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# current conservation



Current Conservation carries the latest in research news from natural and social science facets of conservation, such as conservation biology, environmental history, anthropology, sociology, ecological economics and landscape ecology.

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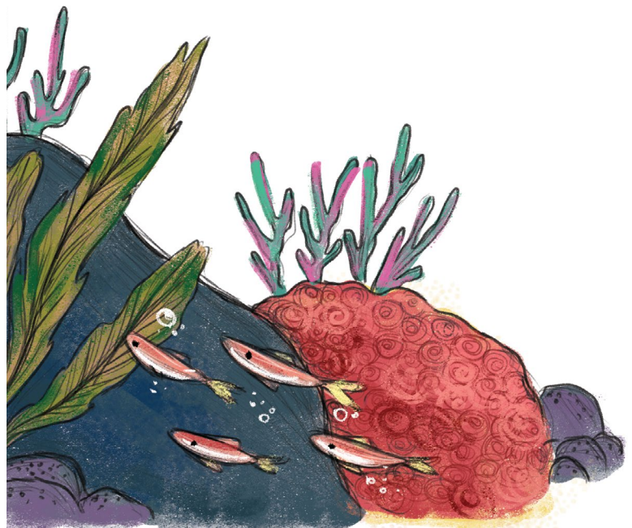

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# editor's note


*Cover art* **Athulya Pillai**

Conservation efforts that don't involve indigenous peoples and local communities are doomed to fail. In this year's marine issue, we bring to you stories of human-centred and locally-led marine conservation initiatives from around the world. Whether it's creating a national network of small-scale fishers in Madagascar or co-designing voluntary conservation programmes with artisanal fishing communities in Chile, people lie at the heart of these strategies. Even while zooming out to the global level of the UN's Sustainable Development Goals, we can and should keep sight of the local. Naturally, this brings into focus the importance of leadership at all levels—individual, team, and system—for conservation impact.

Next, we dive underwater for a look at coral reefs. Our first stop is Maldives, where tourism is driving unregulated reef fishing in this archipelago, which has sustainably fished skipjack tuna for nearly a millennium. Up north in the Indian archipelago of Lakshadweep, scientists discover that the shapes and behaviour of herbivorous fish can affect the recovery of wave-battered coral reefs. Finally, marvel at the diversity of colours and forms in a collection of striking fish portraits from tropical reefs.

— **Devathi Parashuram**

We are delighted to announce a partnership with the Society for Conservation Biology, the world's largest professional organisation dedicated to the conservation of biodiversity. CC and SCB aim to work together to connect scientists and society through stories of research and action from the conservation community combined with CC's signature illustrations.

— **Kartik Shanker**





# The promise of the seagrass revolution and why coastal communities must lead it

*Author* **Charlotte Young** | *Illustrator* **Maya Ramaswamy**

Laced along our world's coastlines are a mosaic of highly productive habitats. Coastal ecosystems, such as mangroves, tidal marshes, and seagrass meadows, straddle the line where land meets the sea and form the foundations of complex and interconnected marine systems. Beyond their beauty and wonder, the ecosystem services they provide are far-reaching. They play a critical role in reducing coastal erosion, protecting shorelines from storms by dissipating wave energy. They aid water filtration and are an important source of building materials and fuelwood. They also protect adjacent habitats, such as coral reefs, from sedimentation and provide habitats that support important wildlife, including many fish species that are essential to the livelihoods and food security of coastal people.

Like their land-based counterparts, the salt-tolerant plants that make up these habitats absorb light and carbon dioxide to power photosynthesis, produce food, and grow. In turn, the carbon absorbed becomes part of their biomass and soils, commonly referred to as coastal "blue carbon".

Despite occupying only a small percentage of the world's oceans, coastal habitats sequester and store more carbon per unit area than terrestrial forests, accounting for approximately half of the carbon sequestered in ocean sediments worldwide. If left undisturbed, carbon can be locked away in their soils for millennia, offering a valuable natural solution to mitigating rising carbon dioxide emissions. However, these habitats are being destroyed as quickly as they absorb carbon.

Coastal ecosystems are disappearing at an alarming rate from shorelines every year due to pressure from coastal development, fishing, pollution, and climate change. Once gone, so too will the wealth of ecosystem services they provide, and their role in climate mitigation will be reversed. Experts estimate that the loss of these habitats contributes to 3–19 percent of global emissions produced from deforestation worldwide. At current conversion rates, vast amounts of these habitats could be lost in the next 100 years, with devastating consequences to coastal communities and at a considerable cost to humanity.

In recent years, the excitement around blue carbon and financing the conservation of coastal habitats has grown because of the potential to bring a new level of investment into ocean and intertidal ecosystem conservation. Mitigating the loss of these habitats can be achieved through several mechanisms, including avoided loss and degradation, as well as ecosystem restoration. Mangrove blue carbon conservation projects, such as the Tahiry Honko project in Madagascar and the Mimoko Pamoja initiative in Kenya, have shown considerable promise. These formally certified Plan Vivo carbon credits offer a potential route for communities to reap sustainable long-term finance from the international carbon market. But the certification, which has only very recently started expanding to include seagrass ecosystems, is complex and realistically beyond most communities, without considerable scientific support. Similar, ideally simpler, impact-based initiatives, must be the way forward. This will place the coastal communities, who undoubtedly have the greatest long-term interest in their success, at the forefront of these efforts.

**Conservation initiatives that place people at the heart of their strategy can help build self-sustaining models, which diversify incomes and generate capital that can be reinvested back into locally-led conservation efforts. This approach offers a new and exciting opportunity to support the costs associated with managing and restoring habitats. It also empowers communities with the skills and means to protect their marine areas for both local and global benefit.**

Building off lessons learnt from restoring and protecting mangrove habitats, eyes are being turned to other carbon-rich coastal ecosystems to explore the opportunities available for financing their conservation and integrating the needs of people into their approach.

### *Communities must lead the seagrass revolution*

Seagrass is found on all continents except Antarctica. Despite only covering 0.1 percent of the ocean floor, it accounts for 12 percent of the total organic carbon stored in the ocean. They are also important nursery grounds for over a fifth of the world's largest fisheries, bolstering life along our coasts.

Although research interest in seagrasses has grown, gaps in our knowledge about these super plants and their role in carbon sequestration still remain. Worldwide, we know that seagrass habitats are in decline, but site-specific data are virtually non-existent, impeding the conservation of these important habitats across the globe.

Spanning five different countries—Indonesia, Malaysia, Philippines, Thailand, and Timor-Leste—the Seagrass Ecosystem Services Project aims to improve the conservation status of seagrass meadows throughout the Indo-Pacific, by incorporating an innovative, holistic and community-centred approach. A first of its kind, this project will assess the health, threats, and ecosystem services provided by seagrass habitats, and empower coastal communities through hands-on data collection and locally-led marine management. The information collected by communities will then be used to inform decision-making and help shape policy at local and national levels.

To fund and sustain long-term locally-led seagrass conservation and marine management, this project supports the development of dual-purpose community businesses that offer alternative livelihoods and income streams away from unsustainable extractive practices, whilst directly funding community conservation efforts that protect and restore seagrass and their ecosystem services. Working closely with communities, innovative ecotourism, aquaculture, and blue carbon credit business models are being explored. These models showcase to communities the added value of conservation and the benefits of a healthy marine environment, whilst building community capacity and reducing dependency on fishing as a main source of income.

### *The future*

Models like these hold the potential to achieve something that few other projects have managed. They enable marine conservation to make economic sense to those most reliant on the ocean's resources. It offers those most vulnerable to the impacts of climate and ecological breakdown, overfishing, and global pandemics, a chance to become more resilient to socio-economic and environmental shocks, whilst empowering them with the skills and resources to safeguard and manage their marine areas. Through this, coastal people can secure a future for themselves and their communities for generations to come. A future that doesn't come at the cost of the environment and paves the way for a more sustainable and healthy blue planet.

