EXECUTIVE SUMMARY

Coral Reef Governance: Strengthening Community and Collaborative Approaches

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Climate change, unsustainable fishing, and land-based pollution (Ainsworth et al. 2016, Cinner et al. 2018, Hughes et al. 2018, Wenger et al. 2020) are among the top pressures to coral reefs globally, resulting in substantial losses of live coral cover (Eddy et al. 2021) and the loss of ecosystem services valued at more than $10 trillion dollars per year (Costanza et al. 2014). Strengthening the enabling conditions for successful coral reef conservation is one of the most pressing challenges facing communities, scientists, managers, policymakers, non-governmental organizations (NGOs), and philanthropic donors in the 21st century, and will require significant investments to improve governance of coral reefs and the human activities that threaten them (Morrison et al. 2019).

Successful local governance underpins two key aspirations of conservation success: better outcomes for biodiversity goals and ensuring that the needs and aspirations of local communities connected to coral reefs are met with sustainable, equitable, and just management. This whitepaper offers insights for improving coral reef governance, drawn from leading research on biodiversity conservation and environmental governance. The paper identifies a set of foundational principles for strong community-based coral reef governance grounded in the work of Elinor Ostrom and further lessons for building, strengthening and supporting community-based governance. These include support for local decision-making, building and linking social, institutional, natural, human and financial capital across scales, scaling-up conservation successes, diversifying approaches to conservation, supporting equity, rights, and justice, and monitoring and management of emerging threats. Although coral reef conservation and governance is place-based and context-specific, there remain several opportunities for stakeholders to contribute to conservation objectives by:

- → **Rebuilding and strengthening local institutions.**
- → **Planning for long-term funding.**
- → **Sharing diverse voices and experiences.**
- → **Ensuring diverse knowledge for decision-making.**
- → **Monitoring progress towards social and ecological objectives.**

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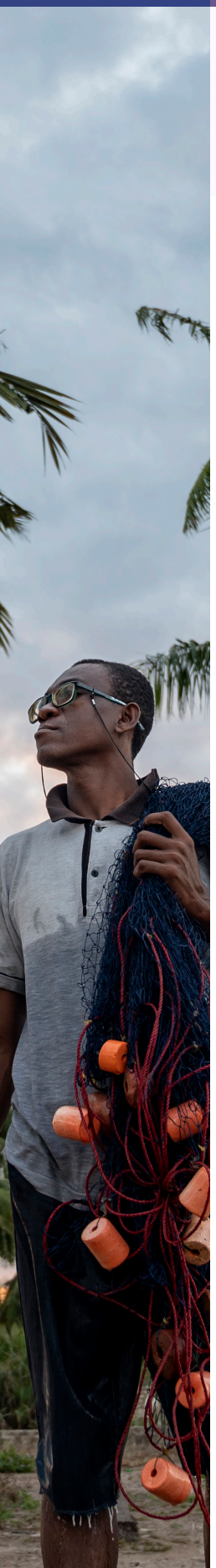
CORAL REEF GOVERNANCE: STRENGTHENING COMMUNITY AND COLLABORATIVE APPROACHES



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Introduction: What is Coral Reef Governance?

Coral reef governance occurs at multiple scales, from community-level decisions, national legislation to international agreements. At the broadest scale, governance can include international agreements that define the rules and regulations that guide the designation of marine protected areas (MPAs) or other effective conservation measures (OECMs, CBD decision 14/8), and the legislation, policies, and rules established by nation states. For instance, international frameworks (e.g., the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the World Heritage Convention, and the Post-2020 Global Biodiversity Framework) can provide a set of tools, best practices, and goals for securing biodiversity conservation that motivate national governments to develop policies and legislation to achieve their objectives (Morrison et al. 2020a). At the national and sub-national levels, governance typically includes processes related to the development of policies and legislation by countries, provinces, regions and municipalities, and the actions they undertake to implement them. Although governments are often involved in governance, there are also important roles played by diverse stakeholders including non-governmental organizations, academic researchers, donors, businesses, and local communities that collectively influence how people make decisions concerning the use and management of resources (Lemos and Agrawal 2006; Berdej and Armitage 2016; Morrison 2017).

At the local level, environmental governance generally refers to the processes by which groups develop rules and norms concerning the use and management of resources, and the actions they undertake to implement them (i.e. enforcement, environmental monitoring, conflict resolution). Importantly, local rules include both the formal rules that are written down in policies, legislation or management plans, as well as the informal rules that are well-understood by communities through local traditions, customs, or taboos but are often invisible to the casual observer (Ostrom 1990). There is a large and growing body of evidence that Indigenous Peoples and local communities (IPLCs) play critical roles in charting a path towards a more sustainable and equitable future through the development of community-based and collaborative governance systems that regulate human interactions with coral reefs and other ecosystems (Ostrom 1990, Cox et al. 2010, Cinner et al. 2016, Schleicher et al. 2017, Bambridge et al. 2019, Dawson et al. 2021). Several recent studies (Cinner et al. 2016, Shaver et al. 2018) have affirmed that high levels of involvement by local resource users in management and rule-making – and especially when those management structures have foundations in customary practices – help lead to more positive ecological outcomes for coral reefs. Local rules however can also be exclusionary to certain groups, such as women or other marginalized groups (Blaikie 2006). Local communities can be powerless against complicated social-economic decisions that arise from national or global scales, preventing the ability of local communities to slow down drivers of reef degradation, such as climate change or market-driven overexploitation from globalized trade agreements (Morrison et al. 2020b). One of the few points of widespread consensus is the need for diverse approaches that support better conservation outcomes through improved local governance (c.f. Ostrom 2007). Coral reefs are recognized as complex social-ecological systems that require governance systems reflective of local conservation problems and power dynamics, including the needs and aspirations of local communities and the contexts in which they are found (Berkes 2004; McClanahan and Abunge 2018b). Box 1 outlines key terms that are used in this paper.

