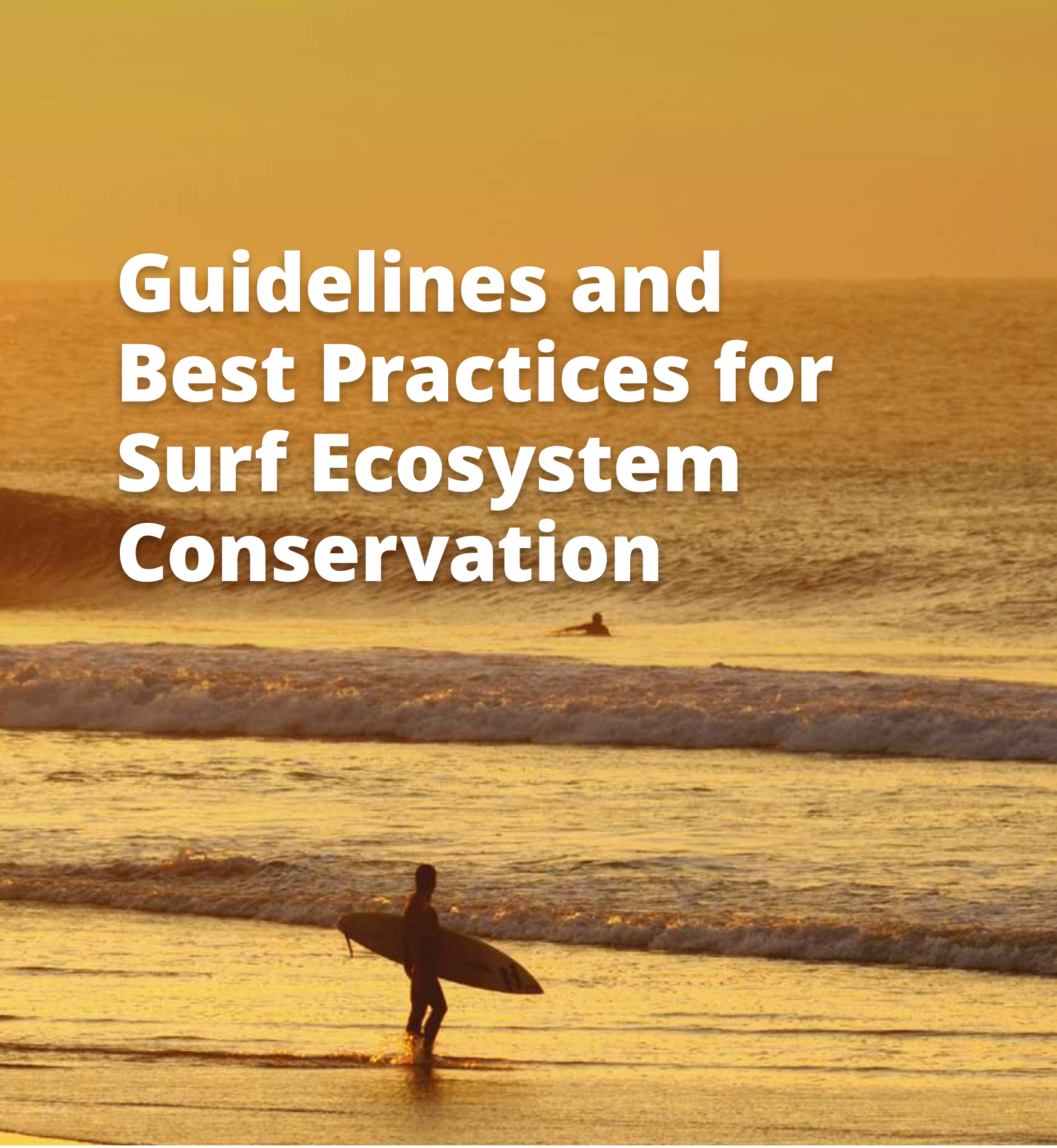
Guidelines and Best Practices for Surf Ecosystem Conservation



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This document was prepared within the framework of the initiative **"Expanding blue economy benefits and conservation of critical biodiversity and ecosystem services through management of surf ecosystems"**, which seeks to promote effective management of marine and coastal ecosystems surrounding surf breaks. Its objective is to ensure the protection of biodiversity and the functioning of these ecosystems, while generating benefits derived from the blue economy in coastal communities in Costa Rica, Panama, and Peru.

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Playa Hermosa, Costa Rica. Site of World Surfing Reserve. Photo by Ryan Chachi Craig.

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This document was made possible by the work of many organizations, communities, governments, businesses, individuals, and other entities around the world who have been implementing surf ecosystem conservation projects and programs for years. We would like to thank all who are mentioned here in the case studies and examples, as well as all others not mentioned who are part of this global effort. This guidance is intended to be the first iteration of a living resource that will be revised, co-developed, and expanded upon in collaboration with the global community of surf ecosystem conservation practitioners.

The document was developed in partnership between Save The Waves Coalition (STW), Conservation International (CI), and the Peruvian Society for Environmental Law (SPDA) as an output for a project supported by UNIDO's Global Environment Facility (GEF) implementing agency to support surf ecosystem conservation in Costa Rica and Peru, while sharing lessons learned and best practices with Panama and beyond.

We also want to thank all of our in-country partners and collaborators under the project, including: Sistema Nacional de Áreas de Conservación Costa Rica (SINAC), Instituto Costarricense de Deporte y Recreación (ICODER), Instituto Costarricense del Turismo (ICT), Federación de Surf de Costa Rica, Municipality of Garabito, Municipality of Parrita, Municipality of Santa Cruz, Municipality of Nicoya, Playa Hermosa World Surfing Reserve, Huanchaco World Surfing Reserve, Illescas National Reserve, the National Surfing Federation from Peru, Servicio Nacional de Áreas Naturales Protegidas por el Estado (SERNANP), Coast 2 Coast, WAVES for Development, EcoSwell, the National Surfing Federation from Panama, and more.

We invite you to join the movement, to collaborate with us in implementing and iterating on these best practices, and to share your additional case studies and best practices in surf ecosystem conservation. Additionally, if you're seeking guidance on implementing surf ecosystem conservation, we are here to help. Let's continue to learn and grow together as we all strive to protect the world's surf ecosystems.

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Playa Hermosa, Costa Rica. Site of World Surfing Reserve. Photo by Ryan Chachi Craig.

Executive Summary

Surf ecosystems support biodiversity, cultural heritage, and local economies. With over 5,000 mapped surf breaks globally, many are in ecologically rich areas that store carbon and sustain marine life. Surfing generates an estimated US $50 billion annually, providing jobs and shaping coastal cultures, while also holding deep cultural and spiritual significance. However, these ecosystems face growing threats from overdevelopment, climate change, and biodiversity loss. A global movement is emerging to protect surf ecosystems, recognizing their role in environmental sustainability and coastal resilience.

This document, developed by Save The Waves Coalition (STW), Conservation International (CI), and the Peruvian Society for Environmental Law (SPDA, for its acronym in Spanish) with Global Environment Facility (GEF) funding, provides key strategies for conservation practitioners, governments, and communities. It covers conceptual foundations for the understanding of surf ecosystems and their benefits, and best practices & implementation strategies for their protection —including mapping, threat assessment, legal frameworks, policy integration, stakeholder engagement, the blue economy, and sustainable financing. The recommendations included in this guidance are accompanied by case studies and examples from around the world— to showcase successes and share lessons learned from surf ecosystem conservation efforts. By combining science, policy, and community action, this initiative aims to ensure surf ecosystems remain resilient and accessible for future generations.