### *Further reading*

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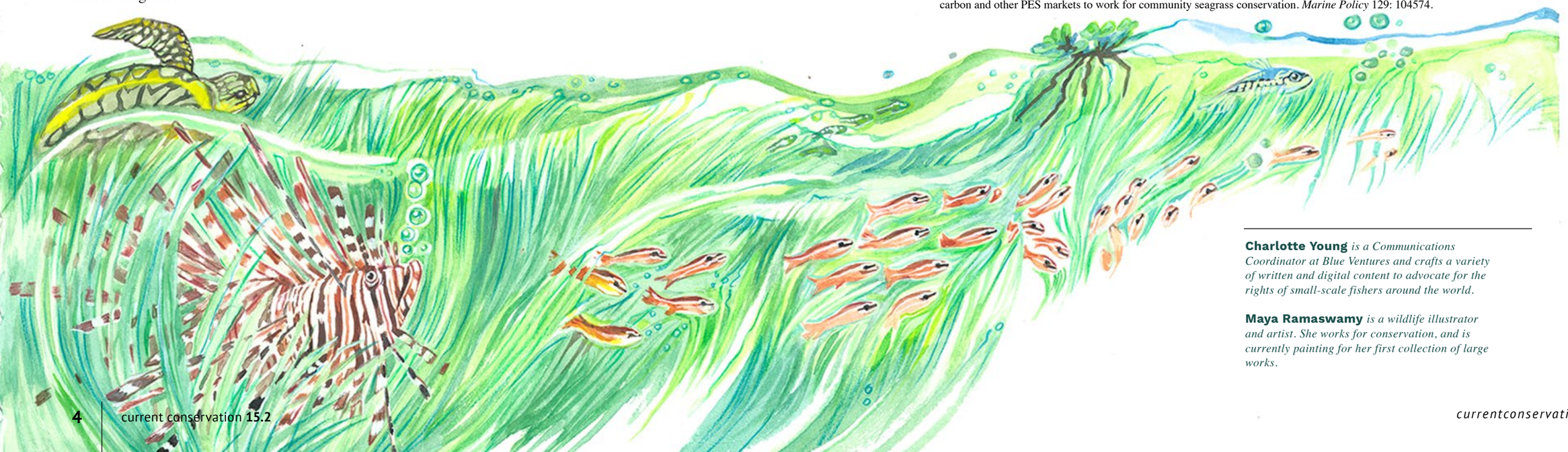

**Charlotte Young** *is a Communications Coordinator at Blue Ventures and crafts a variety of written and digital content to advocate for the rights of small-scale fishers around the world.*

**Maya Ramaswamy** *is a wildlife illustrator and artist. She works for conservation, and is currently painting for her first collection of large works.*

# Current Conservation meets Society for Conservation Biology

## partnering for more effective science communication and outreach

Society for Conservation Biology is the largest international membership society for professionals, students, and non-profits dedicated to advancing the science and practice of conserving biodiversity. Current Conservation communicates conservation-related issues and science in a visually engaging manner to a wide audience.

At the heart of both our missions lies outreach. This partnership seeks to create an opportunity for SCB and CC to work together to promote public engagement by the conservation community worldwide, and take our messages out to a larger audience.

The partnership was officially launched with a panel on Science Communication for Biodiversity Conservation in March 2021.

**Samyuktha S** *is a Chennai-based product designer who finds joy in drawing, studying and interacting with the natural world.*

# Bringing the Sustainable Development Goals to life through stories

*Author* **David Obura** | *Illustration* **Parul Sinha**

I grew up in Kenya with a love for wildlife and the outdoors, hiking and camping. It was an obvious pathway for me to become an outdoor ecologist with the motto "If I can poke it, I can study it". I designed my PhD and career to be outside, not confined within the walls of a lab. I debated the pros and cons of wading through a mudflat, mangrove swamp or insect-infested jungle vs. gliding through a coral reef—the choice was obvious! Since 1989, my research has been focused on coral reef resilience—particularly in the face of climate change—and the biogeography of the Indian Ocean.

Even as a child I was keenly aware of landscapes changing around me. As Kenya's population and infrastructure footprint grew, the views across the escarpments of the Great Rift Valley transformed from wide open savannahs and dry volcanic slopes in the 1970s to squared-off, dense patchworks of shambas (farms), trees, houses, and growing towns. When would this system break? Or less dramatically, shift to a new state? I always wondered how people perceived their shifting context and their complex daily interactions with nature in the landscape—their matrix of uses—and the ever more complex mix of cultures and social norms?

When the Sustainable Development Goals (SDGs) were first formulated, we all focused on ensuring 'our system' was represented. Hence, the ocean science and conservation communities were over the moon with SDG 14 'Life below water'—to conserve and sustainably use the oceans, seas and marine resources for sustainable development. Then followed a few years of grumbling over wording and targets, indicators and investment, and concern over being siloed away from the other goals, before diving into the interactions between goals and targets, and navigating trade-offs. The goals became illustrated in different ways, the most successful conceptually being the wedding cake model. It appropriately placed nature as the foundation for everything, which set the context for society, and both nature and society together set the context for the economy. This led to a three-tiered cake with the 'social goals' in between the 'nature goals' and 'economy goals'.

In many ways, I have always thought the SDG story was obvious—it's an expression of the three pillars of sustainable development, where nature, economy, and society must strike a balance. I came to see the goals as the world's almost 200 countries agreeing on a 'minimum set' of 17 'inalienable rights'. In a different year or month or if the balance of countries or contributors had been different at a crucial point in their negotiation, a slightly different set of goals might have been identified. But most importantly, whether 16 goals or 18, they give us a common language through which to negotiate sustainable development. And indeed that language does not need to be complicated—the goals can be simply expressed in 140 or so words (see Obura 2020), founded on the 'nature' goals, then up through the 'economy' to 'societal' goals and finally the enabling goals that make all this happen, as illustrated in the stack of goals on the next page (Figure 1), inspired by foliaceous corals.

The goals were negotiated at national levels, and they have permeated international discourse and the framing of all global institutions, from biodiversity to climate change to health and human settlements. But within countries, in sectoral entities, at local government levels, in businesses, and for 'the

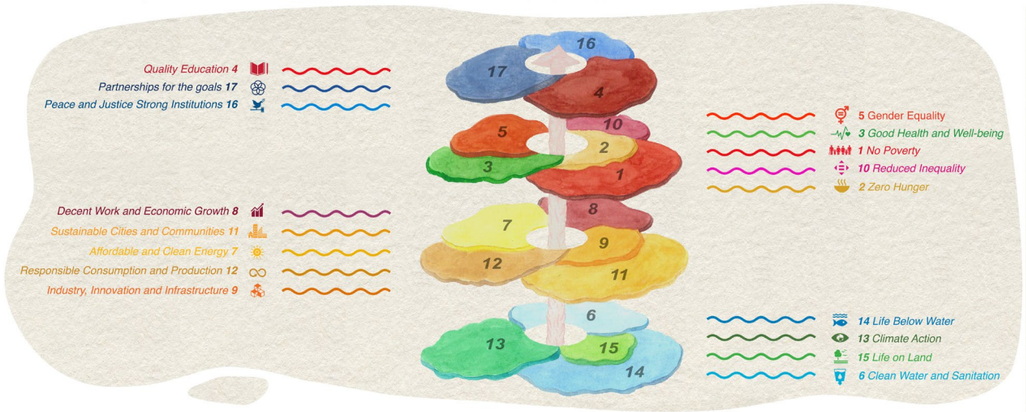


Figure 1. The sustainable development narrative model (Obura 2020)

people', the SDGs have remained esoteric. Many are ignorant about them, question what they are, or fail to relate to them as they go about their daily lives.

The most common depiction of the SDGs—the rectangle of brightly coloured squares—shows no interactions or connections, no curves or subtleties, no interdependencies or overlaps among these 17 core elements of human living. Other depictions resonate more—circular depictions allow links among goals across the middle, the wedding cake version expresses a model of sustainable development—yet, people don't feel how the goals relate to their lives. So, I decided to experiment with a new approach, to explore how local interests can be expressed through the lens of the SDGs. Since I work on coral reefs, the obvious starting point was a coastal fishing community in Kenya, expressed in the form of a story below.

### *The Story of Mariam and Hamisi*

Note: In the following narrative, {curly brackets} link each part of the narrative with the image on the next page, while [square brackets] in the text and icons in the image link to each SDG.

{1} Mariam and Hamisi live from the sea. He catches fish, which she sells 3–4 days a week in the local markets, their combined income paying for school fees, their health needs, repairing their house, etc. This evokes a number of the goals—from fish catch [12] and their jobs [8] and income [1], and the benefits to their household through nutrition [2], income [1], health [3], and gender roles [5].

{2} Their livelihood is entirely dependent on the local reef [14], which also sustains the broader fishing community. Through its representative fisher association, {3} the community has co-management responsibilities with the local government to manage its members' fishing activity, including by establishing closed areas to enable reproduction and regeneration of fish stocks.

{4} The closed areas attract interest from the local tourism sector, which is growing with coastal intensification [15] and small-town development [11], bringing additional income into the local community and

diversified jobs for local tourism operators, shopkeepers and others [8]. As interest in marine biodiversity and development impacts increases {5}, a range of community groups, non-government organizations and even researchers [17], engage with local issues to maintain natural assets and support diverse social programmes. Having gone to college {6}, Mariam and Hamisi's daughter not only works in the town as an electrician, but invests in a cold-store business to link her family and other fisher households to local markets.