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Strong Communities: Foundations of Local Governance on Coral Reefs

Local and Indigenous communities have been managing and conserving resources for millennia through a range of practices and activities rooted in the social and cultural context of their communities (Johannes 1978; Cinner and Aswani 2007; Bambridge 2016). The shift from community to state control over the use and management of natural resources has, in many cases, contributed to the degradation of coral reefs and other ecosystems (Holling and Meffe 1996; Christie et al. 2005). Centralized command and control governance systems that disempower local communities, and trade liberalization policies and global supply chains that can generate local conflicts, erode incentives for collective action and threaten the stability of coral reef governance systems (Cinner et al. 2021). When communities can overcome these challenges, often in collaboration with partners in government, non-governmental organizations, and/or private enterprises, renewed systems of local environmental governance can be strengthened and maintained. Examples of these successes include locally managed marine areas (LMMAs) in Fiji (Jupiter et al. 2014), territorial user rights in fisheries (TURFs) in Belize (Fujita et al. 2017; Sánchez et al. 2021) managed access plus reserves (MA+Rs) in Indonesia and the Philippines (Domondon et al, 2021), and governance systems rooted in the historical customs, taboos or traditions of local peoples such as the Sasi in Indonesia and the rahui in French Polynesia (McLeod et al. 2009; Adiastuti et al. 2018, Bambridge 2012). Although the social and ecological outcomes of these efforts can vary due to local conditions, one recent study found that "bright spots" in coral reef conservation - reefs with unexpectedly high levels of reef fish biomass given ecological conditions - tended to be found where there were high levels of local engagement in management processes, with rules restricting access and/or use of resources rooted in local cultures or social practices (Cinner et al. 2016).

Not surprisingly, local participation, clear social boundaries, and rules adjusted to local conditions are three core components of Elinor Ostrom's (1990) design principles for sustainable community-based natural resource management, for which she received the Nobel Prize in economics in 2009. The design principles emerged at a time when researchers were increasingly questioning the conventional wisdom that local communities would invariably degrade local resources (Hardin 1968) in the face of mounting empirical evidence to the contrary (Berkes 1977, Johannes 1978, McKean 1982). What was lacking, however, was an understanding of the institutional factors that explained why some communities managed to successfully self-organize to develop and maintain effective systems of local environmental governance, while others failed to do the same. Through a careful and detailed review of case studies, Ostrom (1990) uncovered a set of 8 institutional features that were found among all the successful cases, and that at least some of these were lacking among unsuccessful cases. More recent elaborations have expanded these to 11 design principles (Table 1), resulting from the decomposition of some of the original principles, and provided further empirical evidence linking them to sustainable outcomes (Cox et al. 2010; Baggio et al. 2016).

Box 1: Key terms for coral reef governance

Environmental Governance
Refers to the "set of regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes" (Lemos and Agrawal 2006). Governmental actors at various scales are often involved in governance, but the concept of governance offers a broader lens to examine the roles of the state, intergovernmental organizations, communities, businesses, and NGOs in shaping how human beings understand and interact with their environment and each other.

Community
There is no consensus on the definition of 'community'. The term is used broadly in this paper to describe geographically distinct groups of people, who live in close proximity to reefs (not necessarily small in areas occupied). While some level of social identity and cohesion is implied, communities are assumed in this paper to be heterogeneous groups of people with multiple interests, variable influences on decision-making, and influenced by internal and external institutions (Agrawal and Gibson 1999; Kumar 2005). The emphasis here is the local level where place-based governance takes shape.

Institutions
Institutions are the rules, norms and conventions that govern human interactions with the environment and each other (Ostrom 2005). They include formal rules such as the laws and regulations developed by governments and the informal rules developed by communities and cultures concerning the use and management of resources, including sanctions that apply if they are violated. They also include the social norms of communities and cultures that describe behaviours or actions that are socially acceptable or unacceptable.

Table 1: Elinor Ostrom's expanded design principles

Principles & Descriptions *(Sources: Ostrom 1990; Cox et al. 2010)*

1A Clearly defined social boundaries: Rules clearly define the individuals or households that are permitted to harvest resources.
1B Clearly defined resource boundaries: Rules clearly define the areas in which individuals or households are permitted to harvest resources.
2A Fit between rules and local conditions: Rules governing the use of resources are related to local conditions.
2B Proportionality in costs and benefits: Rights to harvest or benefit from resources are tied to contributions to the governance of those resources in the form of labor, material and/or money.
3 Participation: Most individuals affected by the rules can participate in processes to modify them.
4A Monitoring mechanisms: Mechanisms exist to ensure monitoring of resource conditions and the behaviour of resource users.
4B Accountable monitors: Monitors are resource users or accountable to them.
5 Graduated sanctions: Sanctions for violating rules are graduated depending upon the nature, severity and/or frequency of the offense.
6 Conflict resolution mechanisms: Stakeholders have access to low-cost local venues for resolving conflicts.
7 Minimal recognition of rights to organize: The rights of resource users to develop rules for the use of resources are not challenged or undermined by external governmental authorities.
8 Nested governance: Governance activities are nested and linked across multiple levels.

The design principles establish a foundation for long-term, sustainable, and robust community-based environmental governance by providing mechanisms for building and maintaining trust, detecting and responding to emergent threats, and developing rules that are better adjusted to local conditions. Rules that clearly define management boundaries (design principle 1B) and the people that are eligible to harvest within them (design principle 1A) generate incentives for communities to invest in the governance of resources by increasing expectations that they or their dependents are likely to benefit from those investments. For example, Levine and Richmond (2014) suggest that differences in the implementation of fisheries co-management in Hawaii and American Samoa stemmed in part from the presence of well-defined village and marine tenure boundaries. Participatory decision-making processes (design principle 3), meanwhile, provide opportunities for communities to come together, share their knowledge to develop more effective rules, and build trust through collective decision making. They also appear to be one of the defining characteristics of "bright spots" in coral reef conservation (Cinner et al. 2016). McClanahan and Abunge (2016), for instance, found that when community-level stakeholders were involved in discussions about the costs and benefits of potential fisheries restrictions, they were more likely to perceive those restrictions to be fair, and to comply with them.

