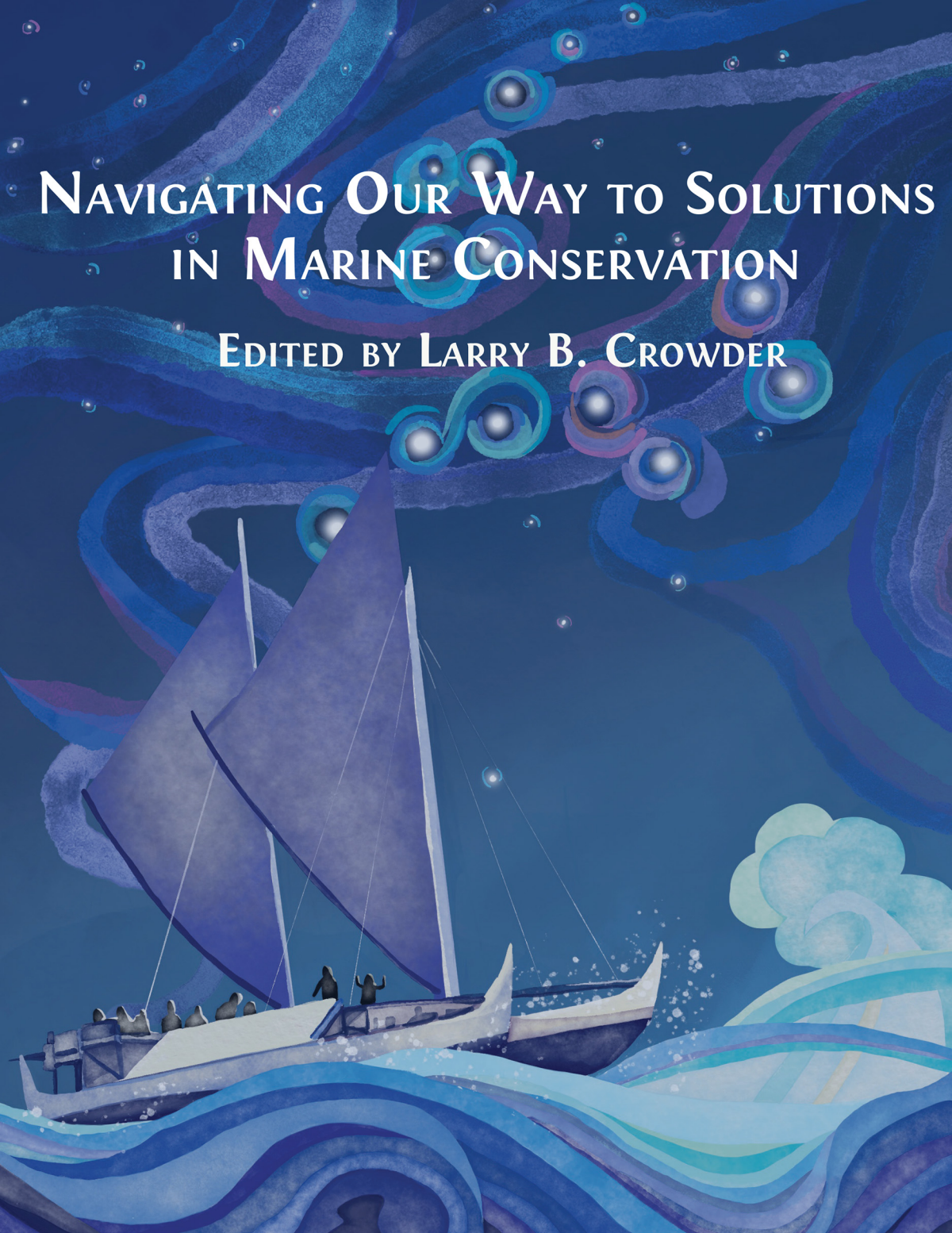
Navigating Our Way to Solutions in Marine Conservation

Edited by Larry B. Crowder



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6. Mainstreaming voluntary marine conservation programs: Insights from TURF-Reserves

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We dedicate this chapter to Benjamin Lagos who was the CEO of Fundacion Capital Azul and spent his life pushing for marine conservation with communities. He left us in May 2022 at 31. We will never forget your push and legacy.