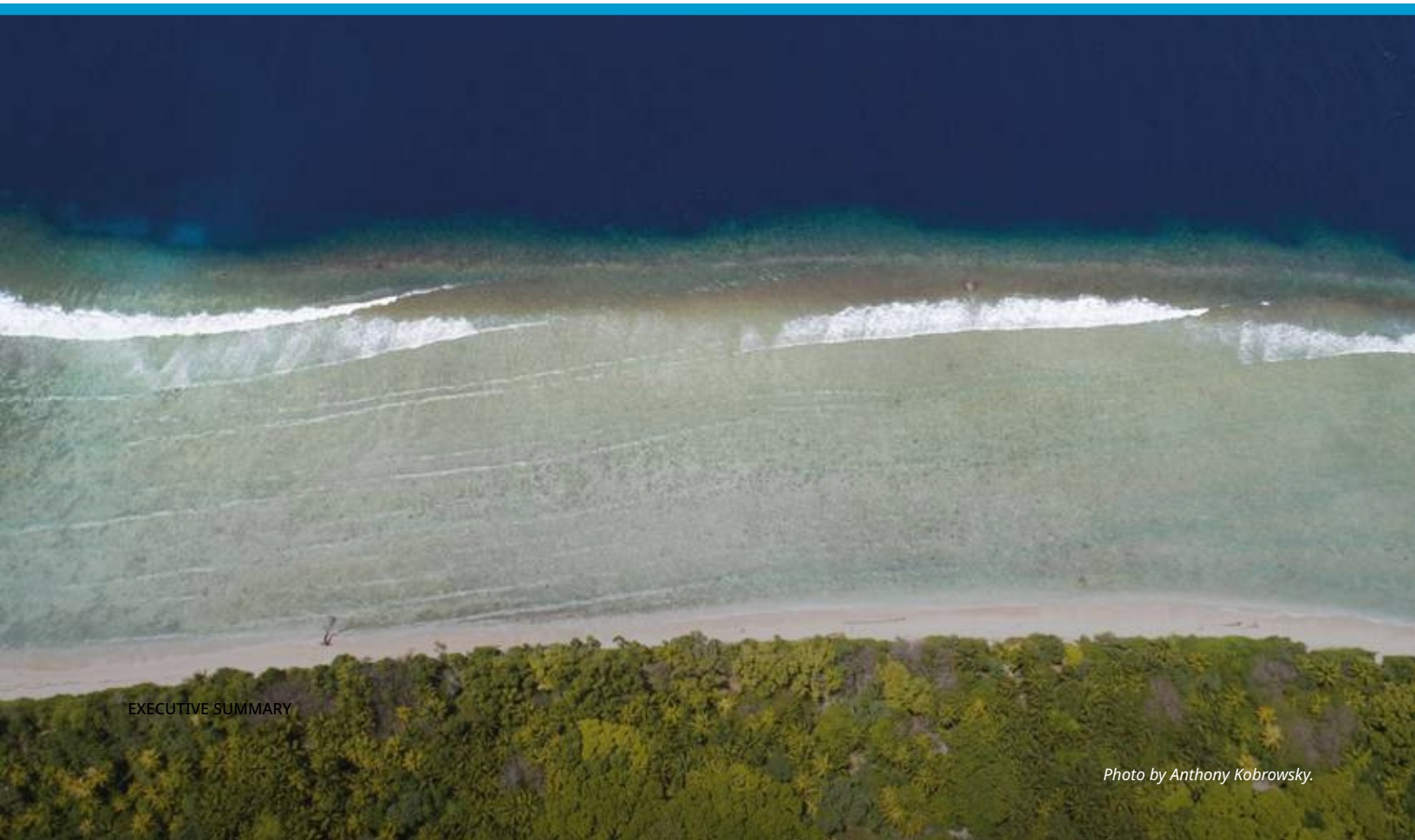

Photo by Anthony Kobrowsky.

Introduction

Globally, there are more than 5,000 surf breaks on the map, thousands of which are located in areas with important biological diversity and ecosystems that are rich in carbon (Reineman, 2021; Bukoski, 2024). Furthermore, surf breaks around the world generate an estimated US $50 billion in total revenue annually for local economies, providing jobs and livelihoods for hundreds to thousands of people (McGregor & Wills, 2016). Surfing is also rooted in traditional indigenous cultures around the world and surf sites play an important role in shaping local culture, history, and lifestyles. Surf breaks and their surrounding ecosystems are more than a recreational playground; in some places they are even considered sacred sites because of the deep connection that people experience with the ocean and nature while surfing (Weinberg, 2013). Unfortunately, the attraction of surfing to more than 35 million surfers worldwide also puts surf breaks under significant threat from over-development and unsustainable use of natural resources. These threats are further exacerbated by issues like global climate change, sea level rise, and biodiversity loss.

Recognizing these growing threats —and inspired by the socio-cultural, economic, and ecological importance of surf breaks and their surrounding ecosystems— a growing number of people and organizations worldwide are working to protect these critically important places. In this document, we refer to these collective efforts to protect surf ecosystems as surf ecosystem conservation. In this guidance, we refer to a wide variety of approaches under the umbrella of surf ecosystem conservation —all of which aim to preserve the integrity of surf breaks and their surrounding ecosystems, while seeking to maintain and increase the benefits that they provide. Due to their diversity of values, the conservation and management of surf ecosystems presents a unique opportunity to address a wide variety of goals— including making significant contributions to addressing climate change, curbing biodiversity loss, improving coastal resilience, promoting human well-being, boosting local economies, and more.

This guidance has been prepared by a multidisciplinary team from Save The Waves Coalition (STW), Conservation International (CI), and the Peruvian Society for Environmental Law (SPDA, for its acronym in Spanish), as part of the project: **Expanding blue economy benefits and the conservation of critical biodiversity and ecosystem services by managing surf ecosystems**, supported by the Global Environment Facility (GEF). The project seeks to promote effective management of marine and coastal ecosystems surrounding surf breaks, and its objective is to ensure the protection of biodiversity and the functioning of these ecosystems, while generating benefits derived from the blue economy in coastal communities in Costa Rica, Peru, and Panama. The purpose of this document in particular is to provide communities, government officials, conservation practitioners, and ocean activists around the world with a foundational understanding of surf ecosystem conservation concepts and a set of best practices to design and implement effective surf ecosystem conservation strategies.

The guidance is structured into two chapters. Chapter 1 introduces the conceptual foundations and principles of surf ecosystem conservation, with the objective of increasing awareness and establishing a shared understanding of surf ecosystems and the benefits they provide to nature and people. In this first chapter, we provide technical explanations of key terms, explain why surf ecosystem conservation is needed, and describe what it takes to protect surf ecosystems. Chapter 2 dives deeper into specific best practices for the design and implementation of surf ecosystem conservation at a national or regional level. Rather than proposing a restrictive approach to surf ecosystem conservation, the guidance summarizes a broad set of best practices and case studies from around the world, offering a diverse menu of options that can be utilized in a variety of contexts. These best practices and case studies cover:

- identifying and mapping surf ecosystems,
- assessing key threats and risks,
- prioritizing places for protection,
- designing legal protection,
- integrating surf ecosystem conservation into public policies,
- engaging key stakeholders in stewardship action,
- capturing the blue economy benefits of surf ecosystems, and
- sustainably financing surf ecosystem conservation efforts.

Overall, the guidance underscores the need for a technical approach to surf ecosystem conservation, combined with durable protection, robust institutions, and an active civil society to ensure the long-term sustainable use of surf breaks and their surrounding ecosystems.

We hope this guidance provides clarity on the foundations and new developments related to surf ecosystem conservation strategies, increases curiosity and interest on the subject, and, most importantly, helps conservation practitioners, activists, and public officers to improve the effective management of surf ecosystems. These special places provide numerous benefits to millions of people on the planet and it is our collective responsibility to keep them healthy and intact for future generations.

CHAPTER 1:

Surf ecosystem conservation fundamental concepts

Authors: Mara Arroyo, Bruno Monteferri, Lucas Lepinard, Scott R. Atkinson, Marissa Anne S. Miller.

Playa Hermosa, Costa Rica. Photo by Esteban Delgado.

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This chapter explores the fundamental concepts and principles of surf ecosystem conservation, aiming to enhance awareness and shared understanding of surf breaks and surf ecosystems as well as the benefits they provide to both nature and people. In this chapter, we provide technical explanations of key terms used in this guidance, explain why surf ecosystem conservation is needed, and give a high-level description of what it takes to effectively and durably protect surf ecosystems.

This chapter includes:

- What is a surf break?
- What is a surf ecosystem?
- Ecosystem services provided by surf breaks and surf ecosystems
- Why is surfing important for biodiversity conservation and climate change adaptation?
- What does it mean to legally protect surf breaks and surf ecosystems?
- What is the blue economy and how is it connected to surf ecosystem conservation?
- What is sustainable financing for surf ecosystem conservation?

Pico Alto, Peru. Photo by Javier Larrea.

1.1. What is a surf break?

A surf break is a natural feature where the hydrodynamic character of the ocean (including swell, currents, tides, and water densities) interacts with seabed morphology and winds to generate waves that can be caught and ridden by surfers (Peryman, 2011). Thus, the presence of a surf break requires specific geophysical conditions to be met. Three factors that contribute significantly to the formation and quality of surfable waves include: the seafloor (e.g., coral reefs, rocks, and sand), the swell corridor (i.e., the path of groundswell as it approaches the coast), and climatic factors (e.g., wind direction, strength, and wave-generating storms). These factors are shaped by geomorphological, hydrological, and climatic processes, which operate across varying time scales, from minutes to millennia, and are susceptible to human impacts.

The seafloor's composition directly affects wave dynamics by determining how and where waves break. Hard substrates (e.g., rocks or reefs) are relatively stable, while soft substrates (e.g., sand) are dynamic, relying on hydrological and aeolian processes for sandbar formation. These sandbar formation processes depend on unrestricted sediment flow, littoral cell connectivity, and the integrity of nearby dune systems. The swell corridor refers to the vast area where distant storms generate waves that travel long distances towards the coast before transforming through refraction, shoaling, and bottom friction—resulting in surfable waves. Wind and storm patterns influence how swells form and travel within the swell corridor in addition to how waves break once they reach the shore. Tides further influence how waves break, especially in areas with high tidal variability, by changing the depth of water over wave-forming features or pushing and pulling water on incoming and receding tides. These dynamic processes, while occurring

over long natural timescales, can be disrupted by short-term human actions like construction or mining. Anthropogenic activities such as ports, jetties, and wind farms can disrupt the swell corridor or seafloor composition, reducing wave quality or even eliminating surfability. On even longer timescales, sea level rise, erosion, and increasing storm intensity (all of which are exacerbated by anthropogenic climate change) further impact how waves form and break.