Social and environmental monitoring (design principle 4A) are equally critical ingredients for long-lasting and sustainable environmental governance. Social monitoring or enforcement helps to maintain trust and promote compliance within communities by ensuring that rule violations by free-riders are identified and sanctioned accordingly. In fact, a global study of the conservation outcomes of MPAs found that enforcement was one of five key conditions contributing to increased fish biomass (Edgar et al. 2014). Environmental monitoring, on the other hand, helps to support adaptive management through timely identification of emerging threats. Although communities unsurprisingly play a critically important role in community-based natural resource management, those efforts are often enhanced when community-based systems are connected to governance processes in other communities and across different scales (design principle 8). Governance networks facilitate coordination of rules and activities across multiple communities and provide mechanisms for sharing information and resources to address threats (Cheok et al 2020). Community relationships with government agencies, conservation organizations, businesses, and donors can therefore help to strengthen community-based management by, for instance, providing resources to enhance the staff and budget capacity of MPAs (Gill et al. 2017) and establishing legal standing to prevent overexploitation of resources (Basurto and Ostrom 2009).

As core guiding principles of community-based governance, the design principles offer a robust and practical approach for supporting institutions for coral reef conservation and the well-being of communities that depend upon them. Recent studies have shown that the design principles are both mutually reinforcing in that adherence to one principle, such as participation (design principle 3), tends to increase the likelihood of adherence to other principles, such as enforcement (design principle 4A) (Alexander et al. 2018; Bergseth et al. 2018), and synergistic in that adherence to additional principles tends to increase prospects for success (Baggio et al. 2016). Thus, communities that manage to develop governance systems that adhere to the design principles are generally more likely to be successful in conserving biodiversity and maintaining sustainable livelihoods in the face of social and environmental change. The design principles are not however a panacea for the diverse conservation challenges faced by communities and stakeholders. Rather they offer an important foundation for understanding, building and strengthening local conservation efforts, and integrating with larger regional, national and international conservation initiatives.

Lessons for Strengthening Community-based Governance of Coral Reefs

Since the development of the Ostrom design principles, a rich history of practice and research has offered additional insights into the enabling conditions that can support effective and ethical governance of coral reefs. For this whitepaper, we reviewed the latest environmental governance literature to identify the following set of lessons that are particularly relevant for coral reef conservation. While the focus of this whitepaper is the governance of coral reefs at the local community scale, these lessons reflect the need for multi-level support and guidance. Each of the lessons - as well as case studies - reflect and build on multiple Ostrom design principles.

Lesson 1

STRENGTHEN COMMUNITY CAPITAL

Build governance capacity through cross-scale investments in training and capacity development, sustained investments in networks and knowledge sharing, advocating for the rights of local communities, and providing adequate financial support

The emergence, persistence, and effectiveness of conservation initiatives depends strongly upon the availability of capital to address the wide range of challenges that groups experience in seeking to ensure the long-term conservation of local ecosystems. Capital is defined here as stocks and flows of tangible and intangible resources available to communities. Although financial capital is a critically important ingredient for conservation (Gill et al. 2017), other forms of capital can also play an important role in influencing the capacity of groups to address threats and realize conservation objectives (Scoones 1998, Bottrill and Pressey 2012).

- Natural capital refers to stocks and flows of ecosystem goods and services (Costanza et al. 1997). Conservation initiatives generally seek to build or maintain stocks of natural capital. Declines in natural capital may, however, act as a catalyst for collective action and community-based natural resource management (Wade 1994; Carrillo et al. 2019).
- Social capital refers to the relationships that can exist within and between families and communities, organizations and governments (Pretty and Smith 2004). Governance capacity and performance is generally higher in communities with high levels of mutual trust and interdependence, and where communities are connected through bridging ties to external individuals, government and organizations that may support local governance (Cinner et al. 2018).
- Human capital refers to the skills and knowledge that groups can leverage to address governance challenges (Bottrill and

Pressey 2012). Governance capacity and performance is generally enhanced when community members possess higher levels of formal education, participate in formal and informal training or skills development opportunities, and develop and share knowledge through networks, meetings and decision-making processes (Rahman et al. 2012).

- Institutional capital refers to the institutional frameworks, policies and legislation that define the rights and responsibilities of stakeholders (Bottrill and Pressey 2012). Governance capacity and performance is generally enhanced when institutions recognize the rights of local communities to participate in conservation planning, and provide mechanisms to support local governance activities (i.e. enforcement, sanctioning, conflict resolution) (Ostrom 1990; Cinner et al 2016).
- Financial capital refers to the monetary assets, including cash, liquid investments and credit available to actors for providing goods and services (Bottrill and Pressey 2012). Governance capacity and performance is generally enhanced when groups have access to adequate financial resources for ongoing operations and stocks that can be drawn upon to address emerging threats (Christie and White 2007; Gill et al. 2017)

Recent research has also highlighted the importance of a scalar capital, as a complement to the other five types of capital (Cheok et al. 2020). Scalar capital is defined as the explicit consideration and application of scalar dimensions in conservation governance, such that different types of capital flow across scales (e.g., between local, national, and international governance levels). These flows of capital have been demonstrated to produce benefits that can accrue through time (see Cheok et al. 2020 for case study examples) by facilitating flows of conservation resources between governance levels to address resource constraints and improving social or ecological outcomes. These resources have included data, practitioner experience and knowledge, and institutional funding and support. In the context of coral reef governance, scale jumping refers to the ability of actors or organisations to operate vertically across multiple scales (e.g., across multiple jurisdictional levels). Fostering this dimension is critical to cross-scale resource flows in conservation governance because it creates social or institutional links between different governance levels, enabling scale-constrained processes to invest and accrue greater capital. For example, investments in capacity building at local levels initiated by scale jumping actors or organisations can facilitate access to capital across levels (social, human, institutional, or financial).

Building capital is particularly relevant at the community level, where jurisdictional distance from national governments is greatest and institutional capacity is often weakest, particularly in nations with developing economies (Cuthill and Fien 2005; Nunn et al. 2014). Cross-scale resource flows tend to be most effective in responding to threats and realizing conservation objectives when governance processes are aligned with the spatial and temporal scales of the ecological systems they are meant to govern. Unfortunately, governance at the community level is often hindered by short-term funding arrangements and rapid turnover in government and NGO staff, leaving communities ill-equipped to respond to threats (Pressey and Bottrill 2009, Pressey et al. 2013).