The goal to create a sustainable world cannot be achieved without recognition of the pivotal roles of the oceans (United Nations Sustainable Development Goal 14 – Life under water). They regulate the Earth's climate and are a primary source of food, wellbeing, and spiritual connection for humans (Costello et al., 2020; Rudolph et al., 2020; IPCC, 2019). Increasing anthropogenic impacts, however, are compromising the ability of oceans to provide these services, which has motivated important discussions on the role that Marine Protected Areas (MPAs) can play in supporting healthy oceans (Edgar et al., 2014; Giakoumi et al., 2018). Key topics have included implementation, effectiveness, enforcement, and representation of current MPA systems, in addition to proposals for expanding the world's networks of MPAs (Sala et al., 2021; Barreto et al., 2020; Weekers et al., 2021; Fernandez et al., 2021).

While MPAs can be effective tools to protect and restore ocean biodiversity and associated services, only around 7% of the oceans have been designated or proposed as MPAs, and less than 3% of the ocean can be considered as fully or highly protected (Sala et al., 2021). Unfortunately, of all MPAs, many are considered 'paper parks': they have been legally designated but are not supplied with effective protection and stewardship, and efforts are falling considerably short of marine conservation targets (Fernandez et al., 2021). Low levels of effective protection and representation can be explained, in part, by conflict between protection and extraction stemming from perceived trade-offs (Langton et al., 2020; Grip and Blomqvist, 2020). Accordingly, increased buy-in is needed from local stakeholders for MPAs to be successful and scale up. Yet, communities are often reluctant to support new initiatives that promote MPAs, particularly if those initiatives are driven by top-down regulatory approaches (Bennett and Dearden, 2014; Gelcich et al., 2009; Oyanedel et al., 2016).

As MPAs have been established widely, it has become clear that incremental improvements in their implementation frameworks (e.g., increasing enforcement) may not be sufficient to achieve their goals (Edgar et al., 2014). New approaches are needed that enhance marine conservation, while also providing an important complement to MPA designation (Cudney-Bueno and Basurto, 2009; Gelcich and Donlan, 2015). If novel approaches are to be effective, they must be embedded within transformative processes that challenge pre-existing views on the relationships between humanity and the ocean (Gunderson and Holling, 2002; Olsson et al., 2008; Gelcich et al., 2010). New approaches must move beyond the dichotomy of protection versus extraction and provide marine conservation pathways to secure the continuity of plans to protect and restore our seas (Rudolph et al., 2020).

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Over the last decade, important insights into the processes and phases of social change have emerged from research focused on sustainable transitions (hereafter transitions; Turnheim et al., 2015) and social-ecological transformations (hereafter transformations; Gunderson and Holling, 2002). These insights, which draw from complex adaptive systems theory, can inform the development and mainstreaming of new approaches to marine conservation (Levin 1998; Preiser et al., 2018). From a social-ecological perspective, a transformation entails the capacity to create new governance systems when ecological, economic, or social structures make the existing system untenable (Walker et al., 2004; Gelcich et al., 2010; Table 6.1). Transitions can emerge when landscape pressures (e.g., population growth, technological change) result in the realization that existing regimes are inappropriate to address destructive pressures or achieve a set of broader goals that previously did not exist (e.g., effective and enforced coastal MPAs; Loorbach et al., 2017; Table 6.1). Despite differences, both concepts can aid in understanding and developing novel marine conservation approaches. Transformations and transitions highlight the key role of enabling conditions as a prerequisite for change (Herrfahrdt-Pähle et al., 2020; Olsson et al., 2006). In addition, a preparation phase is common in which niche innovations can arise as networks of innovators respond to changing conditions by designing systems that aim to respond to emerging pressures (e.g., non-compliance with top-down MPAs or lack of MPA representation; Table 6.1). Understanding the conditions for the scalability of niche innovations in the wider landscape is critical, as are the presence of windows of opportunity that can aid in the institutionalization of a new regime or approach.

Table 6.1 Working definitions of key concepts.