Scarfe (1999) defines five geomorphic categories of surf breaks:

1. **Point Breaks** - Waves refract around a headland or point, filtering out high-frequency waves and enhancing longer-period, surfable waves. The wave direction at the take-off zone differs significantly from offshore direction. Examples: Malibu (United States), Raglan (New Zealand), Kirra (Australia).

2. **Beach Breaks** - Waves break in peaks along the beach, usually over nearshore sandbars. Wave breaking locations vary based on beach conditions and offshore wave characteristics. Stabilizing offshore/nearshore features can improve wave consistency. Examples: D-Bar (Australia), Tairua (New Zealand).

3. **River or Estuary Entrance Bars** - Surfable waves form due to interactions between tidal currents, river sediment, and wave energy at river/estuary entrances. These conditions are dynamic and subject to change. Some jettied inlets have created quality surf breaks. Example: Whangamata Bar (New Zealand).

4. **Reef Breaks** - Reefs provide consistent wave-breaking patterns and steeper profiles, making them some of the best surfing waves globally. Examples: Pipeline (Hawai'i), Padang Padang (Indonesia).

5. **Ledge breaks -** Steep rock ledges cause intense wave breaking as waves move from deep to shallow water abruptly. These breaks are often challenging, suited mainly for bodyboarding. Example: Shark Island (Australia).

G-Land, Indonesia. Photo by Prastiano Septiawan.

1.2. What is a surf ecosystem?

Waves and surf breaks are intrinsically dynamic as they depend on diverse natural processes that can occur far away from the surf break area (e.g., impacted sediment flow upstream of a surf break, or blockage of a swell corridor offshore). Furthermore, the experience of surfing is highly site-specific, as it is linked to both the unique natural features associated with surf breaks and unique cultural dimensions of surfing in different places. To capture these geological, biological and sociological processes and complexity, and to integrate biodiversity into surf ecosystem conservation efforts, Save The Waves Coalition has developed the concept of surf ecosystems and has included surf ecosystem conservation as part of their strategy.

The concept of a surf ecosystem recognizes that complex systems create challenges for sustainability and require simplification to understand and manage (Baldwin et al., 2016). Thus, the term surf ecosystem acknowledges the need for an integrated approach that considers the multitude of interacting biophysical, social, cultural, and economic drivers and processes required to understand and manage surf breaks (Lloyd et al., 2013).

Surf ecosystems are defined as the land-to-sea interface that creates the conditions for breaking, rideable waves and the flora and fauna and human communities dependent upon it (Strong-Cvetich et al., 2025). Therefore, a surf ecosystem is more than a wave: it's the interconnection between the geophysical (e.g., bathymetry, watersheds, sediment flow), the biological (e.g., biodiversity and productivity of the plants and animals), and the socioeconomic dimensions (e.g., human wellbeing, economies, and cultures) that make a surf break and its surrounding environment unique and important. Protecting surf ecosystems, in turn, protects coastal and marine habitat and biodiversity, maintains the resilience of the coast, safeguards local livelihoods, and contributes to people's wellbeing (Strong-Cvetich et al., 2025).

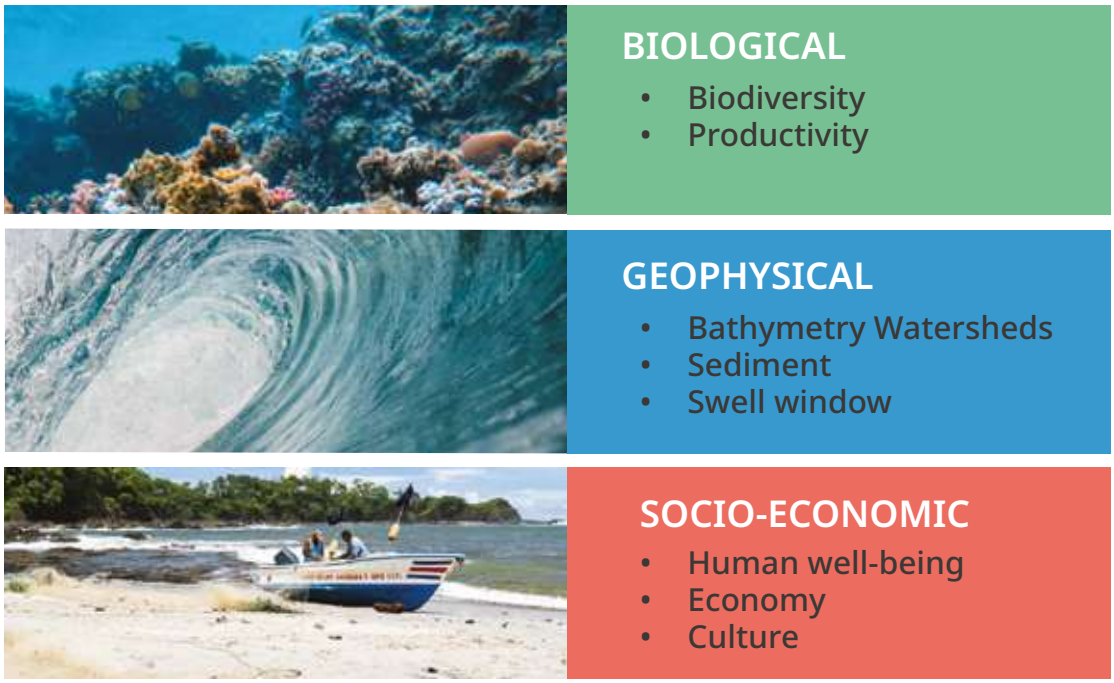

Figure 1. *Surf Ecosystem Components. Source: Save The Waves Coalition.*

From this comprehensive view, surf ecosystems can be understood through three interrelated components:

1. **Biological Components.** The biological components of a surf ecosystem include the living reef, marine plants, microbes, resident organisms, as well as visiting organisms such as algal blooms, pinnipeds, cetaceans, sharks, migratory birds, turtles, pelagic fish, and humans. The biological components of a surf ecosystem also include the biodiversity and ecosystem services or values held within the surf break and surrounding ecosystem, including carbon storage and climate adaptation or mitigation values.

2. **Geophysical Components.** The geophysical components of a surf ecosystem include all the factors that make a wave break, including the swell corridor and bathymetry (e.g., rocks, sand, and sediment), which determine shoaling and seafloor slope, refraction and reflection (e.g., at headlands), breaking speed, and peel angle. This also includes upstream processes that impact bathymetry such as watershed impacts and sediment or dune movement.

3. **Sociocultural Components.** The sociocultural components of a surf ecosystem include a place and its people's history, identity, place-based knowledge, and attachment to a surf break and surrounding area. It also includes the livelihoods, tourism, surf industry, sport culture, and well-being (e.g., psychological and physical health benefits) that surf breaks contribute to society. Sociocultural components also include issues that are not necessarily positive, such as localism, exclusion, or inequities in surfing.

Gold Coast, Australia. Photo by Luke Sorensen.

Playa Nosara, Costa Rica. Photo by Ryan Chachi Craig.

1.3.

Ecosystem services provided by surf breaks and surf ecosystems

The multiple benefits that nature provides to society and that make human life possible are known as ecosystem services (Costanza et al., 1997). These services are essential for human well-being and include both direct and indirect contributions to economic and social systems. Costanza et al. (1997) categorize ecosystem services into four main types:

1. **Regulating Services:** These include climate regulation, water purification, flood control, and disease regulation. These help maintain environmental conditions that support life.

2. **Provisioning Services:** These refer to tangible goods provided by ecosystems, such as food, fresh water, timber, and medicinal resources.

3. **Cultural Services:** These are non-material benefits derived from ecosystems, including recreational, aesthetic, and spiritual values.

4. **Supporting Services:** These sustain other services and include fundamental ecological processes such as soil formation, nutrient cycling, and primary production.

Ecosystem services have immense economic value, even though they are often overlooked in traditional markets. Costanza et al. (2011) estimated the global economic value of these services at US $125 trillion annually, emphasizing their significance to policy and decision-making. This immense value underscores the need for conservation and sustainable management of ecosystems to ensure the continued provision of these vital services.

Surf ecosystems provide diverse types of ecosystem services. Coastal ecosystems surrounding surf breaks serve as a vital source of food and nutrition, with coastal fisheries and aquaculture supplying seafood to millions worldwide. Coastal wetlands, mangroves, and coral reefs in and around surf breaks act as natural storm barriers, reducing the impact of storm surges and flooding on coastal communities. Ecosystems like mangroves, seagrasses, kelp, and coastal forests also play a crucial role in climate regulation by sequestering carbon dioxide, helping mitigate climate change. Surf ecosystems also offer important economic opportunities for coastal communities through surfing, fishing, ecotourism, and other activities.