{7} The seascape is experiencing impacts from climate change [13], with the coral reefs bleaching and losing coral twice in the last decade, stimulating local leaders to lobby the government for climate action and commitment to the Paris Agreement. Conscious of the international travel that brings tourists, the business association puts in place varied climate mitigation and adaptation actions, including through replanting of coastal forests and mangroves, and committing to solar and other renewable energy technologies [7].

{8} As stakeholders in the land- and seascape engage, the local government authorities [16] establish platforms to facilitate broader participation and engagement, incentivising individual actions towards sustainability, and removing barriers to innovation and action. To ensure all interests are addressed, firm commitments to equity are made {9} across income and stakeholder groups [10], for women, children and vulnerable groups [5].

## *So what?*

What might this SDG story approach help to achieve? As Kenyan and other societies grow and blend, I feel the opportunities for decision makers to consider all factors and make decisions that agree with everyone's worldviews diminish. Diversity is good, both in nature and among people, but it does make consensus more challenging, particularly as space (physically and metaphorically) declines and limits loom larger over peoples' choices.

I feel the only feasible way forward across so many contexts around the world is through alignment around common principles. Done right it means that people can trust that choices are mutually supported, and at least not conflictual. The SDGs, adopted by 193 of the world's countries, provide such an opportunity for alignment. I believe they might be even more successful at local levels, where their interdependencies can be tangibly experienced, and all people or actors may be more visibly accountable for their actions, such as if they go fishing in the wrong zone.

The SDGs enable alignment around what is too complex to command and control. For example, consider now in the context of COVID-19; if a business owner, a farmer, and a fisher all adopt SDG principles, they can follow their primary interests with due regard for not harming each others' health and other interests, or those of any other local case-holder of the 14 other goals. Inherent in the model is that awareness and knowledge (goal 4) and good governance (goal 16) are necessary to mediate and assure alignment among stakeholders, and to ensure the burden of impacts and responsibilities is equitable (goals 5 & 10). Further, applying an SDG narrative within a local jurisdiction may help establish social safety nets to minimize risks of destitution (goal 1) and hunger (goal 2) during a common crisis.

This narrative approach may help to link the biggest-picture worldviews with the local. 2020 and 2021 have emerged as 'super years' for framing both climate and biodiversity goals for decades to come, with the world being brought to its knees by a sign of things to come—the COVID-19 pandemic. Climate (goal 13) and biodiversity (goals 14 and 15) are each contained within the SDG framing; in fact, the Convention on Biological Diversity's post-2020 global biodiversity framework is premised on a theory of change defined by the SDGs. Thus, from this global scale down to the local, can conservation and development finally walk hand in hand, such that people and nature interact directly and positively, living out individualized storylines of sustainable development? There are many campaigns vying to capture the collective imagination to deliver on the emerging global goals, in biodiversity, climate, and other domains. However, we will need approaches that are fully nature-positive, people-positive, and economy-positive to enable their integration and aggregation to truly achieve sustainability from local to global scales.

### *Further Reading*


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**David Obura** *a Founding Director of CORDIO East Africa, is a coral reef ecologist and works on coastal sustainability in a changing world, and local to global scales.*

**Parul Sinha** *is an illustrator/visual artist and works primarily in watercolour. Her works are usually an amalgamation of illustration with a hint of absurd that makes familiar things appear estranged from day to day experience.*


**SDG narrative model example**
**A coral reef fishing community on the coast of Kenya**

# How to create a national network of small-scale fishers: Lessons from Madagascar

*Author* **Wanjiku Kinuthia & Vatosoa Rakotondrazafy**
*Illustrator* **Maithili Joshi**

Situated off the east coast of Africa, Madagascar, the fourth largest island in the world, is a country of staggering beauty, contrasts, and unique megafauna. It has an extensive coastline of 5,000 km and as a result, substantial marine, and coastal biodiversity.

For centuries, many of Madagascar's communities have relied on fishing for their food and livelihoods. It is estimated that at least one million Malagasy people depend directly or indirectly on fisheries for their sustenance. But an increase in unsustainable and harmful fishing practices, such as overfishing, have seen catches dwindle over the years. Fish have become scarce, and the future of many of Madagascar's coastal communities is in peril. Its marine biodiversity is under unprecedented threat, increasingly fragile under these immense pressures, both local and external.

To address these challenges, Locally Managed Marine Areas, popularly known as LMMAs, were created in 2003 to empower coastal communities to sustainably manage Madagascar's marine and coastal resources. These are areas of the ocean managed by coastal communities to preserve fisheries, foster marine biodiversity conservation, improve governance, and promote shared benefits. LMMAs also provide the communities with a platform for a united voice. In Madagascar, LMMAs have developed great momentum over the past 17 years, creating a contemporary community conservation movement that draws on traditional practices, shared values, and local knowledge.

But LMMAs have faced tremendous challenges. At the centre of finding lasting solutions is Vatosoa Rakotondrazafy, a passionate Malagasy, who initially wanted to become a human rights lawyer, but found her calling fighting for the livelihoods of small-scale fishers. She is the President of the board of MIHARI, a network established in 2012 to link isolated coastal communities and allow community leaders to share ideas and successful models through peer-to-peer learning. Additionally, MIHARI was created to represent the interests of small-scale fishers at a national level, in particular fisheries policy development. Vatosoa also served as MIHARI's first National Coordinator for six years.

MIHARI now represents over 200 LMMAs, collectively covering over 17 percent of the island's inshore seabed.

Below is an interview with Vatosoa, where she helps to explain the challenges, threats, and opportunities, and how to create a national network of small-scale fishers.

### *Madagascar is the fourth largest island in the world. How important are small-scale fishers to the country's economy and livelihoods?*

Small-scale fishers are integral to coastal communities' livelihoods and daily sustenance. In 2017, Madagascar had 163,500 tonnes of national catch, 59 percent of which was from small-scale fishers. According to the World Bank, the fishery industry is critical to our country's economy—it contributes more than 7 percent to the national gross domestic product (GDP) and constitutes 6.6 percent of Madagascar's total exports.

### *How did the LMMA movement start and grow in Madagascar?*

The concept of LMMAs in Madagascar was born in the Southwest of the island in 2004, when communities came together to manage octopus closures.

Other coastal communities quickly saw the value of having LMMAs, how they could help them address their challenges, and the benefits that would come with that. Today, there are 219 LMMAs across Madagascar, covering 17,000 $km^2$ of the country's continental shelf. LMMAs have four types of management models or focus areas: creating temporary and permanent fisheries closures; restoring mangroves; developing alternative livelihoods; and putting in place local regulations, such as bans on destructive fishing practices.

### *What impact and challenges have the LMMAs had?*

LMMAs have achieved a lot of success over the years. They have improved the food security and income—directly and indirectly—of over 500,000 people in Madagascar. Fisheries production has increased through no-take zones and the regulation of fishing gears. LMMAs are also critical in the conservation of marine and coastal ecosystems, including mangroves, seagrass, coral reefs, and a variety of other species. LMMA management committees support better community governance and promote community participation and decision-making in the management of marine and coastal areas.

But LMMAs have also faced challenges, such as conflicts in resource use and allocation, and a lack of a country-wide legal framework to secure and recognise small-scale fishers' rights. Access to markets continues to be limited, and many of these LMMAs are in isolated, remote areas.

### *Describe the journey of creating MIHARI. Why was it necessary and what impact has it had?*

MIHARI was created as a network to help address some of the challenges that LMMAs face. Today, the network has two types of members: 219 LMMA associations and 25 non-government organisations operating in the marine and coastal spaces.


MIHARI's journey began in June 2012, when 18 LMMA associations met in southwest Madagascar and took the initiative to create a network that would promote peer-to-peer learning and give them a collective voice. I joined MIHARI in 2015 as the National Coordinator and first staff of the network. My role was to make the network more functional and to create more impact for the LMMAs. We hired more staff, created systems, and increased MIHARI membership from 50 LMMAs in 2015 to more than 200 today.

In 2020, MIHARI was recognised as an official Malagasy organisation, a huge step in cementing its legitimacy. Today, MIHARI is considered a key partner in Madagascar's marine management and conservation efforts. It has increased the advocacy for small-scale fishers' rights and built the capacity for LMMA leaders to be more effective. MIHARI has also created a platform that promotes learning and knowledge sharing. Increasingly, we are also focusing on promoting the human rights of small-scale fishers.