Lesson 2

SHARE SUCCESSES

Support the diffusion of effective conservation policies and practices across communities, regions, and countries through long-term and sustained investments in networking, support and knowledge sharing

Conservation initiatives rarely emerge spontaneously at a local scale. Rather, they spread across communities, regions, and even countries through a range of social and political processes. The adoption of conservation initiatives follows a similar pattern to adoption of innovations, in which initial uptake is slow, followed by a rapid period of growth, and then slowing again as the number of potential and willing adopters begins to decline (Mills et al. 2019). This pattern likely emerges as groups, communities, and supporting organisations experiment with conservation innovations, experience success, and then share this information, encouraging further adoption and spread. The adoption of conservation initiatives is not a passive process, it involves negotiations between communities and supporting organisations that shape the policies, practices and principles adopted.

Adoption rates within a set of communities depend upon several factors. For instance, research on the adoption and spread

of community-based natural resource management (CBNRM) in the Solomon Islands found that communities were more likely to adopt innovations when rules and decision making processes were perceived to be legitimate and compatible with existing local resource management ideas, afforded visible management benefits and where there were frequent interactions between key actors and the community (Abernathy et al., 2014).

Where communities are effectively equipped to engage with conservation initiatives (e.g., have legitimate governance, conflict resolution mechanisms), the spread of conservation initiatives from communities to communities can offer governments, conservation organizations, and donors a highly efficient mechanism for securing conservation across large geographic areas. In the past, spread has depended on tangible benefits (e.g., Territorial User Rights Fishing in Chile), or a strong narrative of success (e.g., Community Conservancies in Namibia). In turn, a narrative of success has often relied on large-scale investment in the initial pilot sites (Mills et al., in prep). Thus, the selection of the pilot sites is critical. Ideally, the characteristics which will likely drive perceived and realised benefits (e.g., accessibility, ecological conditions) should be shared with the rest of the region. To date, the spread of conservation initiatives has relied on extension services (via third parties such as governments or NGOs) to facilitate adoption (Mills et al., in prep). Breakdown of the quality and quantity of the extension services provided can both impair further adoption and influence the degree of engagement of current adopters if they need assistance after implementation. Many initiatives that reached scale suffered from ineffective implementation or disadoptions as a result of the inability to keep up with the extension services provided within the first years of the initiative (Browning, 2021).

Conservation initiatives that have spread extensively are often framed around an umbrella initiative which fits a multitude of management actions (e.g., locally managed marine areas or community conservancies; Mills et al, in prep). The actions which are selected are often influenced by the partnering NGO and various community objectives. Ultimately the impact of individual sites can also be highly variable as they are based on what management actions are selected and whether these are implemented. Flexibility is key as communities will engage with the initiative for different reasons. Importantly, even with a large degree of flexibility in what is finally implemented, less than 30% of the potential adopters adopt even the most popular initiatives (Mills et al. 2019). Thus expectations of scaling and impacts should be tempered.

Governance in Action: Chile's Small-scale Fisheries Learning Network

Collaborative Learning Networks or (CLN) are groups that voluntarily organize themselves to share ideas, support collective action, and solve problems to improve governance of socio-ecological systems. CLNs are increasingly being used as a tool for confronting and sharing information about complex sustainability challenges across diverse contexts (Goldstein & Butler 2010; Butler & Goldstein 2010; Dalton et al. 2020). They develop trust, empower leaders, and create a shared vision for conservation and sustainability based on a mutual understanding of what is needed to overcome challenges. Stakeholders can meet on a level playing field and break down barriers to collaboration. A recent analysis of the results of 16 marine CLNs found that they provide effective, collaborative, and adaptive approaches for addressing difficult problems in marine governance (Dalton et al. 2020). For example, CLNs create opportunities for stakeholders to share knowledge and collaborate to improve marine governance providing access to, and sharing, scientific knowledge, encouraging the spread of best practices supporting and empowering local stakeholders to lead change and participate in co-management of natural resources, and collaborating with local partners and institutions to build collective capacity.

Chile's small-scale fisheries learning network, or *Red de Aprendizaje para la pesca artesanal* is an example of a CLN comprised of government, civil society NGOs, small-scale fishers and their associations, seafood buyers, and academic stakeholders. The network began in 2017 and has an active virtual platform, which has maintained connections during the pandemic. The CLN conducts several online and in-person

workshops each year for knowledge sharing and collaborative problem-solving to scale sustainable management of small-scale fisheries and improve marine conservation of Chile's nearshore rocky reef ecosystems.

The network hosts capacity building workshops that have focused on science-based management and participatory data collection, critical habitat monitoring, and evaluation, as well as co-management. These trainings activated several efforts across the network to adopt science-based management by applying data-limited fisheries methodologies. For example, fisherman Roberto Meza and his fishing association immediately began exploring options to manage oysters and benthic species in their fishing area in Patagonia using these methods. Then starting in 2019, more fisheries began to incorporate various data-limited frameworks to their management, including the Juan Fernández Island fisheries inside Chile's largest multi-use MPA. The result has been the Chilean government's approval to use a participatory data-limited framework for ecosystem-based multi-species management plans in these fisheries. In addition, based on this knowledge stakeholders of the network collaborated on publishing peer-reviewed scientific papers.

Replicating these types of outcomes for coral reefs would be an opportunity to strengthen collaborative and collective governance. CLN's are and can be a growing part of global coral reef conservation efforts at various scales and include Caribbean Marine Protected Area Management Network and Forum (CaMPAM), Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF), Mesoamerican Reef Fund (MAR Fund), Locally Managed Marine Area (LMMA) Network and Reef Resilience Network (RRN) (Dalton et al. 2020).