Surf breaks also support mental and physical health and well-being, providing people with recreation, aesthetic inspiration, cultural identity, and spiritual experiences related to the natural environment. Studies on the benefits of spending time in marine environments have shown that there are positive effects on both health and happiness for people living close to coasts (White et al., 2016). Other studies specific to surfing have shown the cognitive benefits of surfing for special needs groups (Armitano et al., 2015), the physical benefits of surfing for children with disabilities, and surfing's contribution to significant increases in wellbeing and confidence for youth suffering from social exclusion or mental health issues (Godfrey et al., 2015; Stuhl & Porter, 2015).

Many high quality surf breaks are also integral parts of iconic seascapes where there is a strong local surfing culture, a world-class stage for surfing competitions, a source of world-class surfing talent and influential surfers, and a gathering place for surfers from around the world; this is true, for example, in places such as Malibu (California, USA), Jeffrey's Bay (South Africa), or the north shore of O'ahu, Hawai'i. Surfing and surf breaks have also inspired many forms of art, from fashion (e.g., surf brands such as Quiksilver) to indigenous tattoo art in the Polynesian islands. In a survey of over 1,000 California surfers, Reineman and Ardoin (2017) found that the majority had a significant place attachment to their surf breaks.

Overall, the protection of surf breaks and surf ecosystems represents an opportunity to protect the integrity of unique coastal ecosystems while also supporting and perpetuating a wide variety of ecosystem services and benefits to people.

Cabo Blanco, Peru. Photo by Javier Larrea.

Playa Hermosa, Costa Rica. Photo by Dixiana Salas.

1.4.

Why is surfing important for biodiversity conservation and climate change adaptation?

Recognizing the significant and diverse values of surf breaks and surf ecosystems, recent peer-reviewed studies have explored the potential for the protection of surf ecosystems to contribute significantly to broader conservation and climate change goals by assessing where surf breaks overlap with highly biodiverse and carbon rich ecosystems. Reineman and colleagues (2021) mapped the co-occurrence of surf breaks with existing marine protected areas and biodiversity hotspots and found that 26% of a total of 3,755 surf breaks assessed are located within five kilometers of Key Biodiversity Areas, (KBAs), the most important places on earth for species and their habitats, and at least 63% of the surf breaks assessed are not yet within protected areas.

Building on the analysis on the overlap of KBAs and surf breaks, Bukoski and colleagues (2024) analyzed the irrecoverable carbon stored in surf ecosystems. Irrecoverable carbon refers to the vast stores of carbon in nature that are vulnerable to release from human activity and, if lost, could not be restored by 2050. They identified 88.3 million metric

tonnes of irrecoverable carbon held in surf ecosystems within 1 kilometer of the shoreline in coastal watersheds surrounding 4,830 surf breaks globally, 17 million metric tonnes of which is within KBAs and not yet protected. The irrecoverable carbon stored in these ecosystems more than doubles when the assessment area is expanded to a 3-kilometer buffer around surf breaks and is nearly 1 billion metric tonnes when assessing entire watersheds surrounding surf breaks—demonstrating the high value of utilizing a0 ridge-to-reef approach to surf ecosystem conservation.

Photo by Javier Larrea.

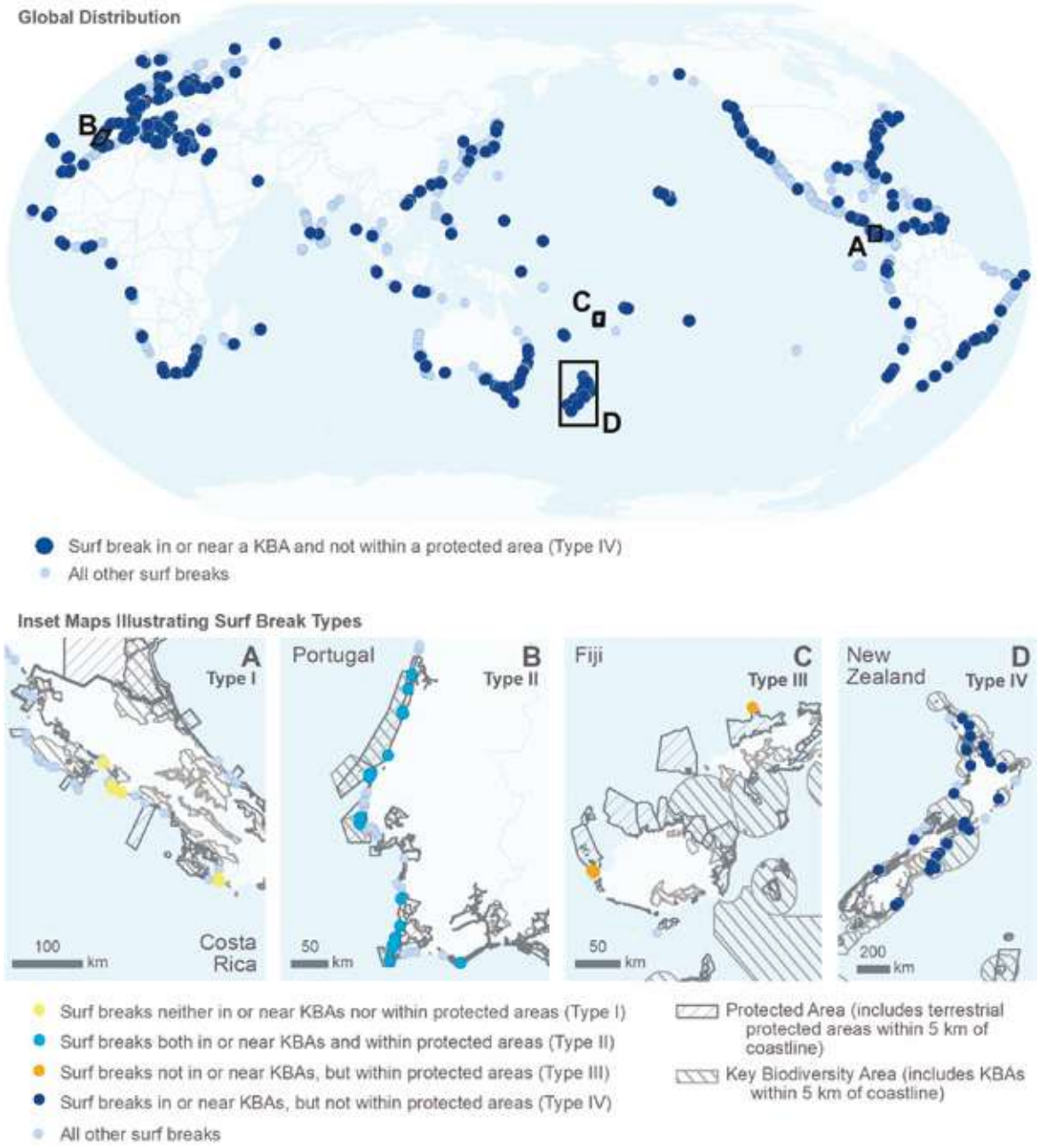

Figure 2. *Global distribution of surf breaks in or near Key Biodiversity Areas and within or outside of protected areas, demonstrating the potential for surf ecosystem conservation efforts to contribute to global biodiversity conservation goals (Reineman et al., 2021).*

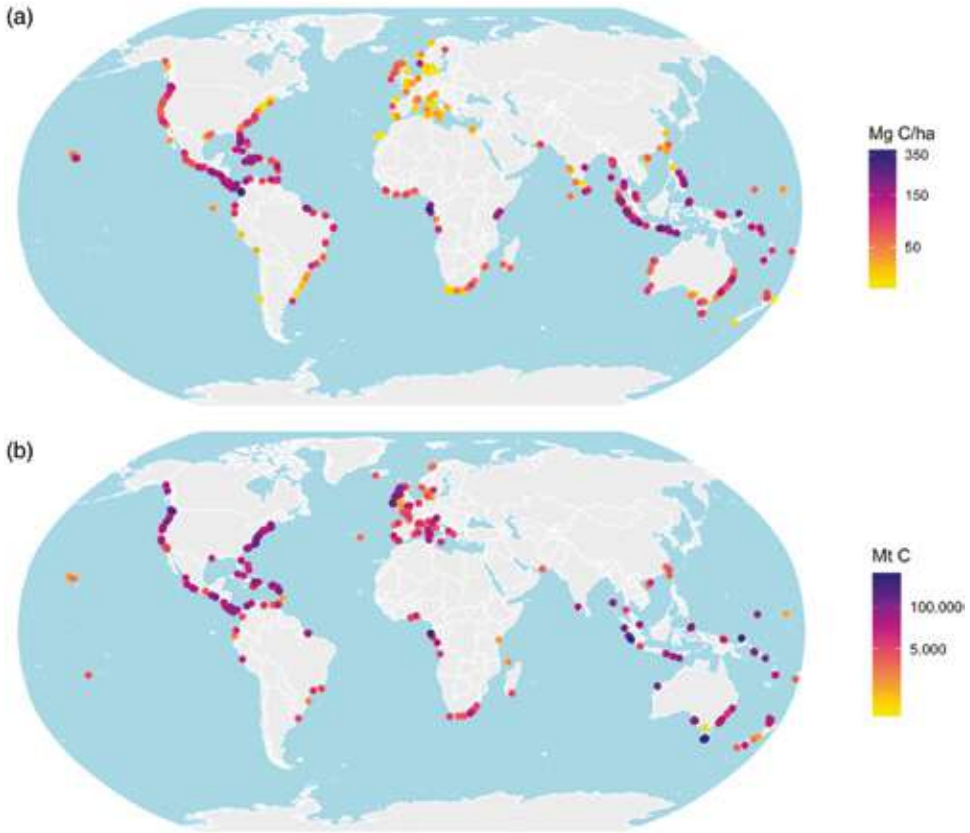

Figure 3. *Global distribution of (a) average density (in megagrams of carbon per hectare) of irrecoverable carbon found in all surf ecosystems, and (b) total irrecoverable carbon (in million metric tonnes of carbon) in surf ecosystems that are in Key Biodiversity Areas but are not yet under protection. Only surf ecosystems with average irrecoverable carbon densities >20 Mg carbon per hectare are shown (Bukoski et al., 2024).*