Concept	**Working Definition**	**Supporting References**
Social-ecological Transformation	The capacity to create fundamentally new systems of human–environmental interactions and feedbacks when ecological, economic, or social structures make the continuation of the existing system untenable. It involves multiple elements, including agency, practices, behaviors, incentives, institutions, beliefs, values, and world views and their leverage points at multiple levels.	Folke et al., 2010; Moore and Milkoreit 2020.
Socio-technical transition	A multi-dimensional shift from one socio-technical system to another involving changes in both technological and social systems that are intrinsically linked in a feedback loop. Transitions emerge from a specific constellation of conditions that interact in complex ways when landscape pressures result in a realization that existing socio-technical regimes are inappropriate to address potentially destructive pressures or achieve a set of broader goals that previously did not exist.	Geels and Schot, 2007; Geels, 2010.
Niche Innovation	Novel approaches through which sectors or stakeholder communities interact with or produce goods from a social-ecological system in response to landscape pressures.	Rudolph et al., 2020
Environmental Stewardship	Actions taken by individuals, groups, or networks of actors to protect, care for, or responsibly use the environment in pursuit of environmental and/or social outcomes in diverse social and ecological contexts.	Bennett et al., 2018

In this chapter, we explore elements of enabling conditions, scalability, institutionalization and mainstreaming of a niche innovation associated with an initiative aimed at improving MPA representation and effectiveness in coastal zones. By examining the factors and processes that underlie transformations/transitions, we present a heuristic for supporting new marine conservation approaches. This heuristic is an approach to problem solving that uses a practical method or various shortcuts in order to produce solutions and allow learning. We ground our analysis in the implementation of TURF-reserves (Costello and Kaffine, 2010).[2] As a pathway toward marine stewardship and improved economic opportunities for artisanal fisher communities, TURF-reserves spatially integrate two widely used management and conservation strategies: Territorial Use Rights for Fisheries (TURFs) and fully protected MPAs. We use a TURF-reserve program in Chile as a case study to provide empirical evidence on the benefits of the approach. Like other conservation interventions (e.g., MPAs or development funds), TURF-reserves can change fishers' short-term behavior. Without a deeper understanding of the conditions that lead to transformational change, however, there is a risk that the system might revert to less desirable and sustainable behavioral patterns in the event of social or environmental shocks. Based on transition and transformation theory, our heuristic can aid in developing resilient TURF-reserve networks or alternative pathways to those of MPAs decreed and managed by a government. In the following section, we discuss the key elements of our proposed heuristic, which is aimed at supporting the development and implementation of novel marine conservation initiatives.

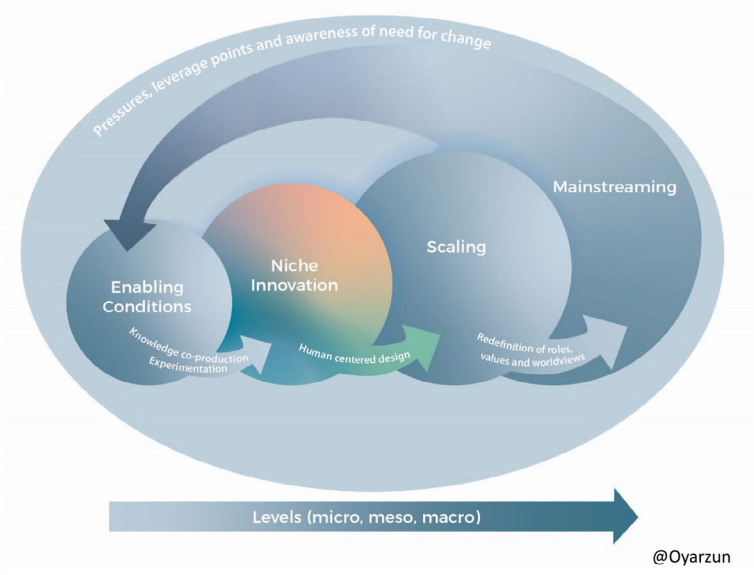

Fig. 6.1 Heuristic to support the development and implementation of transitions to mainstream novel marine conservation initiatives such as TURF-Reserves. The heuristic draws on Transformations and Transition theoretical insights (Table 6.1).