By Erica Cunningham

Lesson 3

DIVERSIFY STRATEGIES

Support a set of diverse and flexible policies that can be locally tailored to yield co-benefits and provide institutional redundancy

Conservation governance problems and the social-ecological landscapes in which they are found are highly diverse (Ostrom 2009, Gurney et al. 2019, Cumming and Epstein 2020), and hence require a similarly diverse portfolio of strategies to achieve sustainable outcomes (Ban et al. 2009, Gurney et al. 2021b). Protected areas, for example, can contribute to the conservation of biodiversity in some contexts (Zupan et al. 2018, Purwanto et al. 2021), but fail in others owing to the lack of one or more enabling conditions (Edgar et al. 2014, Gill et al. 2017). Alternatively, protected areas can be established in places that are currently not under threat - for example, located far from major population centres and in places that hold relatively low value for extractive uses (Joppa and Pfaff 2009; Devillers et al. 2015) - to increase coverage in the most socially and politically expedient way. Although this tends to ease the establishment of protected areas by limiting economic impacts and political conflicts, it can also result in "residual conservation" (Devillers et al. 2015) in areas where they are least needed. Indeed, recent research suggests that conservation measures have the greatest potential impacts on coral reef biodiversity in areas where human impacts are at intermediate levels (Cinner et al. 2018). While in some cases it may be appropriate to apply pressure to establish protected areas in these locations, in others there may be a need for alternative approaches that lessen impacts on local livelihoods and provide a better fit to local problems and conditions.

The diversity of tools or strategies available to conservation practitioners has never been greater. Although protected areas continue to play a central role in coral reef conservation, experts are increasingly recognizing the need for other approaches to complement and/or replace the traditional government-managed protected area model. This can include shifts in how protected areas are governed to provide greater space for local communities, opportunities for private business to play a role in governance through co-management (Camargo et al. 2009), or formal recognition of the rights of communities to use and manage resources within a particular area (Ban and Frid 2018; Schwarz et al. 2020). It can also include alternative rules within protected areas such as the use of gear restrictions (Campbell et al. 2018) and alternative governance arrangements such as OECMs (Gurney et al. 2021b) that can deliver conservation benefits while prioritizing other objectives. Recently, there have also been a growing number of efforts seeking to pursue conservation through social marketing initiatives (McDonald et al, 2020) that target the social norms and values of communities to promote changes in behaviour. In fact, a recent meta-analysis of 84 conservation-oriented social marketing campaigns found changes in social norms and behaviour following the intervention (Green et al. 2019).

Diversification of conservation tools can serve several critically important functions to support long-term conservation of coral reef biodiversity. First, a more diverse portfolio of strategies provides communities, governments and conservation

organizations with a wider range of options for addressing local conservation challenges and identifying those that are better adjusted to local conditions (Epstein et al. 2015). For example, community-based approaches to coral reef governance may be best suited to communities with high levels of dependence on local fisheries, which generates strong incentives to ensure their sustainability through local governance (Cinner et al. 2012; Cinner et al. 2018). Second, combinations of multiple strategies, such as MPAs and ecosystem-based management of coastal ecosystems can yield synergistic conservation and livelihood benefits (Halpern et al. 2010). Third and finally, layering of governance functions and strategies can help to ensure the long-term resilience of coastal systems by providing a measure of redundancy to cope with disturbances (Jones et al. 2013). Co-management arrangements, for instance, provide mechanisms to buffer the impacts of changes in local leadership or influx of poachers from other communities or regions that can often lead to the breakdown of community-based governance (Basurto and Ostrom 2009).

Governance in action: Velondriake LMMA - community-led marine conservation in Madagascar

In 2004, Andavadoaka - a fishing village in southwest Madagascar - closed a small area of its octopus fishing grounds for seven months with the support of Blue Ventures and the Wildlife Conservation Society, contributing to increased octopus catches in the 30 days following a closure's reopening, and spurring interest among neighbouring villages (e.g., Benbow et al. 2014). By 2006, 24 villages across ~40 kilometres of coastline, came together to initiate the establishment of broader regional conservation and fisheries objectives, eventually formalizing these with the creation of a nationally recognised Marine Protected Area, known as Velondriake (which means "to live with the sea"). The locally managed marine area (LMMA) is governed by the Velondriake Association, an elected body which represents the 24 local villages, and three regional sub-committees. Velondriake is regulated by a dina — a locally developed set of laws that has been ratified in court to become a local by-law. The dina has a hierarchical system of enforcement where most conflicts are resolved and sanctions for rule infractions applied at the local level, with opportunities to escalate unsettled disputes to the Velondriake Association and magistrate's court (Andriamalala & Gardner, 2010). Graduated sanctions are used to address non-compliance, reflecting both the nature of the offense and local incomes. For example, the fine for fishing with poisons is higher than the fine for fishing with beach seine nets, as the impact of poisons is considered to be far more severe.

The combination of scientific monitoring, traditional ecological knowledge, and local control over management decisions has been instrumental for building community support for conservation. The LMMA has incorporated a growing number of marine management practices as it has evolved, and now includes seven permanent marine reserves protecting critical coral reefs and mangroves (totalling 2.3 km2) and numerous sites with temporary closures on reef flats (primarily for octopus) and in mangroves. These are embedded within an area of ~600 km2 with gear-based restrictions, notably prohibiting the use of destructive poison and mosquito net fishing gears (Gardner et al., 2020). The LMMA has been supported by a diversified funding model, drawing support from a range of donors and local revenues from alternative livelihood activities introduced by Blue Ventures and partners, including aquaculture, beekeeping, community-based tourism, and blue carbon.

By Gildas Andriamalala and Jenny Oates

Lesson 4

EMBRACE EQUITY, RIGHTS, AND JUSTICE

Ensure that conservation policies and strategies represent the voices, values, and needs of local communities

Although coral reef conservation is critically important for maintaining the structure and function of coastal ecosystems, and the ecosystem services they provide, conservation processes and outcomes are invariably linked and influenced by a wide range of social and environmental issues. Climate change is one of the leading threats facing marine ecosystems and has already had a devastating effect on some coral reefs (Hughes et al. 2018). Lack of participation by women in governance

processes, meanwhile, can contribute to systematic underestimates of fish harvests, gaps in knowledge about the structure, function and conditions of ecosystems, and failure to achieve conservation goals (Lawless et al 2022; Kleiber et al. 2015). On the contrary, participation of women can strengthen local governance and encompass areas (e.g., fringing reefs) and fishes that are often underestimated yet important for domestic food security (Fabre 2021; Thomas et al. 2021). Colonial processes have shaped, and continue to influence natural resource governance (Domínguez and Luoma 2020; Abimbola et al. 2021), meaning that these legacies continue to influence who gets to participate in conservation and governance, as well as how different types of knowledge, values, and perspectives are included and integrated in the design of conservation programs and activities[1] (Dawson et al. 2021, Fischer et al. 2021). This is important because research has shown that differences in demographics or economic disparities - within or between communities - can influence how people perceive benefits and costs of conservation regulations (McClanahan and Abunge 2018a; McClanahan and Abunge 2020).