This model is also being replicated in other countries. For example, I was invited in 2018 to speak about MIHARI's work to representatives from five countries—Japan, China, Indonesia, Thailand, and Myanmar—and provide any lessons that might be valuable for those countries as they implement their marine conservation efforts. We're also promoting learning across the Indian Ocean and sharing valuable lessons with nearby countries.

### *Any advice for communities wanting to follow a similar path?*

Trust traditional knowledge. Coastal communities have incredible mastery and expertise. Involve the communities in the co-creation of the networks. They are your main stakeholders and have to feel a sense of ownership.

It is critical to ensure that the government is included and supports your initiative, and ensure that you build a platform that brings all the stakeholders together to discuss the challenges and shared solutions. Ensure that you plan for exchange visits and learning so that communities can see what's possible by observing what others have done.

I also encourage the creation of a common charter that outlines the rules of engagement so that members understand the value and benefits of the network. Lastly, there's nothing more critical than ensuring that you communicate regularly with all your stakeholders. From communities and NGOs to the private sector and government, it's important to keep them inspired and motivated by your work.

### *Can you speak about your journey in helping to lead this process? What lessons have you learned about leadership?*

Leadership isn't easy, but it is rewarding. I started leading MIHARI when I was 27. I was a young woman from the capital, leading a network that consisted mostly of men from coastal villages. I didn't speak their local languages or understand their way of life, but I quickly learned that leadership is about how you interact with people.

I demonstrated trust and made sure that they understood that I valued their knowledge and contribution. Importantly, I made sure the communities understood that I wasn't there to tell them what to do—I was there to work with them towards a shared vision.

### *You're going through the process of developing a strategic plan for the network. What role has this played in the network's development?*

Our partner Maliasili is helping us develop our strategic plan. This has played a key role in the network's development. A crucial step is that we've made the process inclusive. The strategic plan meets the objectives of the network and fits all the members.

The strategy will guide the network for the next five years and will provide clarity on our priorities. In the past, MIHARI's work has largely been dependent on urgent needs, and we've been doing things on the go. The strategic plan will give us a much-needed guide.

### *What do you hope MIHARI will have achieved in 20 years?*

I hope that in 20 years, small-scale fishers will be playing an even bigger role in the governance of the country's marine resources and are positioned at the forefront of creating sustainable, effective policies. My vision is to have the role of the fishers stipulated in a policy and embedded in national laws.

I also hope that the livelihoods of coastal communities are secured, that small-scale fishers have better income and are economic actors that have the resources they need to look after marine life in Madagascar.

### *What are you up to now in terms of networking?*

With six years of networking experience at MIHARI, mobilizing and engaging actors, I am now working with the Malagasy think tank, INDRI, whose mission is to mobilize the collective brain power of stakeholders to restore Madagascar's terrestrial and marine landscapes. I am leading a national initiative called "Alamino", which brings together the government, NGOs, local communities, funders, private sectors, religious leaders, researchers, civil societies, and others, to re-green the country. For the seascape, we are planning to launch the Blue Agora of Madagascar, which will allow all stakeholders in marine resources to meet, to exchange views and coordinate their action for the sustainable management of the country's marine resources.

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**Wanjiku Kinuthia** *is a Communications Manager at Maliasili*

**Vatosoa Rakotondrazafy** *is a passionate advocate for local communities conservation efforts and has expertise in stakeholders' engagement and mobilization.*

**Maithili Joshi** *is currently based in New York, pursuing her BFA from the School of Visual Arts. She works with a combination of inks, watercolour and digital mediums. Maithili draws from her personal experiences and the people she meets.*

# Fish face

*Author & Photographer* **Umeed Mistry**

I spend a lot of time looking at fish. I also spend a lot of time talking to people about fish. And while I can move a listener with stories about cleaning stations or being surrounded by enormous schools of vibrant creatures, I often feel that the allure of the individual fish is either inexplicable or lost in translation.

There are a couple of reasons for this. It is difficult for divers to make a close and unhurried observation of constantly moving subjects that often swim away from us. And the full spectrum of colour disperses quite quickly the deeper one goes, giving everything underwater a muted cyan tinge.

This is where the medium of photography comes into play. Using an artificial light source brings back the spectrum of colours that otherwise disperse underwater due to refraction. Taking close-up photos of fish with an artificial light helps to freeze a constantly moving subject, while also highlighting all its hues and patterns. This then allows me to take my time marvelling at their faces, fins and scales on my computer screen. In doing so, I have learned a great deal, and constantly find a renewed appreciation for them. This photo essay is a celebration of the diversity of colours and forms in the world of fish.

*Right: It is only under artificial light, at relatively close quarters, that the true colours and patterns of this humphead 'Napoleon' wrasse (Cheilinus undulatus) become visible. This species is the largest in the family of wrasses. The males grow larger than females, capable of reaching up to 2 meters and weighing up to 180 kg. In some parts of the world, Napoleon wrasse become very accustomed to divers and can display a great deal of curiosity. This photograph was taken with the specific intention of being able to scrutinize the structure and patterns of the face and pectoral fins of this gorgeous fish.*

***Maldives.***

*Left: I lit this image so as to highlight not just the extraordinary spiky shape of this ornate ghost pipefish (Solenostomus paradoxus), but also its translucence. Adults that have recently settled on the reef from their pelagic—free swimming—larval phases are smaller and more transparent than adults that have had some time to mature. This individual was somewhere in the middle of that transition.*

***Maldives.***

*Top right: This juvenile spotted drum (Equetus punctatus) will change quite significantly in its journey to adulthood. Many juvenile fish look very different from their adult counterparts. This is part of their strategy to avoid predation. It includes disruptive camouflage with weird shapes, colours and patterns, as well as mimicry of poisonous flatworms and other inedible marine creatures. Photographs allow us to marvel at the extent of the transitions between juveniles and adults in a way that is almost impossible to do while diving.*

***Turks & Caicos Islands, British Overseas Territory.***

*Bottom right: Arguably, all frogfish are extraordinary in their use of varied camouflage as an ambush strategy. This hairy individual was one of my favorites. Unlike the sponges or seaweed that frogfish often camouflage close to, this fish and a couple of others were clustered around a pile of algae-covered ropes and buoys at an underwater mooring surrounded by sand. If it hadn't been for the local divemasters who knew where to find them, I would have swam past this spot with barely a second glance.*

***Mabul Island, Malaysia.***

*Top: The coral grouper (Cephalopholis miniata) has a wide distribution in the Indo-Pacific and parts of the Atlantic. In a rare happenstance while diving in underwater caves across the region, I noticed that the bubbles from my breathing apparatus had collected at the roof of the cave to form a mirror of air. A grouper positioned directly below it was reflected in the mirror, leading to this incredibly lucky image.*

*From a couple of similar encounters during this time, I learnt that these fish were opportunistic individuals, who had realized that exhaled air bubbles reaching the roof of the cave disturb a variety of small creatures. This particular grouper waited, often quite close to my head, and quickly picked off any small crustaceans that were displaced by the expanding ceiling of trapped air. When it occurred to me that this individual was not simply posing for me but instead using me to get an easy meal, I left the cave.*

***Lakshadweep Islands, India.***

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**Umeed Mistry** *is a dive instructor, underwater photographer and cameraman, writer and educator. He is driven by the desire to spark in others the same love he has for marine and freshwater spaces.*





# The fish in a bamboo flask

*Author* **Shreya Yadav** | *Illustrator* **Athulya Pillai**

It's a cloudless day in April two degrees north of the equator. I'm floating in a turquoise lagoon off an island in Laamu Atoll, Maldives, breathing through my snorkel. Below, light zigzags over the reef, catches fish mid-turn, and makes corals glow an ethereal blue. The surge from waves breaking nearby is strong, and the fish and I pendulum back and forth with the water. I'm struck by the number of juvenile corals on this patch of reef. Their skeletons are young, pale green, sky blue, and healthy. Once—perhaps when I was about five years old—this reef might have cast longer shadows and thrived with the permanence of a forest. But that's not the world I live in anymore. Today, the presence of these babies is joy enough. Scleractinian foliage. It means the reef is recovering.

I look up and find that I have drifted, so I begin a slow swim back towards the beach. A line of yellow and red umbrellas comes into view as I get closer. People recline on beach chairs under pools of shade in a desert of sand. Someone sips on a bright blue cocktail the colour of the ocean I am just wading out of. The irony of this scene is not lost on me. We stare out at the horizon, enjoying the view. Meanwhile, the sand is slipping out from under our feet. And I mean that quite literally—80% of the land area of the Maldives is barely a meter above sea level. But the history of these islands is one of resilience, not fragility. And central to this story is fish.