Niche innovation: TURF-reserve

Research on transitions and transformations emphasize the importance of fostering diverse forms of novelty and innovation at the micro level, supported by the creation of *transformative spaces*. These niche innovations allow for experimentation with new mental models, ideas, and practices that could help shift societies towards more desirable pathways (Loorbach et al., 2017; Pereira et al., 2018). Fishers, practitioners and scientists have

2 Territorial Use Rights for Fisheries (TURFs) are a spatial form of property rights in which individuals or a collective group of fishers are granted exclusive access to harvest resources within a geographically defined area (Christy, 1982). We define a TURF-reserve as a marine reserve (i.e., no-take zone) established within a TURF.

been promoting the creation of TURF-reserves along coastal zones (Costello and Kaffine, 2010; Gelcich and Donlan 2015). The establishment of TURF-reserves could increase artisanal fishers' livelihood opportunities and support for MPAs by allowing them to become active participants in conservation, as well as to benefit from potential dividends associated with the creation of a reserve within their exclusive access rights. For example, fishers could capture the benefits of adult spillover or larval dispersal, depending on species and the size of the area (Barner et al., 2015; Lester et al., 2017). TURF-reserves could also generate opportunities to develop new business models (Gelcich and Donlan, 2015). Specific place-based design and implementation of TURF-reserve programs represent niche innovations that challenge and complement mainstream MPA conservation strategies.

Modelling suggests there is potential for improved fishery management outcomes and higher profits with TURF-reserves under certain circumstances (Costello and Kaffine, 2010; Oyanedel et al., 2018). For instance, TURF-reserves could be more effective than TURFs alone to balance fisheries and conservation goals, depending on species mobility, TURF size, and fishing intensity outside the TURF-reserve (Lester et al., 2017). An important caveat is that dispersal of target species will often be greater than the scale of the management of the TURF-reserve (Costello, Quérou, and Tomini, 2015). Nonetheless, bioeconomic modeling suggests TURF-reserves could aid in recovering economic and conservation targets (Yamazaki et al., 2015).

Practitioners are implementing TURF-reserves across many geographies. A review of 27 existing TURF-reserves suggests that they can be developed under a wide range of artisanal fishery settings (Afflerbach et al., 2014). In some places, they have been implemented where no previous rights-based system exists and, therefore, its establishment creates strong incentives for engagement (Smallhorn-West et al., 2020). In many other areas, reserves are being implemented in previously established TURF systems. Irrespective of history and geography, it is critical to understand the transition towards fishers' new role in conservation, to anticipate their capacity to deal with new associated challenges, such as increased enforcement costs, conflicts from poaching, lack of enforcement support, or ineffective sanctions to outsiders (Davis et al., 2017).

Enabling conditions

Simply specifying spatial access rights alone will not provide all the enabling conditions for TURF-reserves to scale (Gelcich and Donlan, 2015). Rather, TURF-reserves must be designed within a setting that has the necessary social and ecological conditions that can allow the approach to be successful (Sorice et al., 2018). For example, the combination of fishing associations and TURF policy creates use rights, strong local governance, and a stewardship ethic. That same combination creates the opportunity to increase biodiversity by boosting enforcement and creating marine reserves inside TURFs. In addition, the level of coordination among fishers will likely influence the performance and acceptance of a program. Active participation and empowerment within small-scale fishers are also enabling conditions (Herrfahrdt-Pähle et al., 2020).

If biodiversity benefits are an explicit objective of TURF-reserves, then latent biodiversity outcomes must exist that can be realized through behavioral changes, and those benefits must be protected against external pressures (Gelcich and Donlan, 2015). In TURF-reserves, fishing associations will often need to regularly conduct surveillance and enforcement activities to prevent poaching (Oyanedel et al., 2018). Enforced MPAs often achieve conservation goals, and, in some cases, may also increase the resilience of surrounding fisheries and enhance local catches (Lester et al., 2009). Latent biodiversity benefits are likely in many TURF-reserve systems, which can be realized through programs that incentivize behavioral changes by participating fishers.

