recognized.
- (19) Fisheries management regulations have been communicated to key resource users.



## Monitoring & Evaluation

- (20-21) Monitoring team is established and data collection plan is in place to inform performance indicators specified in the Global M&E plan.
- (22-23) Data collection is executed (Pre and post- campaign), uploaded and stored in centralized database.



## Fisheries Policy

- (24) Policy landscape analysis is conducted on a national level.
- (25) Leaders and decision-makers engaged in TURF-Reserve management process.
- (26) TURF-Reserves are recognized by relevant government institution.

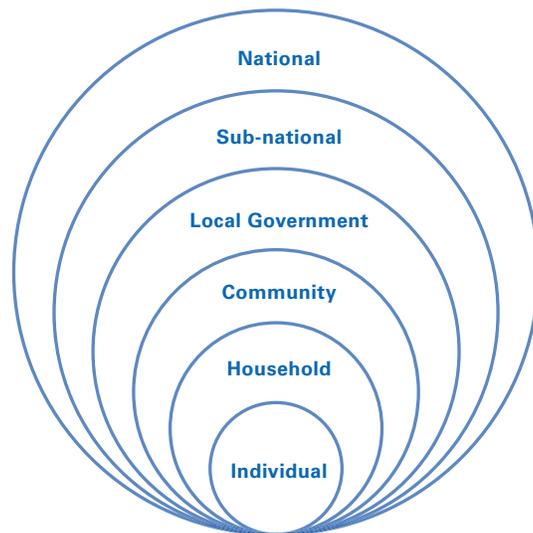


## Links to Markets

- (27) Markets landscape analysis is conducted on a national level.
- (28) Value Chain analysis completed, including identification of promising market interventions.
- (29) ROI analysis completed at site (25% of sites per country).

\* Numbering in parentheses refers to the 29 Minimum Specifications

# APPENDIX IV: BEHAVIORS TARGETED THROUGH FISH FOREVER PRIDE CAMPAIGNS



Levels of Influence	Examples of Targeted Behaviors	Examples of Behavior Tactics Used
<b>National</b>	<ul style="list-style-type: none"> <li>Approve national level legislation</li> </ul>	<ul style="list-style-type: none"> <li>Public recognition in international forums</li> </ul>
<b>Sub-national</b>	<ul style="list-style-type: none"> <li>Create a managed access with reserves network with neighboring municipalities</li> <li>Support for legislative changes</li> </ul>	<ul style="list-style-type: none"> <li>Mayor exchanges</li> <li>Public recognition and commitments</li> <li>Mass media coverage</li> </ul>
<b>Local Government</b>	<ul style="list-style-type: none"> <li>Approve municipal ordinances</li> <li>Support for legislative changes</li> </ul>	<ul style="list-style-type: none"> <li>Mayor exchanges</li> <li>Public recognition and commitments</li> <li>Mass media coverage</li> </ul>
<b>Community</b>	<ul style="list-style-type: none"> <li>Support and facilitate participation in managed access with reserves process</li> <li>Create new commercialization relationships</li> </ul>	<ul style="list-style-type: none"> <li>Community events, i.e., festivals, sports championships, school visits</li> <li>Sponsors of managed access with reserves, i.e., religious leaders</li> </ul>
<b>Household</b>	<ul style="list-style-type: none"> <li>Improve fish handling practices</li> </ul>	<ul style="list-style-type: none"> <li>Prompts</li> <li>Timely feedback</li> </ul>
<b>Individual</b>	<ul style="list-style-type: none"> <li>Adopt and respect fisheries (current and new) management and reserve regulations</li> <li>Report on catch</li> </ul>	<ul style="list-style-type: none"> <li>Fisher exchanges</li> <li>Branded materials for fishing activity</li> <li>Public recognition</li> <li>Prompts</li> <li>Timely feedback</li> </ul>

# APPENDIX V: MAP OF FISH FOREVER COUNTRIES 2014-2017



## Fish Forever Countries and Sites Contributing to this Report:



# APPENDIX VI: EXCERPT FROM THE GLOBAL OUTCOME MONITORING AND EVALUATION PLAN 2.0 (UPDATED DECEMBER 17, 2015)

## Framework, Metrics and Methods: Performance Indicators by Overarching Goal

### Sustainable Fisheries Management

**Goal:** The ability of communities to continuously manage and secure their TURF+reserve fisheries over time

**Hypothesis:** The implementation of the FF program will significantly increase levels of compliance with catch reporting, no-take zones and all TURF+reserve regulations