Contrary to its view in popular imagination as being a remote paradise, the Maldives has actually been at the centre of Indian Ocean trade and commerce for hundreds of years. In the 14th century, the famous explorer Ibn Battuta landed on these shores and stayed for four years. One of the first things he noted in his records[1] was the existing fishery at the time. People's diets, he said, consisted of "a fish...which they call *koulb al mâs*. Its flesh is red, it has no grease. When caught at the fishery, each fish is cut up into four pieces, and then slightly cooked...it is eaten when perfectly dry." Three hundred years after him, a French explorer, François Pyrard de Laval, was shipwrecked in this archipelago. He too noted[2] this fishery, writing with some surprise that the islanders "are daily dispatching cargoes of this [fish] to Achen in Sumatra and elsewhere." The fish they were referring to was tuna. And perhaps Pyrard's surprise was justified—tuna is not easy to fish, and yet these small islands were catching enough to ship around the world.

**Since then, archaeological digs have found tuna remains dating back to the 9th century in the Maldives. References to tuna abound in local lore. A folktale from the islands tells how a famous navigator, Bodu Niyami Takurufanu, first captured the soul of one of these fish in a bamboo flask on a voyage in far-off waters. He released it when he returned to his home island, and ever since, it is said that skipjack tuna have been abundant in the Maldives.**

While tuna has likely been eaten in these islands for a long time, it was old trade networks that cemented its place in the Indian Ocean world. The islands were an important port of trade for cowries, which were used as currency for almost a thousand years from the 9th to the 19th century. With cowries, tuna began to be exchanged too. Bags of dried tuna were transported to Indonesia, Sri Lanka, parts of India, and East Africa. The fish became so well known in the region that it was referred to as "Maldive fish" in Sri Lanka. Boats were specially constructed for tuna fishing in the Maldives and *veshi*, or oral poems, communicated nautical directions that helped fishers navigate through dangerous passages in the ocean. This rich history of tuna fishing was part of the reason that, snorkeling over this reef in Laamu atoll, I felt hopeful for its recovery. Tuna had kept reef fishing historically light here. Now, a diverse and healthy population of reef fish was helping buffer these reefs from climatic disturbances, such as mass coral bleaching events.

Today, however, tourism is shifting this dynamic. Over 200 luxury resorts dot this archipelago. Built on islands without a human population, they offer palm trees and azure lagoons: picture postcard perfection. In 2019, over 1.5 million tourists visited the Maldives. The jobs this has created, and the development it has brought to the country cannot be overlooked. But on the other hand, its environmental impacts have been significant. Burning plastic piles high on Thilafushi island near Malé, where a permanent plume of grey smoke obscures the sky. Whale sharks, turtles, and mantas suffer regular propeller injuries from heavy boat traffic. Sewage runoff from land, the dredging of lagoons, and land reclamation have degraded once healthy habitats.

Tourism has also created a demand for fresh reef fish. Now, freshly caught snappers, emperors, and groupers sit on dinner plates in resorts and guest houses. People are fishing on reefs more than ever before. In the interviews that I conducted with residents last year, I found that reef fishes were becoming increasingly popular amongst locals. In fact, the majority of people I spoke to said they preferred to eat reef fish over tuna today. This reef fishery is currently unregulated. Parrotfish are the only species that are illegal to fish, but they are not uncommon in people's catch. I asked a fisher who had just landed a catch of parrotfish whether he fished for them often. He said he did not. The only reason he had now was that the resort nearby had called, demanding fresh fish.





Why is unregulated reef fishing so worrisome? Unlike skipjack tunas that grow fast, mature early, and have a high population turnover, reef fish generally have longer life spans and are slow growing. This makes them easy to overexploit, as has happened in several places around the world. Importantly, reef fish play critical roles on coral reefs, helping them bounce back after major disturbances. Grazers, such as parrotfish, eat algae and keep substrates clean for young corals to settle and grow. Others slow the progression of coral disease, remove parasites, and prevent sand and sediment from accumulating on coral skeletons.

**Until now, tuna has helped keep Maldives' reefs underfished and relatively pristine. It's these healthy reefs that have been monetised, appearing on t-shirts, postcards, and tourist brochures. It's why glass-bottomed boats and dive charters can provide employment to so many people today. But unregulated reef fishing, a growing problem, has the potential to change all that.**

Islands are mesocosms of the world. What happens here—how we manage these ecosystems, the pressures of development and tourism, and most importantly, how we define and prioritise the well-being of people who live here—can guide how we do this in larger continental systems. On small islands, these decisions can determine whether they continue to be inhabited into the future. The Maldives is an example of a place where an early form of globalization—trade—encouraged the growth of a sustainable fishery. This is now being threatened by a more recent globalization—tourism. Walking along the beach that day, the reef on one side and the resort on the other, it was easy to feel like these were two fundamentally irreconcilable entities. But as Barry Lopez recently wrote[3], it is "important to live for the possibilities that lie ahead". History connects us, and sometimes, looking back is a good way to look forward.

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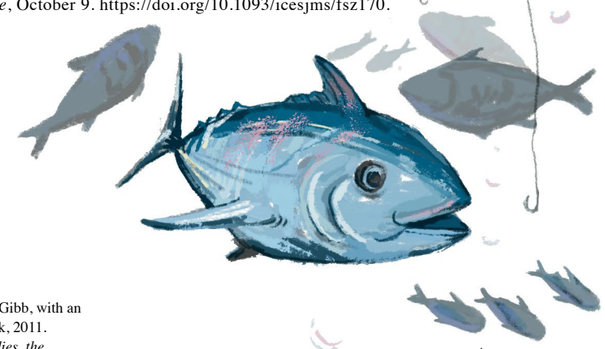

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# Leading effectively for conservation impact

*Author* **Jessie Davie** | *Illustrator* **Komal Pahwa**

**"I became obsessed with work, always there, barely sleeping, fully committed. It took so much of my life and I didn't equally divide work and my personal life. Sometimes I wouldn't see my own family for 2–3 weeks at a time."**

Kahindi Changawa's experience is far too common in the conservation space. The urgency to our conservation issues is palpable. While the local solutions are just within reach, they still require strong commitment and effort to attain. For Kahindi, a Program Coordinator at Kenya's Local Ocean Conservation, the plastics wrapped around and inside sea turtles coupled with rampant poaching were problems he couldn't let rest. And that became 20 years of mobilising communities and 20 years without a day off. "I didn't realise the stress that was building up. I didn't recognise what that looked like."

Kahindi was a participant in the first-ever African Marine Conservation Leadership Program, a program designed and run by Maliasili and Blue Ventures. It brought together a new generation of marine conservation leaders from Somalia, the Comoros, Kenya, and Tanzania, strengthening their skills and confidence to lead.

Kahindi and his fellow participants spent three weeks exploring leadership at different levels: individual, team, and system.

***Individual Leadership:*** This relates to how individuals develop their own personal skills and characteristics as leaders, develop self-awareness of their preferences and tendencies, maximise personal strengths, develop the ability to relate to and interact with other people, and manage one's own time and health (e.g., motivation, avoiding burnout).

***Organisational Leadership:*** This pertains to the leadership of organisations and their management, as a group of people working towards common aims. Effective leaders need to strengthen the performance and durability of their organisations, managing for results, mobilising resources (i.e., fundraising and business development), and leading strategically.

***Collaborative Leadership:*** This aspect of leadership extends beyond one's own organisation, to the scale of multiple organisations and different actors, whose interactions are critical to achieving large-scale, systemic change. A good leader constantly reaches out beyond the confines of their organisation to increase impact. To be effective, one must build trust, cooperate, and unify around common goals and a shared vision.

At the end of the program, it is hoped that the conservation leaders will take their new skills, experiences, and personal awareness back to their organisations and work to enhance team performance and conservation impact.

Kahindi did just this, and he's seen changes both personally and professionally: "Time and prioritisation have been my greatest leadership challenges... I've made adjustments, delegating more and identifying top priorities. I now spend two days a week with just me and my family."

## How are you leading?

The conservation field needs more effective leaders who can inspire others, while also taking care of themselves. We need stronger local organisations that help people realise their full potential, grow, and strengthen their performance. And we need collaborations that work, where organisations pool their skills and resources to achieve something much greater than they can do on their own.

Below are some questions to help conservation leaders reflect on what's needed to be effective and supportive on all three leadership levels. How are you currently leading? How do you want to lead?

***Leading Oneself***: Which three words best describe your leadership style? Do you think your team would choose the same words or view your style differently?

***Leading Teams***: What has been your best management experience? What made it great? Based on your answer above, how do you think you can manage your team better?

***Leading Collaborations***: Think about an important partnership or collaboration you have been part of. Can you think of any individual who played an important role to make it work? What did they do? You might also reflect on whether there was any individual who was particularly ineffective and why.