In sum, it is important to understand the foundations on which levels of governance, coordination, participation, and empowerment can create the enabling conditions to design, prototype, and mainstream TURF-reserves (Figure 6.1). Methodologies from social and ecological science can help assess and understand key gaps in enabling conditions. Biodiversity assessments and impact evaluations based on counterfactual thinking and the study of actors' perceptions can provide insights from an ecological and social perspective,

respectively. Perceptions is an umbrella term that includes interests, social values, experiences, interpretation, and evaluation (Gelcich and O`Keeffe, 2016; Bennett, 2016). Although perceptions are not necessarily objective, individuals' subjective perceptions can become their truths (Munhall, 2008). Accordingly, considerations of perceptions towards TURF-reserves become more important as marine conservation increasingly depends on the actions of interested groups of actors (de Groot and Steg, 2009).

Scalability and sustainability

Receiving less attention than implementation, scaling and sustaining TURF-reserves will require integrating needs and preferences of fishers whose behavioral change will result in sustainable outcomes (Sorice et al., 2018). The value of a TURF-reserve program will depend on participants' perception of benefits. Because TURF-reserve programs most often rely on voluntary engagement, they will only be successful if individuals choose to participate. Understanding the preferences of potential participants can enhance program design by specifically addressing place and culture (Manzini 2015). In addition to external rewards (e.g., income), program desirability can increase when it incorporates aspects such as trust and belonging, as well as supporting basic human needs (Chan et al., 2015, Deci and Ryan 2008). A greater focus on program desirability can help understand the potential of TURF-reserves to scale and increase participation by engendering feelings of empowerment and serve as a motivator for sustained environmental stewardship (Bennett et al., 2018; Fig 1).

Although addressing the scalability of programs beyond single communities is key to achieving sustainability, it is still rare in marine conservation and TURF-reserve design. In Chile, researchers explored scalability as a predicted probability of fishers to participate in TURF-reserve programs, focusing specifically on different program factors and beliefs such as contract characteristics, expected resource increases, and enforcement requirements (Sorice et al., 2018). Results demonstrate the importance of small design choices for scalability. However, it also stresses the need to advance research from the program user's perspective, in order to assess and inform the broader program design.

Scalability of TURF-reserves depends on the ability to understand the social values associated with biodiversity, as well as resolving potential trade-offs between different interests (Scarano 2017). The importance of understanding stakeholders' values associated with marine reserves and integrating them into decision-making is widely recognized (Barreto, et al., 2020, Rasheed & Abdull, 2020). Therefore, scalability depends not only on social, economic and ecological priorities in specific areas, but also on how conservation programs align with social values at regional and national scales. For example, lack of political or public support for financial schemes for conservation programs could undermine the scaling of successful local projects (Kettunen et al., 2017).

Mainstreaming and institutionalizing a new program

TURF-reserves can emerge as isolated niche innovations which can then scale (Smallhorn-West et al., 2020, Gelcich and Donlan, 2015). However, for a transformative process to occur, TURF-reserve programs must be mainstreamed and become a well-supported complementary alternative to government-managed MPAs (Barner et al., 2015). That support must not come only from local coastal communities, but also from government agencies. This dynamic process must be informed by changes in wider values, frames, and worldviews of wellbeing, sustainability, and the role of civil society in coastal conservation. As such, it must replace less effective political, economic, and social institutions. The list of challenges to mainstreaming TURF-reserves is a long one: resolving coherence between regulatory frameworks, coordination, clarity, outdated regulatory assumptions, conflict over allocation of space and rights of access to resources, inadequate monitoring and enforcement (Sorice et al., 2018; Davis et al., 2017), lack of inclusivity, and inequity in the distribution of ecosystem service benefits (Brain et al., 2020; Sorice & Donlan 2015). Tackling these challenges will require capacity-building and alternative narratives. A purposeful shift towards governance for TURF-reserves is required to address these

challenges and mainstream programs (Figure 6.1).

In practical terms, mainstreaming new governance models for TURF-reserves will entail a process in which decisions are taken by new or reformed actors in novel settings (Afflerbach et al., 2014). Accordingly, new social-ecological feedbacks will become established (Moore et al., 2014) and the implementation of novel governance regimes must be monitored and fine-tuned to ensure legitimacy and avoid unintended consequences (Westley et al., 2013). Key aspects to consider include exploring the changing role of existing actors and the inclusion of new actors within a TURF-reserve system, as well new decision-making processes.