The problem of coral reef governance is thus not only about the in situ conservation of biodiversity and ecosystem services, but rather part of larger equity, rights, and justice issues across different scales (Österblom et al. 2020). While on the one hand linkages between coral reef conservation and other complex and intersecting problems can create further challenges for conservation, they can also present unique opportunities to achieve synergies and ensure more efficient use of limited resources. There is growing evidence to suggest that efforts to protect and secure the rights of local and Indigenous communities to use and manage resources may offer one of the most promising pathways for advancing biodiversity conservation (Cinner et al. 2016; Jones et al. 2017, Schleicher et al. 2017, Garnett et al. 2018, ICCA Consortium 2021).

There are several moral and instrumental reasons to support calls for pursuing justice in conservation. First and foremost, fair governance is a moral imperative. Pursuing just conservation involves recognizing and respecting the rights that sustain human wellbeing and dignity (Martin 2017, Schreckenberg et al. 2016) and helps redress power imbalances and other legacies of colonialism (Martin et al. 2016). From an instrumental perspective, justice is a means to achieve conservation objectives. People's perceptions of justice influence emotions, attitudes, and behaviors (Tyler 2015), and therefore influence levels of support and compliance with conservation rules and ultimately, its ecological and social outcomes (Martin 2017, Pascual et al., 2014; Tyler, 2015). Multiple studies have shown how perceived injustices lead to anti-environmental behaviors and social conflicts, rendering conservation ineffective (Mariki et al. 2015, Raycraft 2020).

Conservation stakeholders can support the pursuit of justice through actions and activities at multiple levels. First, at the local level it is important to recognize and support local governance which helps to ensure benefit-sharing mechanisms and decision-making processes are suited to the socio-cultural context, and perceived as fair by local actors whose voices are often overlooked (Bennett et al. 2021). This is crucial because local actors' notions of what constitutes a fair distribution of benefits or decision-making process and perception of success and failure, can differ from those embedded in the conservation sector (Martin et al. 2014, Gurney et al. 2021a). At a broader scale, recognizing and supporting community-level governance fosters equity in the global conservation system, because it can lead to increased acknowledgment and respect for the diversity of human-nature relations, including knowledge, values and forms of stewardship, challenging powerful values and knowledge systems that are institutionalized in conservation (Gurney et al. 2021b). Further, support for community institutions and decision-making can advance distributional justice at the level of the global conservation system by alleviating the inequitable distribution of conservation benefits where burdens are primarily experienced by local communities, while benefits are shared globally (e.g., carbon sequestration) (Gurney et al. 2021b).

Finally, although support for local communities and their institutions is important for securing more just and equitable conservation, local governance systems often reproduce the underlying inequalities that exist within different communities and countries (Lawless et al. 2022). Depending on the context and nature of the relationship between communities and conservation stakeholders, addressing underlying power inequalities that produce and reproduce injustices in conservation decision-making may be warranted (Ruano-Chamorro et al. 2021). For example, power inequalities may arise between communities and external conservation actors (e.g., donors, NGOs, government, etc). Addressing these inequalities, including through developing legal frameworks that legitimize alternative knowledge and plural value systems in conservation will be critical to advancing conservation justice through supporting local institutions (Guibrunet et al. 2021).

Governance in Action: Empowering Women in Fijian Fisheries Governance

In Fiji, the Wildlife Conservation Society (WCS) has led several efforts in recent years to recognize the important role that women play in local fisheries, supporting local livelihoods, the economy and health of communities. Although the role of women as gleaners of nearshore invertebrates and seaweed is widely acknowledged, women in Fiji harvest over 100 different species of fish in a wide variety of habitats (Thomas et al. 2021) and make significant contributions

1 A fulsome discussion of colonialism is beyond the scope of this paper but we want to emphasize that we have raised these issues as a call for further inclusive dialogue towards justice in conservation.

to household subsistence and earnings through sales at local markets (Vitukawalu et al. 2020; Thomas et al. 2020). These contributions are, however, rarely identified or acknowledged as a result of gender-blind data collection and reporting practices that fail to provide details about the role of women in fishing and supply chains. The systematic underrepresentation of women in fisheries contributes to a lack of participation of women in management and decision-making processes (Vitukawalu et al. 2020; Mangubhai and Lawless 2021). Although many women in Fiji indicate that they are able to participate in fisheries management and conservation decision-making processes, they also indicate that they rarely share their opinions in meetings or hold leadership positions.

WCS Fiji has worked closely with donors, university researchers, and community partners to develop a better understanding of the role of women in fisheries and management. As women are the main participants and users across certain marine habitats in Fiji (Thomas et al. 2021), the lack of meaningful participation of women leaves important governance gaps in knowledge about the conditions of different species and the broader coastal ecosystem. Excluding the ideas and insights of women also creates barriers for institutional innovation and adaptation to extreme events such as tropical cyclones (Thomas et al. 2019). WCS is working to mainstream gender equity and social inclusion in fisheries management and conservation by encouraging international organizations, including the Food and Agricultural Organization of the United Nations (FAO) and governments around the world, to collect and share information on women's participation in fisheries, and advocate for the development of policies and practical tools for ensuring that women have a space to meaningfully participate in fisheries management and conservation decision-making across different levels (i.e. local, national, international) and activities (i.e. fishing, policy, research). Empowering women in governance can help ensure that diverse perspectives, knowledge, and approaches are recognized to address pressures facing coral reefs and ensure sustainable practices.