Performance Indicator	Metric	Data Stream	Frequency	Site level objective	TOC Category
Catch reporting compliance	Percentage of TURF+reserve fishers who are complying with local catch reporting system [CLARIFY IF VOLUNTARY OR MANDATORY]	Catch reporting system	Baseline Annual summaries (data collected monthly) for years 1,2 & 3, then years 6 & 9	Within 3 years from the establishment of the TURF+reserve, members at each FF site will be complying with local catch reporting system	Behavior Change
TURF regulation violations	Number of violations of TURF regulations per hour of surveillance [separated by TURF+Reserve members or not]	Enforcement logbooks	Baseline Annual summaries (data collected monthly) for years 1,2 & 3, then years 6 & 9	Within 3 years from the establishment of the TURF, each FF site will have a stabilized or decreased number of TURF violations	Behavior Change
Reserve/No-Take Zone (NTZ) violations	Number violations of NTZ regulations per hour of surveillance [separated by TURF+Reserve members or not]	Enforcement logbooks	Baseline Annual summaries (data collected monthly) for years 1,2 & 3, then years 6 & 9	Within 3 years from the establishment of the reserve, each FF site will have a stabilized or decreased number of reserve violations	Behavior Change

### Ecosystem Conservation and Fisheries Productivity

**Goal:** Positive biological outcomes from TURF+reserve interventions including improvement in overall ecosystem health, resilience and biodiversity to ensure that sites are capable of sustainably producing fish

**Hypothesis:** The implementation of the FF program will significantly increase target species length and biomass, percent of TURF area protected, habitat health, and fish species diversity.

Performance Indicator	Metric	Data Stream	Frequency	Site level objective	TOC Category
Average length of relevant target species under TURF+reserve management	Average length of relevant target species under TURF+reserve management in the catch	Landing site/ Boat intercept surveys	Baseline Annual summaries (data collected monthly) for years 1,2 & 3, then years 6 & 9	Within 6 years from the establishment of the TURF+reserve, each FF site will have stabilized or increased average length top species under management	Threat Reduction/ Conservation Result
Percentage area of TURF+reserve that is in reserve	Percent of the TURF+reserve system that is protected by a marine reserve encompassing critical habitat	Spatial mapping	Baseline Any time zoning changes	<b>Aggregated global</b> - By 2023, FF sites globally will have on average 20% of the TURF in reserve status	Conservation Result
Fish biomass inside reserve	Total fish biomass (inside reserve) (all species)	Underwater visual survey and/or Biomass estimation survey	Baseline 3 years 6 years 9 years	Within 6 years from implementation of the reserve, each FF site will have stabilized or increased biomass ratio	Conservation Result
Fish biomass outside reserve (& inside TURF)	Total fish biomass (outside reserve) (all species)	Underwater visual survey and/or biomass estimation	Baseline 3 years 6 years 9 years	Within 6 years from the implementation of the reserve, each FF site will have stabilized or increased biomass	Conservation Result

<b>Habitat Health</b>	Average % live coral cover (inside and outside NTZ) / % change in mangrove aerial extent	Underwater visual survey / satellite image or aerial photography + GIS	Baseline 3 years 6 years 9 years	Within 6 years from the implementation of the reserve, each FF site that is coral dominated will have either maintained or improved coral cover within the reserve relative to outside. Mangrove sites will have either maintained or increased mangrove aerial extent.	Conservation Result
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### Profitable Fisheries

**Goal:** Increase community profits through increased production, increased fish prices, decreased fishing costs, and/or supply chain efficiencies associated with implementation of the TURF+reserve and community organization

**Hypothesis:** The implementation of the FF program will significantly increase landings, CPUE, ex-vessel prices, and average daily fishing profits, while decreasing average daily fishing costs.

**Note:** All indicators that are tracked at the species level only need to be tracked for the top 1-5 relevant target species under TURF+reserve management. These species may be a combination of high volume, high value, or culturally or ecologically important, depending on community priorities.