Application of the heuristic: The Chilean TURF-reserve pilot

In Chile, a TURF policy has been in place for over three decades and there are hundreds of active TURFs along the coast (Gelcich et al., 2019; Figure 6.2a). They form a substantial part of the coastal seascape in Chile: they tend be ~100 hectares in size, surrounded by open access areas, and ~2-5 kilometers away from the next adjacent TURF (Gelcich et al., 2010). To be granted a TURF, artisanal fisher associations must undertake a baseline study of the area and develop management plans that need to be approved by the government (Aburto et al., 2013). Surveillance and enforcement by the association is required, and it is forbidden to extract any benthic species not included in the management plan. The use of TURF fishing associations is part-time. That is, diving for benthic resources is usually restricted to a few times a month and the extracted resources are around 10–30% of total income for an association (Gelcich et al., 2017).

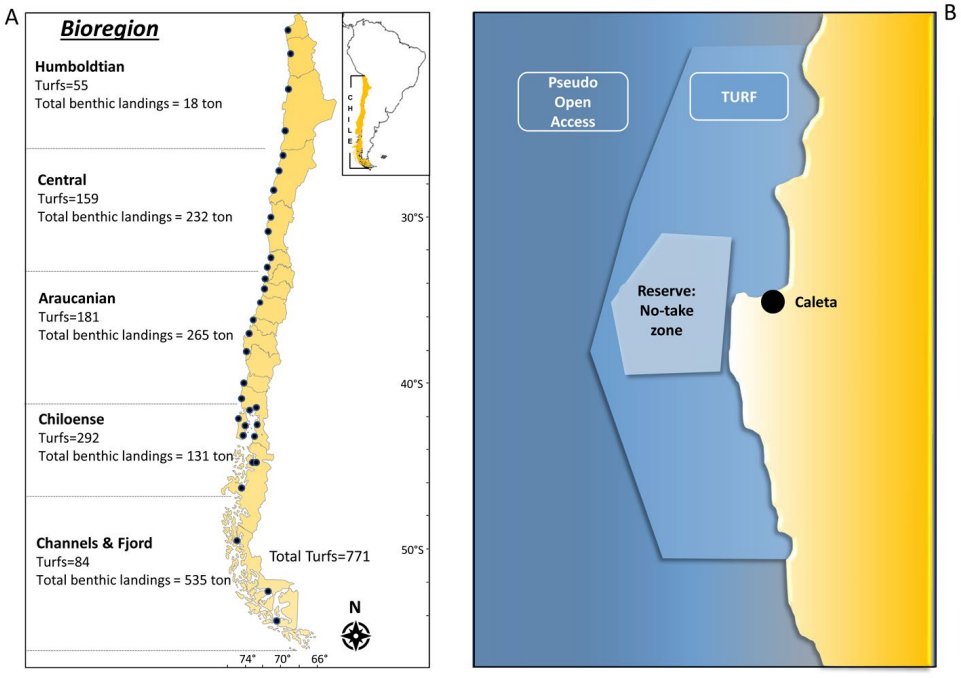

Fig. 6.2 (A) Some of the over 700 TURFs along the coastline of Chile showing coverage and benthic resource landings of all bioregions in Chile. (B) TURF-reserve niche innovation which compensates Chilean fishing associations annually for setting aside a portion of their formal fishing grounds as a no-take reserve alongside their landing port, known as "caleta" (Adapted from Sorice et al., 2018).

A series of studies have assessed both the social and ecological enabling conditions necessary to design a voluntary conservation program that could incentivize additional biodiversity benefits through TURF-reserves (Villaseñor-Derbez et al., 2019, Gelcich and Donlan 2015; Figure 6.2B). In essence, existing TURF policy creates use rights, governance structures, and a stewardship ethic (Crona et al., 2017). That same combination creates latent biodiversity and enforcement benefits. That is, increasing enforcement and creating a marine reserve