In addition, surfing is growing globally in popularity with an 80% increase projected in the next ten years, especially after its successful debut as an official Olympic sport in 2020. Currently, there are over 35 million surfers globally and the global surf travel industry contributes an estimated US $50 billion to local and international economies. Surfers worldwide are a critical constituency for conservation because they love the ocean and millions of the world's surfers understand that the ocean is threatened and are motivated to protect it. In summary, surf ecosystem conservation can play a key role in engaging broader coastal constituencies and creating new partnerships to advance conservation. Furthermore, surf ecosystem conservation can be mainstreamed into broader marine and terrestrial conservation strategies, contributing meaningfully to global priorities and targets like those under the Kunming-Montreal Global Biodiversity Framework for Biodiversity Conservation (a landmark global framework with targets for halting and reversing biodiversity loss by 2030).

Photo by José Javier Barragán.

1.5.

What does it mean to legally protect surf breaks and surf ecosystems?

Non-statutory mechanisms in response to surf ecosystem threats, such as campaigning and litigation, have been used to protect surf breaks around the world with varying degrees of effectiveness. Given that the list of surf breaks affected by infrastructure projects continues to increase every year, the use and enhancement of legally binding measures to proactively protect surf breaks is a key priority. A surf break is legally protected when formal regulations are in place and effectively enforced to proactively prevent activities that could negatively impact the surf break's geophysical components and the enabling conditions for its safe recreational use (Monteferri, 2021).

Rieblich (2013) suggested that legal protection for surf breaks should consider the protection of all three main components of a surf break, including: (a) submerged lands, (b) swell corridor, and (c) access. Building on such frameworks and efforts to conserve surf breaks, Monteferri (2021), in collaboration with Save The Waves Coalition, proposed a framework for the holistic or comprehensive legal protection of surf breaks. This framework, which will be further explained in Section 2.4, proposes the following components:

- Formal recognition of surf breaks in legal frameworks, including a comprehensive definition of surf breaks;
- Formal inclusion of surf breaks in official maps, including clear coordinates of the surf break area;
- Concrete obligations to ensure the protection of surf breaks' physical components,
- Conditions that enable the safe recreational use of surf breaks;
- Clear authority mandates and participatory processes, to strengthen governance for the enforcement of protection measures; and
- Conservation of the surrounding ecosystems as well as the cultural and historical values associated with surf breaks.

Figure 4. *Monteferri & Arroyo (2022). Protect your Waves: Surf Breaks Legal Protection. SPDA and STW.*

In order to achieve this comprehensive protection, surf breaks should be legally protected on multiple levels, which could materialize using a mosaic of legal tools, as it is difficult to protect all components of a surf break and their surrounding ecosystems with a single legal tool (Reiblich, 2013; Monteferri et al., 2019; Monteferri & Arroyo, 2022). This requires establishing the following legally binding measures:

1. A surf break must be expressly recognized in formal regulations as a stated objective of protection, and the area encompassing its components should be geographically defined.

2. Prohibitions must be established to prevent activities that could negatively affect the surf break's physical components and the conditions on which wave quality depends.

3. Regulations must also be in place that require all proposed infrastructure projects in coastal areas and rivers to demonstrate a finding of no significant impact to any surf breaks in the vicinity.

4. Regulations must be instituted that protect the enabling conditions for the recreational use of the surf break (e.g., access, water quality, and safety).

5. Policies should seek to protect not only the surf break but also its surrounding ecosystems, including the cultural and historical values associated with the surf break.

6. Governance must be strengthened for the sound implementation of surf ecosystem conservation policies, and civil society organizations should be strengthened as they play a key role in advocating for improved policies and holding government authorities accountable.

As further explained in Section 2.4, legal protection can be established by policies enacted by different levels of government (national, regional, or local) and can utilize a diversity of legal schemes, such as enacting specific laws for surf break protection or incorporating surf breaks into integrated coastal management plans and policies, protected area regimes, and other mechanisms.

Todos Santos, Baja Mexico. Site of World Surfing Reserve. Photo by Nikki Brooks.

Caballito de totora in Huanchaco, Peru. Photo by Walter Wust.

1.6. What is the blue economy and how is it connected to surf ecosystem conservation?

In this guidance, we define the blue economy as "the sustainable use of ocean resources for economic growth, improved livelihoods, and job creation while preserving the health of ocean ecosystems" (World Bank, 2021). Core components of the blue economy include established ocean industries, such as fisheries, tourism, and maritime transport, as well as new and emerging activities, such as offshore renewable energy, aquaculture, seabed extractive industries, marine biotechnology, and bioprospecting (World Bank & United Nations Department of Economic and Social Affairs, 2017). While the blue economy encompasses a wide range of ocean-based and coastal industries, this guidebook focuses specifically on surfing and surf-related activities as an entry point for both sustainable economic development and conservation. In this guidance, we also discuss other economic activities beyond the blue economy that relate to or impact the surf ecosystem; for example, land-based economic activity like farming or tourism development can directly affect surf breaks through eutrophication, sedimentation, habitat destruction, pollution, or erosion, but if well-managed, they can also contribute to the economic viability of the surf ecosystem.

As explored in greater detail in Section 2.7, surfing can represent a significant part of the blue economy by generating revenue, employment, and development opportunities for coastal communities. Mach and Ponting (2021), employing a direct cost method, estimated that international surf tourism expenditure was valued between US $31.5 to US $64.9 billion per year and surfers reported being willing to collectively pay between US $1.99 billion and US $4.1 billion more annually for sustainable surf tourism products.

Several case studies have also quantified surfing's financial contributions to local and regional economies. Through Surfonomics research, organizations like Save The Waves Coalition have determined the economic value of surf breaks and surfing to local communities to help decision-makers make better choices to protect their coastal resources and waves. In Uluwatu, for example, a 2014 study estimated that surfing contributes US $35 million annually to the local economy (Save The Waves Coalition, 2020). This economic value stems from spending on accommodations, restaurants, surf schools, transportation, guiding services, and retail businesses catering to surfers and surf tourists.

However, while surfing contributes significantly to local and regional economies, it is also widely recognized that surf tourism can generate negative social and environmental impacts if not managed properly. Potential impacts include exploitation of local workers, community displacement, conflicts over scarce resources, and profits disproportionately benefiting multinational companies rather than local residents (Towner & Davies, 2019). In some cases, the influx of tourism has led to an increase in property prices and the cost of living, which can displace or marginalize local residents and reduce their access to natural resources (Ericson et al., 2023). These dynamics highlight the urgent need for inclusive, long-term, and sustainable surf ecosystem management which includes equitable blue economy benefits for local people.

To manage surf ecosystems effectively, it is essential to consider their human dimensions. Coastal communities are not just passive beneficiaries but active participants in these ecosystems, with livelihoods that both depend on and directly impact the geophysical, biological, and socioeconomic dimensions of surf ecosystems. In the face of climate change, shifting tourism dynamics, and overly exploitative practices, coastal communities are increasingly vulnerable to resource scarcity and environmental degradation. Over time, these stressors can "trap" local communities in negative feedback loops—where reduced resources lead to unsustainable practices which, in turn, accelerate environmental decline. Developing the blue economy sustainably and equitably presents a framework to not only balance human needs with that of the natural environment, but also to break this negative cycle of poverty and degradation. In the best cases, conservation practices coupled with economic opportunity, improved livelihoods, and job creation can create a virtuous cycle that simultaneously enhances human well-being and ecosystem health and resilience. It is important to recognize that improved economic conditions alone do not necessarily

lead to stronger conservation outcomes. In some cases, they can enable more intensive resource extraction. Therefore, strong local governance, incentives, and safeguards are necessary to ensure that blue economy initiatives remain equitable, sustainable, and conservation-oriented.

WHAT ARE DIVERSIFIED LIVELIHOODS AND WHY ARE THEY IMPORTANT?