By Sangeeta Mangubhai, Mark Andrachuk, and Graham Epstein

Lesson 5

MONITOR AND MANAGE

Invest in adaptive management to measure progress, detect and address threats as early as possible, and advance understanding for a changing world

The problem of coral reef conservation is invariably complex and dynamic. Not only do outcomes depend upon interactions among a wide range of social, ecological, and institutional factors (Ostrom 2009; Barnes et al. 2019; Gurney et al. 2019), but these factors and their effects on conservation change over time (Leenhardt et al. 2017; Cinner and Barnes 2019). In some cases these changes can be rapid, as in the case of hurricanes that can cause damage to corals and affect the abundance of at least some species (Price et al. 2021) and the livelihoods of local communities, often with disproportionate impacts on the most vulnerable members of these communities, such as women, the poor, and other marginalized groups (Elliott and Pais 2006; Román et al. 2019; Thomas et al. 2019; Mangubhai et al. 2021). In other cases, such as the development of human and/or social capital, changes tend to occur more slowly, but can have profound impacts on the ability of groups to successfully self-organize to address coral reef conservation problems (Gutierrez et al. 2011; McClanahan and Abunge 2018b). For conservation planners and researchers, knowledge about the status and trends of coral reefs, the people that use them, and the rules that govern their interactions with coral reefs and each other are critically important for identifying emerging threats and advancing understanding of strategies for addressing them.

There have been a growing number of efforts in recent years to build capacity, tools, and resources for long-term social-ecological monitoring. The Marine and Coastal Monitoring (MACMON) Framework developed by the Wildlife Conservation Society, represents one of the first attempts to operationalize the social and ecological elements of Elinor Ostrom's expanded design principles. The MACMON framework combines standard coral reef monitoring techniques to assess reef conditions and fish biomass with household surveys and key informant interviews to collect information about the socioeconomic conditions of communities and the governance of local reefs (Gurney et al. 2019). The program has collected and stored data from

seven coastal countries in Africa, Asia, and the Pacific and is in the process of using this information to provide guidance about how MPA's and OECMs can contribute to biodiversity conservation and support local livelihoods. Similar efforts are underway at the WWF, who are in the process of developing and launching their aptly named Elinor Tool for tracking a broader range of conservation initiatives.

Long-term support for social-ecological monitoring is an essential ingredient for efforts to secure long-term biodiversity conservation and sustainable local livelihoods. Social-ecological monitoring systems, particularly those that integrate scientific, local and traditional knowledge, can help groups to anticipate threats to the sustainability of local ecosystems and develop strategies for addressing them (Boyd et al. 2015). Supporting community-level governance of coral reefs means ensuring that community actors help develop and have access to these monitoring systems and can use them to inform governance tools. Long-term social-ecological monitoring programs that collect data at regular intervals, meanwhile, provide mechanisms for tracking trends in social and ecological conditions, assessing progress towards conservation, policy and community objectives, and help to avoid issues with shifting cognitive baselines by maintaining records over time (Bolster et al. 2012). Finally social-ecological monitoring systems that provide a long-term perspective of the evolution of social-ecological systems and representation of diverse social, ecological, and institutional contexts can provide a critically important foundation for research on the design and development of institutions for addressing mounting sustainability challenges.

Recommendations

To achieve effective and equitable coral reef governance through collaborative and community-led approaches, our recommendations build on the core foundations of strong communities (the Ostrom design principles) and the subsequent lessons that can help share and scale these governance successes. To conclude our whitepaper, the following actions can be taken by philanthropic foundations, conservation organizations, governments, and other stakeholders with the goals of providing funding, establishing conservation and governance priorities, and promoting enabling policy changes.

1. REBUILD AND STRENGTHEN LOCAL INSTITUTIONS

Ensure support, resources, and partnerships for co-development of conservation initiatives with local communities

Recognition of the importance of customary and Indigenous practices is a starting point for supporting the rights of communities living near coral reefs to use and participate in the management of local resources. Providing resources and support can occur at the national level through legislation and programs that ensure that protected areas (e.g., MPAs) and other conservation initiatives are co-developed and generally supported by communities. The resurgence of local institutions and governance approaches can also be supported by investing in activities that remove policy and regulatory barriers that limit incentives and opportunities for local communities to participate in the sustainable and nature sensitive management of local coral reefs (e.g., OECMs) (Wabnitz et al. 2021). In some instances, this should involve active development of partnerships that promote Indigenous and traditional control and management of MPAs and other reef management tools.

We offer several examples of how external organizations may support this resurgence. First, external organizations can support local communities and their role in coral reef and conservation governance by encouraging the adoption of supportive government legislation, policies, and programs. Second, there is a need for the development of tools and training resources that enhance opportunities for local actors to participate in decision-making processes and ensure that these processes are fair (Ruano-Chamorro et al. 2021). Such tools may include funding or material support for fisher associations or community councils that facilitate greater community participation, such as Blue Ventures' community health programmes. It is also worthwhile to explore existing mechanisms that can be unlocked to channel funding towards these tools, such as village development funds, and climate or disaster risk funds. Third, any efforts to nudge groups away from harmful practices (e.g., dynamite fishing) need to be locally-led, place-based, culturally appropriate, equitable, and sensitive. That is, tools and approaches should be adequately contextualized in order to promote the adoption of more sustainable practices. Fourth, it is important to identify local leaders that are highly regarded and respected by local community members. Any efforts to support local leaders should be done with an understanding of what local leadership is and the importance of cultural differences around its definition, how it manifests, and what is needed to support it (Kenny and Fraser 2012; Straka et al. 2018, Glory 2021).