within a TURF should produce marine conservation benefits and associated ecosystem services (Gelcich et al., 2019). Research also documents the presence of enabling conditions in the form of increased social capital (Marin et al., 2012; Crona et al., 2017). TURFs alone already facilitate conditions for the development of enforcement capacity and the internalization of social norms (Gelcich et al., 2013). Further, participation in TURF programs create positive shifts in fishers' environmental perceptions (Gelcich et al., 2008). It is also common in Chile for fishers to design and implement surveillance programs and rules for resource management, both of which are sustained by active stakeholder participation. The resulting benefits are both perceived and valued by TURF members (Gelcich et al., 2009). In sum, empirical evidence suggests that additional biodiversity benefits would be generated if a fishing association enters into agreement to set aside at least 15 hectares of its TURF as a no-take marine reserve and agrees to conduct anti-poaching surveillance (Gelcich et al., 2012). The enabling conditions are often present for such a program to be successful.

Recognizing that enabling conditions were in place, a conceptual model for a voluntary incentive program associated with TURF-reserves was developed (Gelcich and Donlan, 2015). A pilot of the program was co-produced with two fishing communities in an iterative learning process which was context-based, pluralistic, goal-oriented, and interactive (Nostrom et al., 2020; Figure 6.3A–B). Early on, a key aspect of the program that needed to be developed related to enforcement technology. A Chilean technology company provided land-based surveillance cameras, technology, and data which is shared by fishing communities. This provides the community with an additional surveillance tool, while providing the program with a means of assessing compliance. A biodiversity and fishing monitoring program to track the impact of the program, which included control sites, was implemented with the fishing associations (Figure 6.2C). With funding from U.S. foundations, the niche innovation was piloted for several years while social science research was conducted to make design changes so as to better align fishers' perspectives and needs in order to begin address the scalability challenge.

To address the challenge of scaling, a human-centered approach was used to design the program (Sorice and Donlan 2015). Focus groups, surveys, and stated-choice experiments helped understand and quantify fishers' preferences on different aspects of a TURF-reserve program, such as the contract length, payments, perceived benefits, types of surveillance systems (e.g., land-based video surveillance), and biodiversity monitoring requirements. Doing so allowed the design of a program that was highly desirable, as well as to identify highly undesirable program structures. For example, while financial incentives serve as a relatively strong factor to encourage a fisher to opt-in to a TURF-reserve program, their ability to do so substantively diminishes as attitudes become negative, trust decreases, and dependence on fishing decreases. In fact, results suggest that those financial incentives alone are insufficient to attract enough participation by Chilean fishers to scale the program and deliver significant environmental benefits (Sorice et al., 2018). In addition, fishers' willingness to participate differs if program funding comes from revenue generated from sustainable seafood, industry interested in offsetting their environmental impacts, or the philanthropic sector. Fishers prefer programs that are funded by offsets or philanthropy compared to sustainable seafood sales. Participation also differs, by as much as 30%, by how familiar fishers are with TURF-reserves programs. These results help to define programmatic design changes that may improve program desirability and thus participation as the program scales. In parallel to designing the program through the lens of the users, research was conducted around assessing sustainable financing models to be able to better scale the program.

In 2019, efforts towards mainstreaming TURF-reserves were formally established through the creation of the Chilean NGO Capital Azul. The NGO is focused on managing, scaling and mainstreaming the TURF-reserve program in Chile. Supported by a board and program partners, Capital Azul maintains new and existing relationships with fishing communities, supports surveillance activities, and conducts the annual monitoring of the reserves alongside fisher association divers. The marine reserve program currently consists of a network of five reserves in central Chile. Only 200km from the capital Santiago, this region is one of the mostly densely populated in the country, with no national marine protected areas. Thus, the network informally complements the existing national protected area network and serves as a high-visibility example of a voluntary conservation

program to the hundreds of thousands of Chilean tourists that visit the region during the summer months.

While results from surveys of over 250 fishers demonstrate general support about the benefits of the program, there is still little quantitative evidence of wide changes in ecosystem state and, ultimately, coastal fisheries resources. Annual monitoring of the areas (and control sites) is underway to examine the impacts of the TURF-reserve program, and preliminary results suggest positive impacts. But TURF-reserves are still too young for strongly discernible changes in species richness and abundance to have occurred.