Diversified livelihoods are one tool within the blue economy framework that refer to engaging in multiple income-generating activities to reduce reliance on a single resource, enhancing resilience and environmental sustainability. Diversified livelihoods that are linked to or benefit from conservation actions are especially important because they provide direct social and economic incentives for communities to support long-term conservation goals (Salafsky et al., 2000). For example, a coastal community may combine surf-related activities —such as offering surf lessons, surf-guiding, surf photography, or eco-friendly surf lodging— with other complementary or traditional income streams like artisanal craft-making, small-scale agriculture, sustainable fishing, or reef monitoring. This approach allows households to benefit from the tourism economy while participating in broader conservation initiatives. When designed thoughtfully, these livelihood strategies reduce the pressure on marine resources while fostering local ownership of conservation outcomes and local benefits from blue economy activities. Diversified livelihoods can allow community members to continue long-standing livelihoods like traditional subsistence fishing practices while also participating in new income-generating activities like surf tourism, which increases income resilience and introduces new opportunities while allowing for sustaining customary traditions.

Thoughtful investment in diversified blue economy livelihoods —particularly those linked to surfing and conservation— can play a key role in achieving durable surf ecosystem conservation. As explored in greater detail in Section 2.7, these efforts should be approached with careful planning, community engagement, and a deep understanding of local community motivations to ensure they support, rather than undermine, long-term sustainability goals.

Photo by Javier Larrea.

1.7.

What is sustainable financing for surf ecosystem conservation?

Sustainable financing for the conservation of surf ecosystems refers to recurring, predictable, long-term funding from reliable sources that fully or partially cover the costs of ongoing surf ecosystem conservation initiatives. This is important to reduce dependency on short-term or unpredictable funding sources and ensure that surf ecosystem conservation efforts are financially viable in the long-term.

It is recommended to identify potential sources of sustainable financing early in any surf ecosystem conservation effort. Establishing sustainable financing can typically take several years and may take longer than it does to set up legal protection.

There are numerous options for sustainable financing, including those listed below. It is important to acknowledge that each finance mechanism must be assessed for feasibility within each local context or application, as some options are only viable when certain enabling conditions are present. More detail and case studies on each of these is provided in Section 2.8 of this guidance.

Sustainable financing mechanism options:

- Visitor fees or user fees
- Business contributions
- Site-specific fundraising or crowdfunding
- Community fundraising
- Government appropriations
- Payment for ecosystem services
- Large-scale conservation financing schemes (e.g., debt-for-nature swaps or project finance for permanence)
- Global, national, or local funds
- Technology-oriented finance schemes

Sustainable financing is a critical component of building the long-term durability of surf ecosystem conservation efforts. However, it is most impactful and long-lasting when combined with other critical elements of durability, including: ensuring local community and stakeholder leadership and support, promoting socioeconomic and cultural benefits for communities, and building a supportive enabling environment (including government, legal, and private sector support) for surf ecosystem conservation.

CHAPTER 2:

Identification, prioritization and strategizing for surf ecosystems conservation

Surf camp in Sumba, Indonesia. Photo by Marissa Miller.

This chapter provides a summary of best practices for the design and implementation of strategies for surf ecosystem conservation and enhancing blue economy benefits at a national or regional level. Rather than proposing a restrictive approach to surf ecosystem conservation, the guidance summarizes a broad set of best practices and case studies from around the world, offering a diverse menu of options that can be utilized in a variety of contexts. This chapter includes best practices and case studies for:

- Identifying and registering surf breaks and surf ecosystems
- Identifying and categorizing main threats to surf breaks and surf ecosystems
- Strategic prioritization for surf ecosystem protection
- Legal protection for surf breaks
- Integrating surf ecosystem conservation into public policies
- Stakeholder engagement
- Assessing and capturing economic benefits of surf ecosystems
- Sustainable financing schemes for surf ecosystem conservation

Each section of this chapter contains a description, best practices, and case studies. The description provides a high-level introduction to the section topic, followed by best practice recommendations and guidance, which are supported by case study examples from around the world. For easier navigation and reference throughout the guidance, each best practice and case study has been numbered. Overall, this chapter underscores the need for a technical approach to surf ecosystem conservation, combined with durable protection, robust institutions, and an active civil society to ensure the long-term sustainable use of surf breaks and their surrounding ecosystems.

Playa Hermosa, Costa Rica. Photo by Ryan Chachi Craig.

2.1.

Identifying and registering surf breaks and surf ecosystems

Authors: Laura Zumbado, Mara Arroyo

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The identification and registration of surf breaks and surf ecosystems can occur at the national, regional, provincial, or even district level. Engaging with local communities (see Section 2.6 for more information on stakeholder engagement) is key to obtaining accurate place-based knowledge of local surf break characteristics, including information on their location, quality, and variability. Integrating this community-based information with scientific approaches can contribute to more resilient protection of surf ecosystems (Arroyo et al., 2020; Skellern et al., 2013).

For surf break registries, Atkin et al. (2019) calls for the creation of a comprehensive surf database where surf breaks are clearly described and characterized. The surf database should have clearly geo-referenced information, allowing both the surf break and surf ecosystem to be mapped utilizing simple, open-access platforms such as Google Earth or more specialized geodatabases. The surf database should initially aim to include the following information for each surf break: a specific surf break point, the full surf break area, and the swell corridor(s). After each surf break and its swell corridor are mapped, the surrounding marine and terrestrial ecosystems that are linked to each surf break can then be identified and mapped to provide a full surf ecosystem map. A fully comprehensive surf ecosystem map can take several studies, efforts, and iterations to be completed (see Case Study #2 on mapping the Playa Hermosa World Surfing Reserve).

This mapping process also helps identify data gaps or missing information about the surf break and surf ecosystem that future studies might aim to address. These knowledge gaps should not be seen as restrictions, but rather as an opportunity to engage deeply with local surfers, academia, and businesses to jointly reduce these knowledge gaps and promote further stakeholder engagement (as covered in detail later in Section 2.6). This initial identification process also provides a critical foundation for establishing legal protection of surf breaks and surf ecosystems (see Section 2.4 on legal protection of surf breaks). The initial identification and mapping process also serves to provide key data on baseline conditions, against which future data or future scenario modelling can be compared. The surf database should expand with quantitative and qualitative data over time, as more studies are conducted or new knowledge is acquired, allowing practitioners and communities to make informed decisions on how best to manage surf ecosystems or appropriately respond to threats (Mead & Atkin, 2019).

BEST PRACTICES

BEST PRACTICE #1:

Developing surf break and surf ecosystem databases at different scales

Surf break databases can vary greatly depending on the selected spatial scale or area of analysis used. Variations can range from a 1:5,000 scale for hyper-local (1.6 km^2) analyses to a 1:8,500,000 scale for a national or multinational (1.5 million km^2) analysis. Larger analyses allow for aggregating high-level surf break and surf ecosystem data across broader jurisdictions, while hyper-local analyses enable the use of more granular or site-specific data and inclusion of detailed geophysical information about the surf breaks and surf ecosystems within the area of interest.

When developing a surf break and surf ecosystem database, in order to determine the appropriate scale or spatial extent of the analysis, it is important to consider a variety of factors or existing boundaries, including political (jurisdictional areas like municipalities, provinces, states, or countries), geophysical (e.g., land division by mountains or rivers), and ecological (e.g., extent of ecosystems of interest) factors. The extent of the analysis should be determined by the goals and scope of the surf ecosystem conservation initiative.

Thus, a best practice is to define the spatial scope of the surf ecosystem conservation initiative before the surf database development, to ensure alignment with surf ecosystem conservation priorities. Subsequent analyses can refine the database at either a broader or more detailed scale to accommodate future data requirements or changes in priorities and objectives. The complexity of developing a database differs significantly in the quantity of surf breaks and the quality of the data, with scale selection influencing data representation (see Figure 5). Thus, it is important to ensure the feasibility of developing the database at the selected scale, based on resources and data available.

Additionally, a best practice is to consider identifying and registering surf ecosystems on a broader scale, where feasible, to enhance opportunities for regional interconnectivity of surf ecosystem conservation efforts. Figure 5 demonstrates how surf breaks may appear overcrowded at a broad scale, yet sparse or dispersed at a smaller scale. This example examines the difference between a hyper-local map of several surf breaks in Playa Grande, Costa Rica, compared to a regional-level map of surf breaks along the entire Guanacaste

province in Costa Rica. This illustrates how the area's surf breaks may seem densely populated at the provincial scale but underrepresented at the hyper-local level.

Figure 5. *Comparison of the level of detail for a surf break geodatabase at two scales: left at 1:1,000,000 and right at 1:40,000. In this Costa Rica example, the left shows the provincial level analysis of Guanacaste while the right shows the community level analysis of Playa Grande, Marino las Baulas National Park. Sources: Google Maps and (SINAC, 2019).*

BEST PRACTICE #2:

Using publicly available data and engaging local stakeholders to develop comprehensive publicly available surf databases

Surf reports, analyses, travel guides, and forecast websites serve as valuable resources for surf break identification. A best practice is to use open-access platforms, such as WannaSurf, to provide an initial geo-referenced database with fundamental surf break information, then expand on this data through collaboration with local stakeholders to ensure the creation of a fully verified and locally informed database (see Case Study #9 on New Zealand's surfer participation).