### *About the column*

*Maliasili helps great local conservation organisations become even better by focusing on organisational development and growth. Ultimately, Maliasili supports greater conservation impact through stronger organisations achieving more. This column takes a different look at our conservation field by providing ideas and thinking to strengthen organisations, as these are often undervalued and get overlooked. They are critical to an organisation's effectiveness and thus, to our planet's health.*

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**Jessie Davie** *is Maliasili's Director of Communications & Learning. She loves making organizational development accessible and practical to best support local conservation organizations.*

**Komal Pahwa** *is a visual communication designer and Illustrator. She works as a full-time Sr. Visual Designer currently at Byjus.*

# Shapes of reef recovery

*Author* **Pooja Rathod** | *Illustrator* **Ritika Nair**

Herbivorous fish are the gardeners of reefscapes. They graze on algae that live on reefs, making sure it does not overgrow and ensuring there's plenty of space available for new coral to settle and grow. How their activity is distributed across the reefscapes can therefore determine how these reefs function. In a new study published in Scientific Reports, we investigated how exposure to wave action affected herbivore distribution and function.

The study was conducted in the Lakshadweep archipelago because it provided ideal natural conditions to study wave action on reefs—some parts of the islands are exposed to stronger waves than others. Due to the southwest monsoon winds, reefs on the western sides of the islands were more exposed to waves, while those on the eastern sides were relatively sheltered. This allowed us to compare herbivore distribution and function on eastern and western sides of the island.

The study consisted of a combination of field observations, which included swimming transects and video recording, exclosure experiments—mesh cages were constructed on reef substrate to keep out herbivorous fish in order to study how algae grows in the absence of these fish—and a pinch of luck, when we chanced upon a rare recruitment event where thousands of tiny surgeonfish larvae or recruits entered the reefs to settle, giving us an opportunity to understand their settlement choices at an early stage in life.

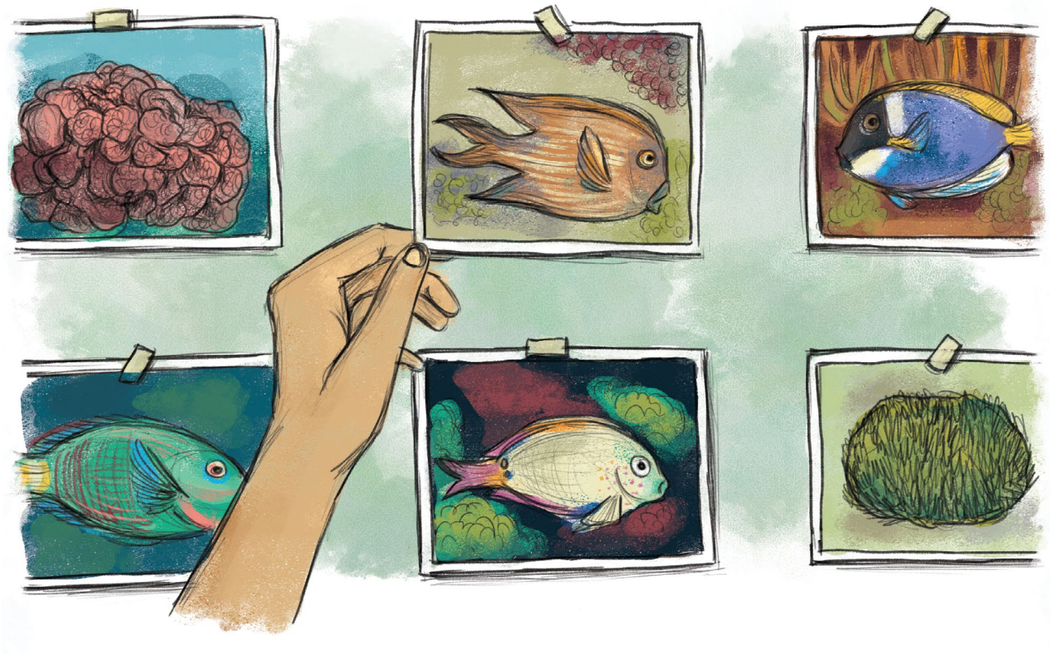
We found that reefs exposed to strong waves (on the western sides of the islands) had fewer herbivorous fish, fewer number of fish species, and the ones that did live there seemed to be eating less algae than those that lived on the eastern sheltered reefs. In other words, the western coral reefs were less controlled by herbivores than the eastern coral reefs.

We also found that the shapes and swimming abilities of fish played an important role in determining how they performed on wave-battered reefs. Laterally compressed fish (having a flattened body shape) were unable to do well here, likely because they found it harder to manoeuvre through rough waters. Fusiform or torpedo-shaped fish on the other hand, did better on these wave-battered reefs.

For the two observed species of surgeonfish, a larger number of recruits settled on the sheltered reef than on the wave-battered reef, thereby suggesting a preference for stable and complex structures of reefs in calmer waters. And this tells us that the patterns we see in the distribution and abundance of adult surgeonfish start early on in life—right from their settlement choices as juveniles. If the wave-battered reefs lose more coral structure in the years to come, we could expect even lower recruitment of juveniles to these reefs.

Herbivorous fish are the gardeners of the reef. How their activity is distributed across the reefscape can decide how these reefs function. Our study shows that their distribution is distorted, limited by wave action and by the ability of differently-shaped fish to access choppy waters. In turn, the herbivores affect how much algae can grow and are, therefore, critical to the survival of coral recruits. When coral are able to successfully settle, healthy reefs can bloom.

If we are to imagine a future where reefs are healthy and bustling with life again, it is time we take a deeper look into the ways in which fish behave and drive coral reef recovery.

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**Pooja Rathod** *is a marine biologist turned wildlife filmmaker with a deep interest in documenting natural history of all things terrestrial and aquatic.*

**Ritika Nair** *is a Visual Artist and Designer. Illustration has always been a mode of meditative expression and healing for her. Now she extends it to help heal others and our planet.*