In parallel with the Capital Azul program, the institutionalization of TURF-reserves is underway in Chile (Fig 6.3C). With the support of university academics and Foundation Costa Humboldt, Capital Azul recently recommended, through the formal recommendation channels, a series of revisions to the proposed bill that will modify the General Law of Fishing and Aquaculture for Benthic Resources (Boletín N°12.535; Capital Azul, 2021). Recommendations were included in the new bill proposal, which now formally acknowledges actions geared toward conservation and allows for the establishment of reserves within TURF areas:

> Among the allowed management actions, the establishment of buffer zones will be considered in which extractive fishing activity on benthic resources will be restricted to agreements for the established purposes in the respective management plan, where duly justified research, monitoring, and other management actions may be carried out to ensure the sustainability of resources and their ecosystem. (Boletín N°12.535).

While the new bill proposal has not yet been passed by Congress, the above language is an important step in mainstreaming TURF-reserves in Chile (Figure 6.3D).

The scaling of the TURF-reserve program in Chile has allowed government to trigger changes about marine conservation. It is helping to produce a shift from species-centered to people-centered marine conservation approaches, and has given opportunities for civil society, beyond fisher communities, to connect with alternative ways in which conservation can be achieved. Accordingly, a vision of how positive biodiversity impacts can support the local economy have begun to transcend public resistance and civil society is slowly becoming a protagonist. Considering this, scientists, fishers, NGOs, local authorities, and other actors can subscribe to the same coastal conservation project, which is leading to the creation of wider networks of participation, a key aspect in legitimizing and mainstreaming novel marine conservation approaches.

Fig. 6.3 A) Participatory narrative building workshop drawing led by Capital Azul, B) Fisher leaders and Capital Azul TURF-Reserve co-design team meeting at Zapallar, Chile in 2019, C) Subtidal diversity monitoring, jointly between academics, practitioners and fishers in 2020 D) Meeting with government authorities in Maitencillo fishing cove as a way to address institutionalization and mainstreaming challenges E) TURF-Reserve model diagram used to inform the general public at each location.

Conclusion

Understanding transitions and transformations implies identifying capacities that tend to reduce the resilience of systems, and supporting the emergence of new, more desirable systems that confront path-dependencies, build capacities, and promote shifts towards sustainable pathways (Elmqvist et al., 2019; Olsson et al., 2017). More sustainable ocean systems will require other approaches that complement government-managed MPA approaches. TURF-reserves or other novel approaches should avoid the path dependency created by many MPA models. Our heuristic provides an approach to specify the dynamics of TURF-reserves by signaling key elements necessary for transformational change.

For alternative conservation approaches to be successful, many complex system components need to be dismantled and re-organized (Folke et al., 2021). This includes enabling conditions, capacities for change, and access to new knowledge. Without these components, niche innovations will not emerge, scale, or catalyze alternative pathways to MPAs. Consideration of the characteristics presented in our heuristic can support decision-makers and stakeholders in implementing TURF-reserves successfully. Institutionalizing TURF-reserves requires strengthening governance models at multiple levels (Herrfahrdt-Pähle et al., 2020). Local programs, with successful niche innovations, require organizing institutional arrangements and structural features for scalability (Carlsson & Berkes 2005, Ostrom 2005, Folke et al., 2005). In the case of Chile, the mainstreaming of successful TURF-reserve programs requires formal recognition and widespread changes in values and worldviews to accept TURF-reserves. Otherwise, niche innovations may be blocked by bureaucratic-administrative processes.

Thinking through the enabling conditions, scalability, and mainstreaming of TURF-reserve programs can provide key insights into mechanisms by which to avoid known pitfalls in the expansion of protected areas. First, enabling conditions allow the development of local communities' commitments in the management of MPAs (Collier et al., 2020). This promotes the establishment of learning networks that allow the concatenation of transforming experiences from one case to another (Berkes 2009). Second, ensuring that programs are designed with a fisher-centered approach entices associations to participate and protect areas in ways they would likely not do so otherwise. Third, thinking through mainstreaming TURF-reserves is critical, especially considering the real-world constraints of many governance contexts such as fragmented institutions, contested policy processes, and poorly delineated roles and capabilities of policymakers and administrators (Patterson et al., 2017). Applying this heuristic successfully to other settings will rely on understanding the specific conditions that will ultimately foster the greatest long-term engagement in management and conservation.

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