Performance Indicator	Metric	Data Stream	Frequency	Site level objective	TOC Category
<b>Landings of relevant target species</b>	Total landings annually per species (by weight) [IF SUB-SAMPLE, NOTE DETAILS]	Catch reporting system	Baseline Annual summaries (data collected monthly) for years 1, 2 & 3, then years 6 & 9	Within 6 years from the implementation of the TURF+reserve, each FF site will have annual landings (either by species or aggregated) that are stabilized or increasing	Social Result
<b>Catch per Unit Effort (CPUE)</b>	CPUE of relevant target species and gear types (kg/day, given as a monthly median)	Catch reporting system	Baseline Annual summaries (data collected monthly) for years 1, 2 & 3, then years 6 & 9	Within 6 years from the implementation of the TURF+reserve, each FF site will have standardized CPUE (either by species or aggregated) that is stabilized or increasing	Conservation Result/ Social Result
<b>Ex-vessel price of target species</b>	Ex-vessel price by species paid to fisher (monthly average per species, broken down by different markets)	Landing site/ Boat intercept surveys	Baseline Annual summaries (data collected monthly) for years 1, 2 & 3, then years 6 & 9	Within 6 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased ex-vessel price of target species	Social Result
<b>Average daily fishing costs</b>	Fixed and variable fishing costs (monthly average across all TURF fishers, broken down by species if relevant)	Landing site/ Boat intercept surveys	Baseline Annual summaries (data collected monthly) for years 1, 2 & 3, then years 6 & 9	Within 6 years from the implementation of the TURF+reserve, each FF site will have stabilized or decreased cost of fishing per day	Social Result

### Sustainable Livelihoods

**Goal:** Improvement in livelihood and human well-being as defined by increase in the basic material and social assets, tangible and intangible, that people use for constructing their livelihoods.

**Hypothesis:** The implementation of the FF program will significantly increase fisher levels of subjective well-being, social equity, participation in fishery governance, index of household assets, household food security, livelihood stability, social trust, collective efficacy, and gender equality and empowerment.

**Note:** The best practice is to have household surveys representative of the community conducted by an independent/third-party to reduce bias; this will also enable the collection of all indicators. If this is not possible due to budgetary constraints, sustainable livelihoods questions may be added to the KAP survey, with sufficient numbers of surveys conducted to ensure the results are representative of a community (not just the target audience for a fishery). If survey length is a concern, the first four indicators should be prioritized because they can be collected via a KAP survey with fewer issues of bias or sensitivity for the local implementing partner.

For Sustainable Livelihood indicators, a sufficient number of women should be surveyed to have sex-disaggregated gender data for each of these metrics in order to evaluate the gender dimensions of Fish Forever. A draft framework for collecting baseline data on gender responsiveness for Fish Forever has been developed (Appendix G)

Performance Indicator	Metric	Data Stream	Frequency	Site level objective	TOC Category
<b>Subjective well-being</b>	Subjective well-being (Life satisfaction)	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased subjective well-being within the fishing community.	Social Result

<b>Social equity</b>	Perception of equity in access to fishery benefits	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased perception of equity of access to TURF+reserve benefits within the fishing community	Social Result
<b>Fishery governance participation</b>	Percentage of TURF+reserve fishers who report actively participating and holding leadership positions in the TURF+reserve management process	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, all TURF+reserve fishers at each FF site will have reported attending at least one meeting per year	Social Result
<b>Household assets</b>	Household assets index	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased household income vis-à-vis household assets, within the fishing community.	Social Result
<b>Household food security (access)</b>	Perceived household food access	Household survey	Baseline 3 years 6 years 9 years	Within 6 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased average household food access scale rating within the fishing community.	Social Result
<b>Livelihood stability</b>	Perceived livelihoods stability	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased perceived livelihood stability within the fishing community.	Social Result
<b>Social trust</b>	Trust in other community members	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased social trust within the fishing community.	Social Result
<b>Collective efficacy</b>	Perception of community collective efficacy	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased perceived collective efficacy for fishery management, within the fishing community.	Social Result
<b>Local political trust</b>	Perceived competence of fishery management body and trustworthiness of local government	Household survey	Baseline 3 years 6 years 9 years	Within 3 years from the implementation of the TURF+reserve, each FF site will have stabilized or increased local political trust within the fishing community.	Social Result
<b>Gender Responsiveness</b>	Scores on gender responsiveness framework (in review).	Gender responsiveness framework (in review)	Baseline Annual Summaries	TBD	Social Result