# *Chilean fishers, TURFs, and human-centred marine conservation programmes*

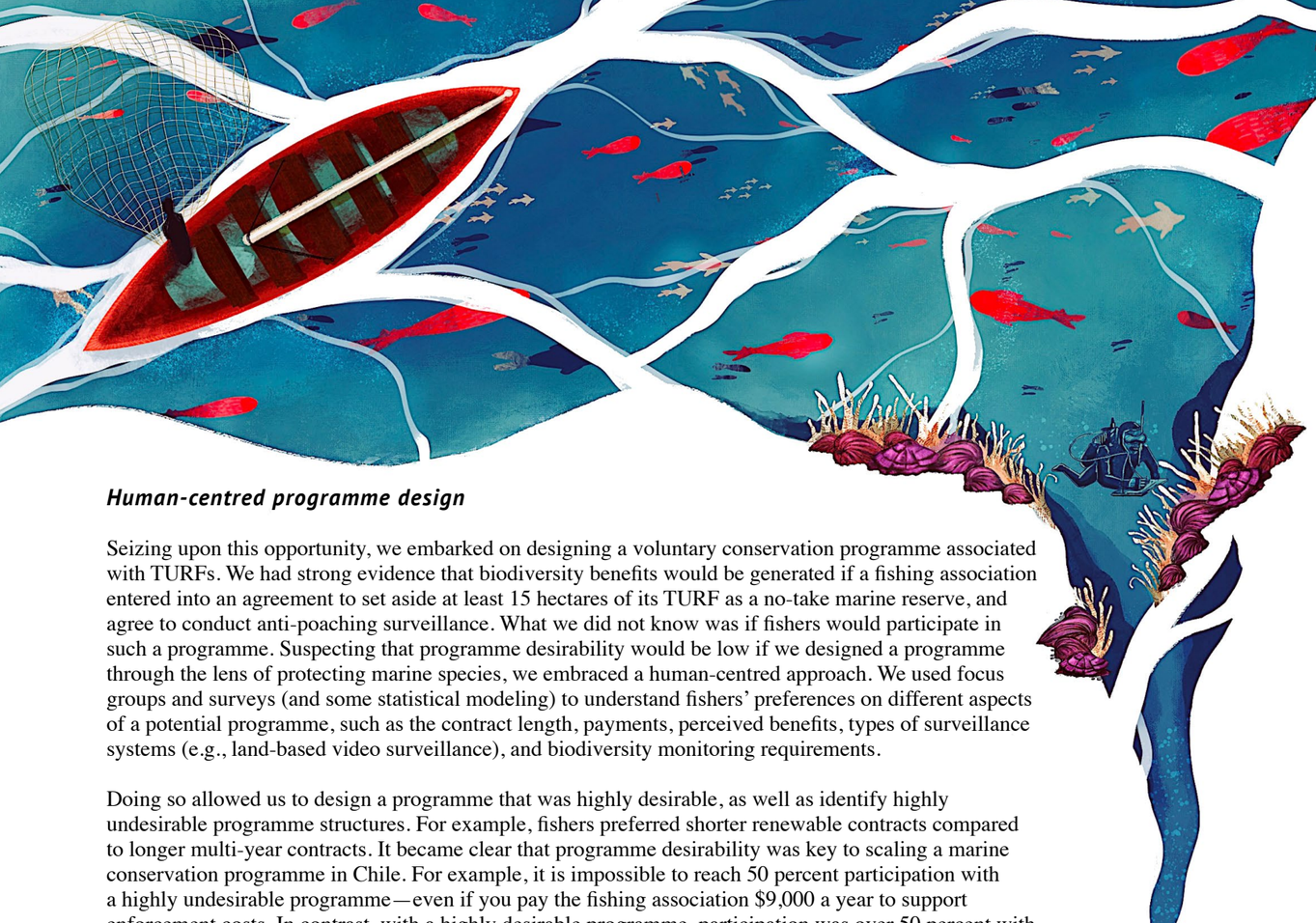

*Author* **Benjamín Lagos S., Paulina Martínez M., Stefan Gelcich** & **C. Josh Donlan** | *Illustrator* **Pooja Sreenivasan**


Along Chile's long and diverse coastline, nearly 100,000 artisanal fishers catch about half of all seafood landing in the country through a diverse set of activities, which include intertidal gathering, offshore fishing, and diving for nearshore resources. These fishers are therefore central to marine conservation for such programmes to succeed. In this article we describe our efforts to design a conservation programme that is fisher-centred and how it is evolving to provide more benefits to artisanal fishing communities and achieving scale within Chile.

## *TURFs as an opportunity for marine conservation*

Territorial user rights for fisheries (TURFs) have been promoted as a tool which can enable the sustainable use of marine resources by providing access rights and incentives to fishing communities. Throughout Chile, groups of artisanal fishers have organized into associations and gained TURF rights to extract nearshore resources from distinct stretches of the coast. The policy has been in place for over three decades and there are now hundreds of active TURFs along the coast. They make up a substantial part of the coastal seascape in Chile: TURFs tend to be roughly 100 hectares in size and surrounded by open access areas. To be granted a TURF, artisanal fisher associations must undertake a baseline study of the area and develop management plans that need government approval. Surveillance and enforcement by the community is required and it is forbidden to extract any species not included in the management plan. For example, diving for benthic resources is usually restricted to a few times a month and the extracted resources are around 10-30 percent of the total income for an association.

Researchers have demonstrated that TURFs have higher levels of biodiversity compared to open access areas, and those levels increase with local enforcement to prevent poaching. Researchers have also demonstrated that biodiversity levels inside TURFs are lower than in marine protected areas, and that enforcement is a key aspect in determining biodiversity levels. The combination of part-time use, strong enforcement, and high levels of biodiversity has sparked dialogues about TURFs playing a role in the economic diversification of small-scale fishing communities. Both the social and ecological conditions are present to design a voluntary conservation programme that could incentivize additional biodiversity benefits. The combination of fishing associations and TURF policy creates user rights, strong local governance, and a stewardship ethic. That same combination creates the opportunity to increase biodiversity by increasing enforcement and creating a marine reserve inside TURFs.



### Human-centred programme design

Seizing upon this opportunity, we embarked on designing a voluntary conservation programme associated with TURFs. We had strong evidence that biodiversity benefits would be generated if a fishing association entered into an agreement to set aside at least 15 hectares of its TURF as a no-take marine reserve, and agree to conduct anti-poaching surveillance. What we did not know was if fishers would participate in such a programme. Suspecting that programme desirability would be low if we designed a programme through the lens of protecting marine species, we embraced a human-centred approach. We used focus groups and surveys (and some statistical modeling) to understand fishers' preferences on different aspects of a potential programme, 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 us to design a programme that was highly desirable, as well as identify highly undesirable programme structures. For example, fishers preferred shorter renewable contracts compared to longer multi-year contracts. It became clear that programme desirability was key to scaling a marine conservation programme in Chile. For example, it is impossible to reach 50 percent participation with a highly undesirable programme—even if you pay the fishing association $9,000 a year to support enforcement costs. In contrast, with a highly desirable programme, participation was over 50 percent with only a $3,000 payment.

Overall, our research revealed important factors that influenced participation in voluntary conservation programmes. While payments, for example, served as a relatively strong factor to convince fishers to opt-in to a programme, their ability to do so substantially diminished as their attitude became negative, trust decreased, or dependence on fishing decreased. In fact, our results suggest that payments alone are insufficient to attract enough participation by Chilean fishers to scale the programme and deliver significant environmental benefits.

### Launching the programme

Armed with an evidence-based programme design, we began piloting the programme with two fishing communities. We partnered with a Chilean technology company that provided land-based surveillance cameras and machine learning technology. Fishing communities have direct access to video and machine learning alerts which provide them with an additional surveillance tool, while providing the programme a means of independently assessing compliance. We designed a biodiversity and fishing monitoring programme to track the impact of the programme, which included control sites and was implemented with the fishing associations. We created annual contracts with the fishing associations, which provided a small payment to the association to help assist with increased anti-poaching surveillance and outlined sanctions in the case the conditions of the contract were broken. With funding from US foundations, we were able to pilot the programme while also continuing to collect data from fishers with surveys and focus groups, in order to make design changes to better align the programme with fishers' perspectives and needs.

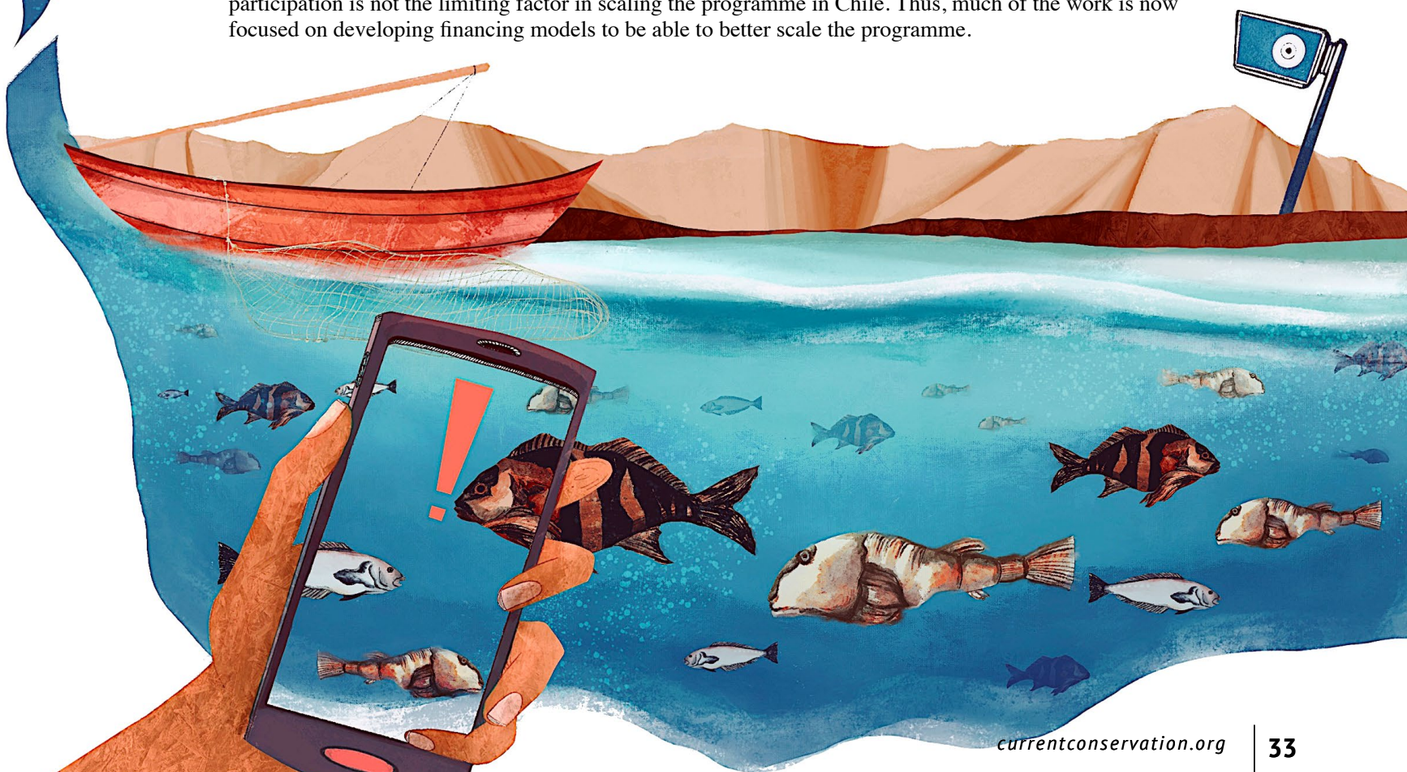
During the first few years, with feedback from participating associations, we incrementally improved the programme and overcame challenges. The reliability of surveillance cameras placed in remote marine environments was a major challenge, which required multiple rounds of improvements. Trying to balance cost-effectiveness with scientific rigor, we struggled with developing diving monitoring protocols that were feasible and affordable, while still being robust. We modified the programme incentives, replacing annual enforcement payments with a small grants programme. Fishing associations are now eligible to apply for small annual grants for projects that improve or complement the outcomes of their reserve. After several rounds of improvements, the marine reserve programme was up and running in three fishing communities in central Chile.