2. PLAN FOR LONG-TERM FUNDING

Design long-term funding mechanisms to directly support local communities and organizations, such as empowering local NGOs

While maintaining the emphasis on community institutions and community-led or co-led governance, funding programs can be most effective when they extend beyond typical three- to five-year cycles. Effective funding programs will need to have built-in capacity for year-to-year administration as well as adaptability to respond to rapidly emerging crises (i.e., hurricanes, coral bleaching, external fishing pressure, rapid changes in markets). A critical issue is moving from piecemeal project funding to programmatic, base funding that ensures development of additional, diversified revenue streams to support communities and other conservation partners (Murphy et al. 2021). Project Finance for Permanence (PFP) is an example of an initiative for

generating full, permanent funding for conservation areas. An early assessment of PFP pointed to some pragmatic lessons that can be drawn for coral reef conservation, including how to gain funder and political buy-in, identifying the main steps in the funding process, and how to mitigate risks. Another initiative with promise (and challenges) is blended finance mechanisms such as the Global Fund for Coral Reefs (GFCR) that can be explored for meeting longer-term goals for coral reef conservation. Other alternative funding arrangements include designing funding sources to better meet the needs of local organisations that can use it most effectively. Continuing to strengthen and identify ways that local communities can effectively use global funds is a crucial need in the conservation community, such that promising local organisations are not seen as 'too small' or 'risky' from global funding initiatives.

In addition to the form and duration of funding, this whitepaper also emphasizes the importance of investing in innovation and diverse coral reef management strategies. There is opportunity to look and listen for local, community-led innovations and strategies that draw on coral reef resources while also protecting them for long term use (Cohen et al. 2016; Mcleod et al. 2019). New avenues for private finance to contribute to coastal recovery hold great potential, particularly if they recognise the interconnections between coastal habitats e.g. the role mangroves play as nursery grounds and water filters for adjacent coral reefs. One example is the Ocean Risk and Resilience Action Alliance, which aims to drive $500 million of investment into nature-based solutions by 2030 by pioneering innovative finance products such as reef insurance. Philanthropic and government funding can play an important role in the incubation and proof of concept stages for such innovations, before projects can attract private investment.

3. SHARE DIVERSE VOICES AND EXPERIENCES

Create platforms to share diverse stories from the frontlines of conservation and climate change

Community stories can be very powerful. Storytelling from the people who live near and depend on coral reefs can showcase the experiences of those on the frontlines of climate change and centre local leaders and Indigenous voices. The questions become who are the audiences for these stories and what types of platforms are most suitable? For instance, reaching national and international audiences (e.g. policy makers and conservation funders) can be accomplished through web-based platforms that include StoryMaps, video, facilitated panel discussions, and podcasts. Engaging people living in the vicinity of a reef (e.g. to share lessons or engage youth) may be better accomplished through events at schools, through books in local languages, or small workshops. Essential to any communications program is to ensure that both the platforms and stories are co-designed by the people whose voices are being promoted. To cultivate a diversity of voices, it is important to identify and support communications training, tools, and campaigns for emerging reef heroes and storytellers as they speak up for positive change and a future for their coral reefs.

4. ENSURE DIVERSE KNOWLEDGES FOR DECISION-MAKING

Connect communities by supporting networks that share knowledge, challenges, and successes

This whitepaper has promoted the importance of local, community-led governance, but there is also recognition that any local governance can fail without sufficient multi-level, multi-dimensional support (Morrison et al 2020). Decision-makers at regional, national, and international levels need to see the value in supporting communities living near reefs, and they need to make decisions that are informed by the best available science. There is no doubt that economic, environmental, and political trade-offs are inherent in governance. As ecosystems are critically important for broader marine sustainability (Morrison et al. 2019), trade-offs involving coral reef conservation ought to be well informed.

The Chilean Fisheries Learning Network that was profiled in this whitepaper illustrates one means of sharing information through a network of actors. Another example for sharing knowledge and experiences between communities and experiences for local management of coral reefs is the Locally-Managed Marine Area Network (LMMA Network). Support for these types of initiatives can greatly enhance the ability of scientists and local experts to transfer their knowledge to decision-makers at higher political levels. The intent here is not to wash over science-policy translation issues, but to identify some pathways that can enable effective communications between these actor groups.

5. MONITOR PROGRESS TOWARDS SOCIAL AND ECOLOGICAL OBJECTIVES

Develop and implement tools for long-term social-ecological monitoring of community-based coral reef conservation

A strong theme in this whitepaper has been the importance of socially just and collaborative governance of coral reefs. Any monitoring and evaluation of reef conservation programs needs to consider the extent that processes are sensitive to community contexts and impacts, and measure whether the outcomes bring social-ecological benefits for communities in addition to conservation wins. Extending beyond scientifically sound and robust ecological monitoring, practical social and economic monitoring is critical for practice and research that can inform adaptation of governance approaches. It is important to embed holistic monitoring and ongoing management costs and responsibilities within government and community plans, budgets, and programs to ensure lasting change.

There are several examples in recent years that build knowledge and capacity for governance through investments in long-term social, ecological, and institutional monitoring programs. One example is the MACMON monitoring framework that is being used in seven countries in Africa, Asia, and the Pacific. MACMON is a social-ecological systems monitoring framework, which uses underwater surveys and questionnaires with households and experts (Gurney et al. 2019). Another example is Elinor, which helps stakeholders assess the management, governance, and equity status in areas under protection or management, and includes a tool for data collection, storage, and visualisation. A third example is the Marine Ecological Research Management AID (MERMAID) platform that provides real-time ecological data that can support science and rapid action for management. Investment in, and further refinement of, these types of monitoring programs, and attempting to blend social and ecological platforms, can bring multiple benefits for coral reef conservation and the people who depend on them.

Conclusions

The current status and projected declining trends for coral reefs offer compelling reasons for catalyzing, building, strengthening, and supporting the adaptation of coral reef governance at multiple levels to address local and global pressures. To strengthen community-based governance, conservation organizations, funders, and governments can play a critical role in these efforts by providing financial and technical support, and ensuring the enabling conditions of policy and legislation. Successful efforts require meaningful involvement, support, and co-design with the local communities who directly rely on reefs for their livelihoods.

The lessons and recommendations in this whitepaper offer several pathways for improving coral reef governance. These pathways are not meant to be prescriptive for addressing complex coral reef conservation problems across diverse social and ecological contexts. Instead they offer a suite of mechanisms for discussing and sharing with diverse and multiscale conservation stakeholders to ensure that governance systems and approaches align with the needs and values of local communities, the problems they are experiencing, and ultimately ensure the sustainable and equitable use of ecosystems.

Photos by: Alissa Everett, Tom Vierus, Erica Cunningham, Jenny Oates, Blue Ventures, Sangeeta Mangubhai, Emily Darling
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