# APPENDIX VII: EXAMPLES OF RARE'S CLIMATE COMPATIBLE DEVELOPMENT (CCD) CONTEXT FOR FISH FOREVER

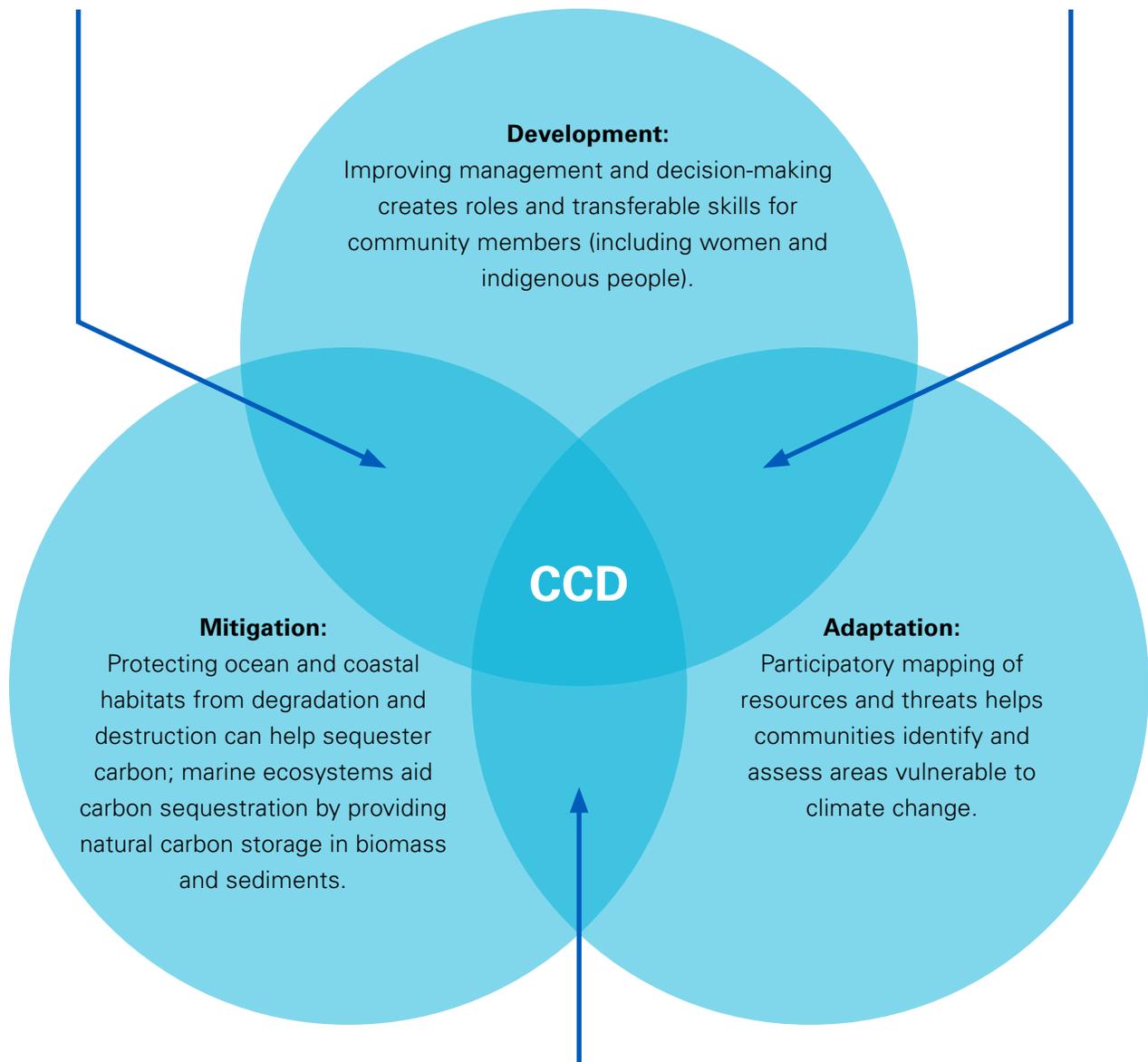
Figure 1: Example of Rare's CCD Context for Fish Forever

### Low-carbon development:

As Rare helps rebuild coastal fisheries, fishers do not need to travel as far or stay on the water as long, reducing catch per unit effort, and ultimately reducing fuel use and decreasing costs.

### Climate-resilient development:

The development of decision-making groups for natural resource access and use in managed access with reserves can help fishers ensure equity—community members have rights to their fisheries and are protected from illegal outside fishers, and fishers can adaptively manage as fish stocks fluctuate.



### Co-benefits:

Local management capacity for managed access with reserves helps communities identify and plan for changes in natural resource availability. This improves food security and extends planning time horizons, enhancing community well-being by reducing sudden shocks and enabling communities to adapt and recover.