The surf database should include key elements and attributes of each break, such as: formal and informal names, location, accessibility, consistency, type of wave, optimal swell direction, optimal wind direction, and level of difficulty. Mapping the full surf break area and swell corridor is also key to informing legal protection measures (see Section 2.4).

Legal and technical stakeholders can also support this mapping with the expertise required to define alternative surf break influence areas, if information on each actual surf break area is not available. For example, in Peru, a one kilometer buffer around the identified surf break coordinate was utilized for establishing a protected area (see Case Study #11 on Peru's legal protection of surf breaks).

Finally, by making platforms publicly available, collaboration between researchers, practitioners, and community members is promoted. However, when developing publicly available surf databases, it is important to evaluate whether any included surf breaks are regarded as 'secret'. Adequate local community participation should also help ensure that lesser-known local surf breaks or 'secret' breaks, unknown to the broader public, are not publicly registered nor disclosed as a result of the surf ecosystem conservation process. Accidental inclusion of secret breaks in official maps or lists of surf breaks could increase their vulnerability to threats like coastal development and overcrowding. Disclosing the location of otherwise secret breaks should only be part of a surf ecosystem conservation strategy if there is broad consensus from the local community that a public campaign would help protect the break from an imminent threat. This should be carefully considered with all key stakeholders in the campaign.

Punta Conejo, Mexico. Photo by Save The Waves.

BEST PRACTICE #3:

Considering a surf ecosystem approach when adopting and collecting data

When identifying and registering surf breaks, a best practice is to conduct an ecosystem-based analysis to understand the broader geophysical components that influence wave formation beyond the direct components of the surf break. This analysis should consider both terrestrial and marine ecosystems to develop a comprehensive surf ecosystem perspective. Analyzing wave types and wave formation characteristics provides insights into the dependence of surf breaks on surrounding ecosystems, facilitating the recognition of interconnected ecological relationships.

For instance, it is important to understand that surf breaks are dynamic and that their conditions are influenced by sediment flow; thus, damming a nearby watershed or building a pier (while not necessarily located directly within the surf break area) can have significant impacts on the quality of a surf break. Therefore, a full understanding of surf ecosystems, including the resources and conditions that enable the surf break's unique and explicit surfing conditions, is essential for effectively managing them and enhancing the blue economy benefits they yield.

This analysis should document the existing surf-enabling conditions and areas of influence, drawing on scientific data and studies, local knowledge, and technical analysis. Depending on local conditions, the resulting mapped area of influence may extend beyond the zone of breaking waves to encompass a portion of the swell corridor offshore, or it may extend terrestrially to encompass part of the watershed upstream of the surf break.

CASE STUDIES

CASE STUDY #1:

Identification and mapping of surf breaks through a Surf Conservation Index

The Surf Conservation Index (SCI) is a methodology developed by Save The Waves Coalition that helps identify potential sites for surf ecosystem conservation and provides a way of prioritizing surf breaks based on the highest surf ecosystem conservation potential. The SCI methodology was originally developed for Mexico and Costa Rica, and was adapted from a multi-criteria analysis methodology developed for Indonesia. The geospatial analysis in an SCI is based on a Pressure-State-Response framework, which assesses locations based on pressure (human activity nearby that can impact the surf ecosystem), state (the quality of surf, biodiversity, social value, etc.), and response (existing responses to socio-environmental issues such as protected area designations). Data is compiled for each of these indicators and overlaid on all the mapped surf breaks in a country, then the information is consolidated and normalized to produce a final SCI value for each surf ecosystem. This framework helps assess and understand the complex interactions between humans and the environment in surf ecosystems and should help facilitate communication between different groups of relevant stakeholders (Arroyo et al., 2023).

The process of identifying surf breaks to utilize in an SCI analysis usually builds off of existing public surf break databases as a baseline, leveraging open-source forums and establishing partnerships with surf guides and other private businesses with curated national and/or global surf break data sets. In mapping surf breaks for an SCI, all available data sets are usually cross-referenced and combined to form a more comprehensive database of surf breaks in the country. Often, this is followed by a participatory process for data validation, which includes stakeholders from surfing communities across the geography under analysis. Depending on the spatial extent of the country, a geographically-representative group of local surf experts can help validate existing data and provide additional data on surf break location and characteristics to be utilized in the SCI. Generally, multiple local stakeholders representing different regions in the country are included in this process to avoid potential regional biases in wave quality and to ensure “secret” surf breaks are excluded, as needed. Additionally, local support from the national surf federation, local surf associations, and tourism bureaus is recommended to obtain the most accurate and locally-sensitive surf break database.

Key information to include in this surf break database (and to validate with local experts) for adequate identification, mapping, and analysis includes: (a) the exact coordinates of each surf break (which provides the basis of the whole SCI analysis), and (b) the unique characteristics of each surf break, including wave quality, experience level required to surf there, consistency of surf (how often it can be surfed), and type of wave (beach break, reef break, point break, etc.). When developing an SCI, identifying and mapping the surf breaks for analysis is the first and most important step, as well as the most time consuming, as all geospatial analyses are calculated relative to the location of each surf break in the country. Including local stakeholders early in the process can help ensure local buy-in and a collaborative analysis that frames results in the local context, making the SCI more valuable to local partners and decision-makers.

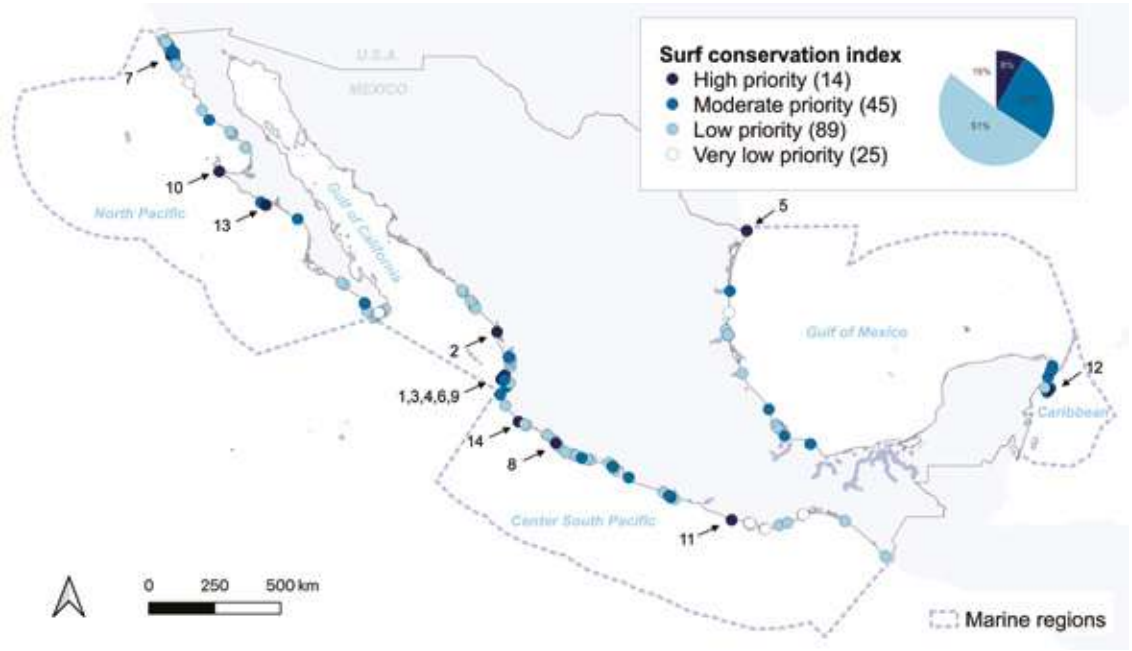

Figure 6. *Example of Surf Conservation Index results for Mexico, showing SCI ranking for surf breaks across the country.*

CASE STUDY #2:

Playa Hermosa World Surfing Reserve ecosystem mapping

Playa Hermosa's World Surfing Reserve (WSR) ecosystem mapping was carried out in two stages. The first stage gathered input from experienced local surfers only, which was followed by a second stage that invited broader surfer participation and incorporated open government data into a technical analysis. As part of the WSR application process, this initial classification of surf breaks was performed by mapping and characterizing key wave features in the area.

The primary guiding questions included:

- Where are the main surf breaks?
- What are the key characteristics of the surf breaks?
- What makes the wave unique and valuable for so many?

These questions were explored while maintaining the confidentiality of certain lesser-known surf breaks and following the parameters of surf break characteristics provided by Save The Waves, including: wave quality, wave variety, surfable days, and sports relevance.