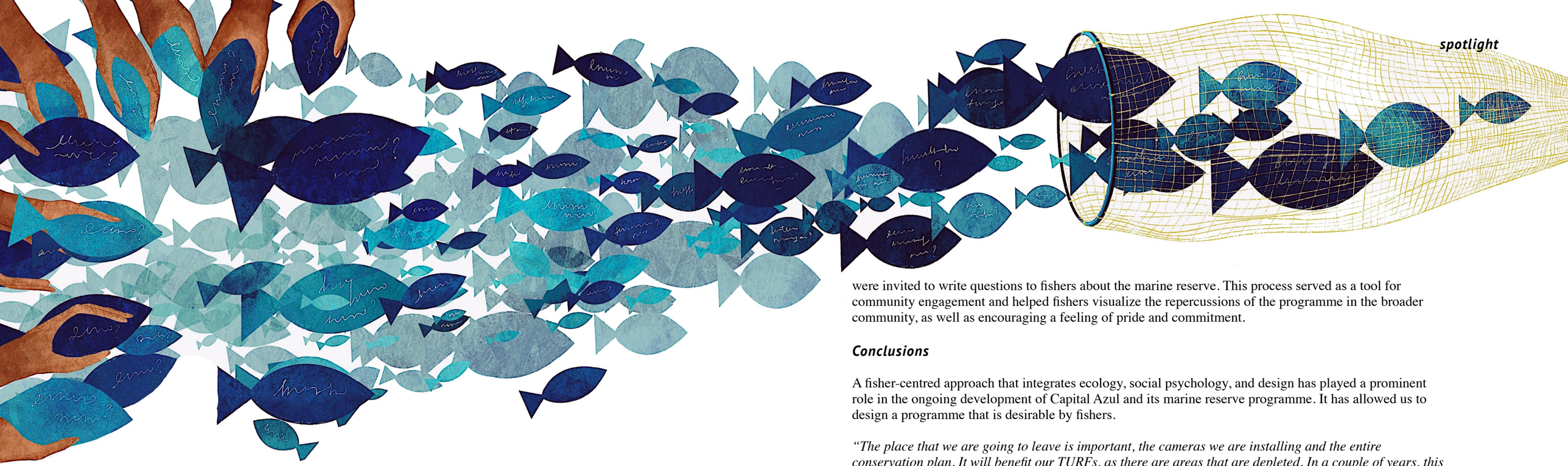
### Scaling the Capital Azul Marine Reserve Programme

In 2019, we pivoted our efforts toward scaling the programme. This involved four main activities: 1) building human capital to run the programme, 2) conducting social science research focused on scaling, 3) developing a sustainable financing model, and 4) increasing the involvement of the broader local communities in the programme.

We formally established Capital Azul as a Chilean NGO. Supported by a board and programme partners, Capital Azul maintains new and existing relationships with fishing communities, supports surveillance activities, and conducts the annual monitoring of the reserves. The marine reserve programme currently consists of a network of five reserves in central Chile. Only 200 km from the capital Santiago, this region is one of the most densely populated in the country, with no national marine protected areas. Thus, the network is informally complementing the existing national protected network, and serves as a high-visibility example of a voluntary conservation programme to the hundreds of thousands of Chilean tourists that visit the region during the summer months.

We have pivoted our research toward other important questions about scaling conservation programmes, while still focused on designing the programme through the lens of its users—fishers. For example, we are exploring the impact of where the payments come from on participation. It turns out that willingness to participate is greater if programme funding comes from revenue generated from industries interested in offsetting their environmental impact compared to revenue generated from sustainable seafood premiums. Participation also differs, by as much as 30 percent, depending on how familiar you are with similar programmes. These results help us consider programmatic design changes that may improve programme desirability and thus participation, as the programme scales. It also informs our financing strategy. Today, participation is not the limiting factor in scaling the programme in Chile. Thus, much of the work is now focused on developing financing models to be able to better scale the programme.





### The journey ahead

As Capital Azul matures as an organization, we are starting to engage broader coastal communities within the programme. This is based on the recognition that collaboration and support across different local actors will be needed for the programme to be a success over the longer term. Taking an approach that blends community psychology with collaborative arts, we are engaging communities in three distinct ways. First, we are collaborating with communities to define what marine reserves mean for them. Our goal is to create space with communities to integrate local knowledge into the different dimensions of the Capital Azul Programme, with the hope that it will result in an increase in both the value and appreciation of the programme.

*"A child can observe today that some marine life, like reef fish and clams, are gone from our fishing grounds. It should bring her joy to know our marine reserve is important, because from that space, fish, abalone, limpets, and more are going to thrive and reproduce."*
*— Artisanal Fisher, 2020*

Second, we are mapping the community stakeholders that influence and are influenced by the reserve network. Our goal is to conduct a network analysis for each participating community, as actors differ across locations. Some actors seem important across all communities, such as local municipalities that can support the programme in different ways. Other actors, such as tourism operators and educators, can potentially benefit directly via synergistic activities—including potential collaboration across communities. It is also important to identify stakeholders that are potential detractors or that could be harmed from the programme. In one community, for example, fishers recognized young spear fishers as detractors of the programme. When we talked with several of them, however, their views were more nuanced and several actually expressed support for the programme and the desire to collaborate.

Third, we are using collaborative art as a tool to explore communities' shared meanings around marine conservation. Collaborative art practice involves artists and communities working closely together as a way to explore engagement and worldviews. Our goal is to bring community members together to share perceptions and values on marine conservation and collectively express them through visual arts. While our broader community engagement is new, early results are encouraging. With the Capital Azul team, fishers in the town Zapallar recently created cardboard figures of local rocky reef fish, which were then put on display at the beach inside a chinguillo—a type of local collecting bag used in the ocean. Beachgoers were invited to write questions to fishers about the marine reserve. This process served as a tool for community engagement and helped fishers visualize the repercussions of the programme in the broader community, as well as encouraging a feeling of pride and commitment.

### Conclusions

A fisher-centred approach that integrates ecology, social psychology, and design has played a prominent role in the ongoing development of Capital Azul and its marine reserve programme. It has allowed us to design a programme that is desirable by fishers.

*"The place that we are going to leave is important, the cameras we are installing and the entire conservation plan. It will benefit our TURFs, as there are areas that are depleted. In a couple of years, this will be a wonderful thing."*
*— Artisanal Fisher, 2020*

Doing so has also allowed us to focus on other important aspects necessary for the programme to scale, such as human capital, programme management, community involvement, and financing. Without sufficient participation, voluntary community-based conservation programmes will not scale. The necessary social science research is rarely conducted *a priori* to understand the conditions under which a programme will attract widespread support and participation. Increasing participation is a function of the overall structure and administration of a programme. By focusing on empathy for participants and learning from the rapid prototyping of programme concepts, we have been able to implement a new approach for marine conservation in Chile that appears to be working—producing social and ecological benefits for local fishing communities and the country.

### Further Reading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Sorice, M.S., C.J. Donlan, K.J. Boyle, W. Xu, S. Gelcich. 2018. Scaling participation in payments for ecosystem services programs. *PLoS ONE* 13(3): e0192211

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# *Plant or animal?*

*Author & Photographer* **Danika Tavora**

My favourite creatures are the ones that stubbornly refuse labels and categorisation.

Deciphering the floral form of a Crinoid rooted to the sea
floor, I am transported back 450 million years,
to a time where all of life is water vascular, sessile and filter-feeding.

Watching its animal arms feeding in the water column,
I am invited into a world where embracing duality
is a perfectly acceptable way to exist.

**Danika Tavora** *is continuously awed by the transformative, expansive power that water wields on people, place & time. She feels passionately about introducing the ocean into people's lives.*