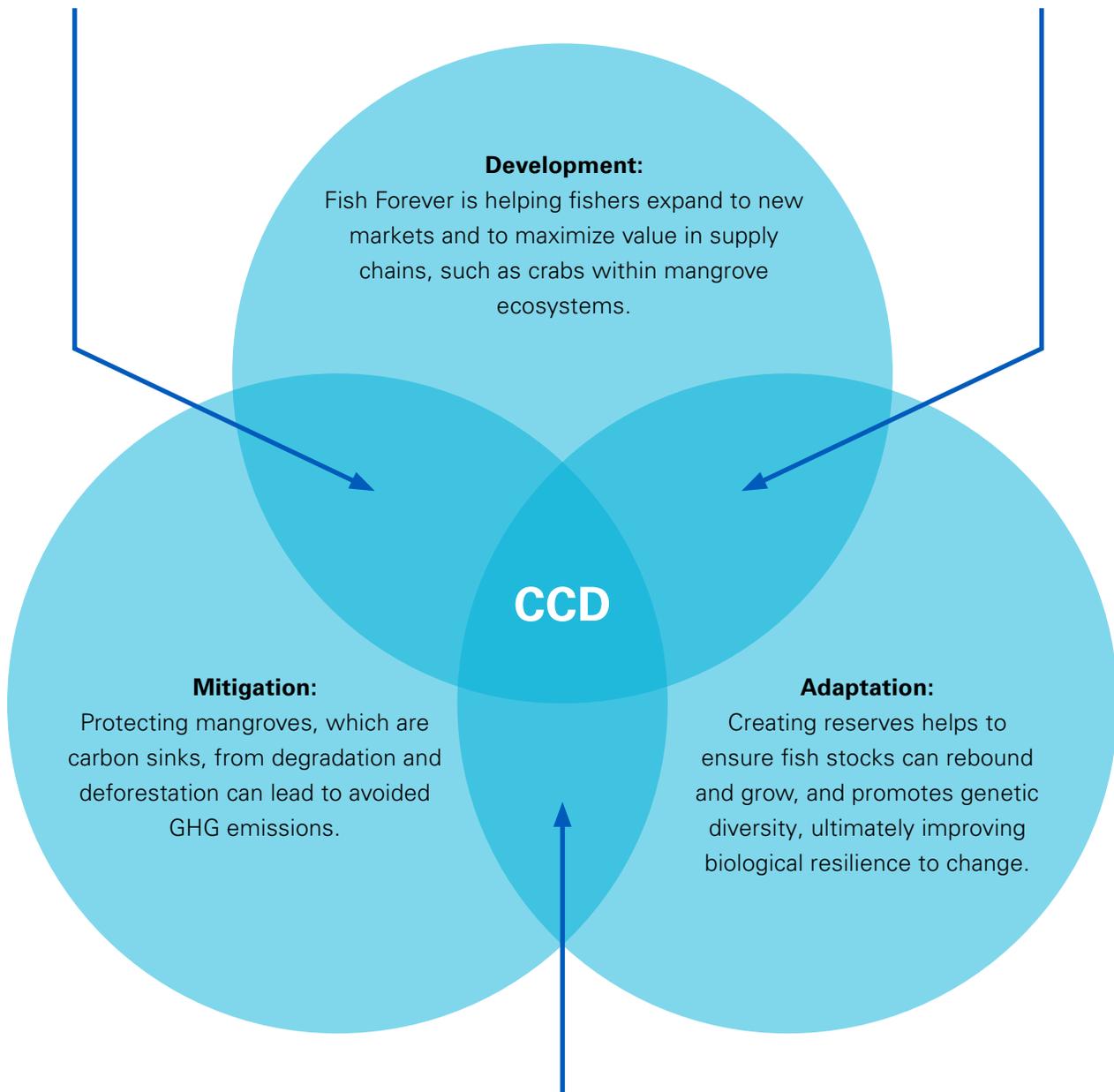
Figure 2: Example of Rare's CCD Context for Fish Forever

**Low-carbon development:**

Improved fisheries management can lead to reduced efforts by fishers – who consequently spend less time on the water, reducing fuel costs and emissions from boats.

**Climate-resilient development:**

Managed access with reserves development and enforcement can enhance social trust and cohesion, thereby improving disaster risk management and community response to disasters; Rare's work with policy makers in each Fish Forever country also helps ensure EbA measures are included in major policy.



**Co-benefits:**

Mangrove protection for avoided emissions helps protect people, infrastructure and wildlife from storm surges.



Rare is the global leader in using behavior change to advance conservation. Rare partners with local leaders to support community-led conservation, and motivates people to take pride in, and protect, the natural resources that sustain them. Rare has worked in more than 350 communities in 56 countries, activating local leaders, engaging with change-makers at all levels of government to scale of impact and unlocking capital with innovative ways to finance the transition to sustainability.

**Learn more at [rare.org](https://rare.org) and follow us @Rare\_org.**



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