Figure 7. *Initial surf ecosystem mapping at Playa Hermosa highlights differences in user experiences. Source: Playa Hermosa World Surfing Reserve application (2019).*

As understanding evolved through initial workshops and exploratory site visits, a more detailed participatory analysis was conducted, guided by the following questions:

- What's the influence area of these surf breaks?
- What are the geophysical elements that enable this wave?
- What roles does the surrounding ecosystem play in the wave formation and quality?

Systematic analysis of governmental sources provided the surfers with additional information to support informed responses. This information provided linkages within ecosystems and surf-enabling geophysical elements. Geo-referenced data included watersheds, flooding areas, historic changes in land use, conservation gaps analysis, and topography, among other data.

The final analysis resulted in the classification of surf breaks and the identification of the broader surf ecosystem. The key identified elements included:

- The wetland ecosystem – essential for reducing water velocity, controlling sediment, and regulating water table pressure
- The rocky system – causing waves to break and shaping wave formation
- The rivers – responsible for shaping river mouth breaks while supplying nutrients and sediments that nourish sandbars
- The mangroves – which slow and retain water from the Tulin River while providing sediment control
- The Pochotal lagoon – which shaped the coast and contributed to the formation of temporary intertidal lagoons.

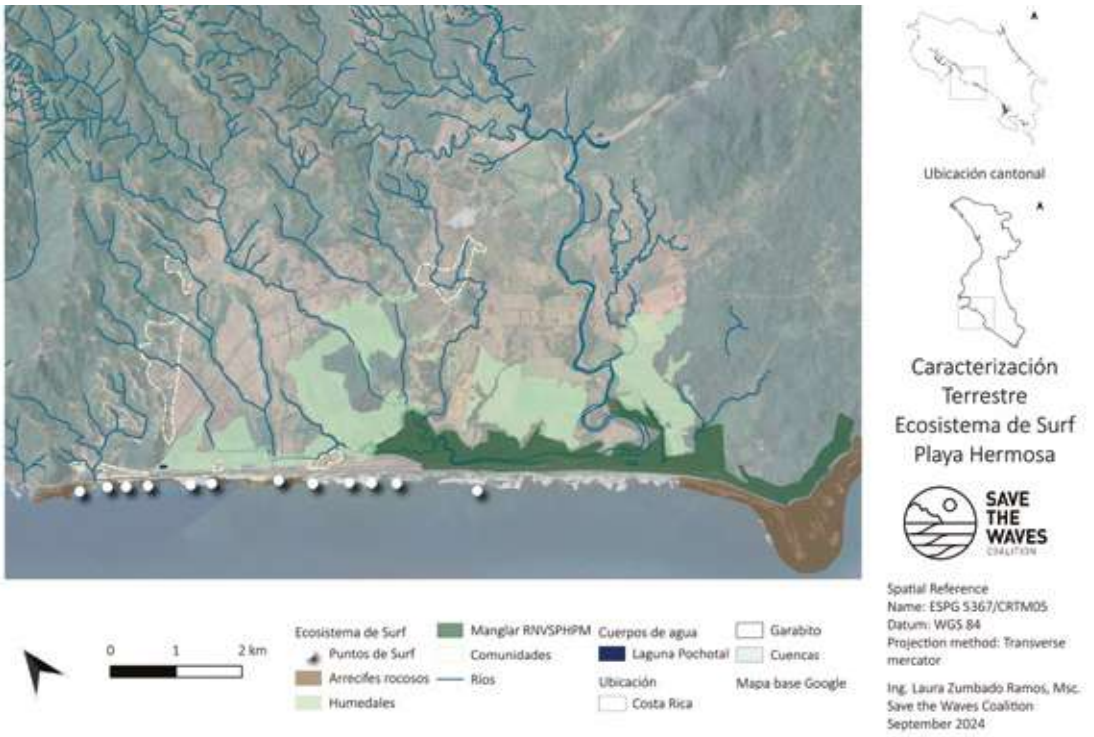

Figure 8. *Results of participatory mapping of Playa Hermosa World Surfing Reserve. Source: Integrating surf ecosystem protection in Playa Hermosa Punta Mala Wildlife Management Plan.*

Playa Bonfil, Acapulco, Guerrero from Mexico SCI report. Photo by Jesús Salazar.

CASE STUDY #3:

Participatory mapping for Punta Conejo's surf ecosystem

The Mexican coastline of Oaxaca hosts incredible biodiversity, punctuated by unique mangrove wetland ecosystems, which contribute to effectively storing substantial amounts of the world's carbon. These coastal ecosystems also create the conditions for approximately 17 well-known and world famous surf breaks, helping anchor a resilient tourism economy dependent on the unique geophysical and biological characteristics of this place. Unfortunately, this coastline is facing serious threats from industrial development, which brings significant water quality issues (including, most recently, a serious oil spill), heightens the coastal impacts of climate change, and will alter traditional marine uses for local fishing communities as well as visiting surf tourists.

In 2019, Save The Waves joined local partners to launch the #SalvemosPuntaConejo campaign opposing a proposed port project, securing 291,000 signatures in support of the petition. A community workshop and participatory mapping session was carried out with local surfers, businesses, fishermen, biologists, and community leaders to solidify a grassroots, community-driven strategy. Additionally, Save The Waves began to develop the required technical studies to designate Punta Conejo, the lagoon of Salinas del Marqués, Playa Azul, Playa Guelaguichi, and Playas de El Morro Mazatán as a natural protected area (according to Mexican environmental law and UNESCO).

Participatory mapping is a collaborative geospatial data collection process where maps are created to visualize and represent community spatial knowledge and socio-environmental perception of a given territory. These maps show elements that the community perceive as relevant for any conservation strategy. Participatory mapping is a useful tool for Integrated Coastal Zoning and Management (ICZM) and Marine Spatial Planning (MSP). Participatory mapping helps to go beyond descriptions and graphically build the history of territories, their conflicts, actors, relationships, threats and opportunities.

For this campaign, the scale mapping technique was utilized to present accurate georeferenced data. In scale maps, local knowledge is gathered through conversations around the map and then drawn directly upon the map. Scale mapping is a practical and fast technique because it uses formal cartographic protocols, and the information on the map can be easily verified on the ground. Information can also be easily incorporated into other mapping tools such as GIS. This technique is low cost and generates quick outcomes.

Steps for Participatory Scale Mapping include:

- Give a brief introduction to the importance of maps as tools for the social construction of the territory and the management of natural resources.
- Delimit the boundaries of the territory to be mapped.
- Define the elements of interest (elements to be indicated on the map and the symbolism to be used).
- Start collaboratively sketching elements onto a scale map of the zone of interest.

Two key outcomes of these workshops and meetings were: (1) the approval by the communities to support the proposed conservation project, and (2) the completion of the cartographic mapping of priority areas for conservation. As a result, the communities proposed a conservation area of 3,212 acres of coastal ecosystems for environmental protection, including wetlands, mangrove forests, beaches, surf breaks, coastal dunes, and more.

Playa Hermosa, Costa Rica. Photo by Dixiana Salas.

Lobitos, Peru. Photo by José Javier Barragán.

2.2. Identifying & categorizing main threats to surf breaks and surf ecosystems

Authors: Laura Zumbado, Mara Arroyo, Scott R. Atkinson

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A surf break threat is anything that can change the break's natural character, restrict access, raise health and safety concerns, or permanently harm or destroy the wave itself. Surf ecosystem threats are broader, as they include natural or anthropogenic potential sources of harm or impact on any one of the surf ecosystem components (biological, geophysical, and socio-economic).

Surf ecosystems worldwide are under threat from the global impacts of climate change, such as sea level rise, ocean acidification, and ocean warming (Scavia et al., 2002; Harley et al., 2006; Caldwell & Segall, 2007; Hoegh-Guldberg & Bruno, 2010; Caldwell et al., 2013; Hemer et al., 2013; Reguero et al., 2013; Espejo et al., 2014; Reineman et al., 2017). These will impact, as studied by Sardprour and Reineman (2023), swell generation, wave breaking, wave height and period, depth, seafloor composition, coastal sediment processes, and local ocean surface conditions.

Surf breaks are not only susceptible to these large-scale, global threats, they are also impacted by a wide range of anthropogenic activities, from small-scale localized impacts to large-scale industrial operations with broad environmental implications. This includes coastal development, coastal erosion, overcrowding, marine debris, sewage spills, oil spills, and other pollution events (Corne, 2009; Caldwell et al., 2013). Surf break threats can even come from activities intended to support local communities or boost local economies, such as coastal construction projects (e.g., ports, harbors, coastal hardening, and infrastructure development), dredging and beach nourishment, offshore aquaculture, or mining (Atkin et al., 2019; Ball, 2015; Reiblich, 2013; Touron-Gardic & Failler, 2022).

Maladaptive infrastructure development can be a serious threat to surf ecosystems, particularly when decision-makers aim to protect expensive beachfront infrastructure at the expense of preserving coastal dynamics and surf breaks. Surf breaks also experience "cross-system threats," which include not only threats in the immediate vicinity but also threats originating from activities farther offshore that cut off swell corridors, or terrestrial and inland activities that impact sediment flow and prevent wave-creating sandbars from forming (Álvarez-Romero et al., 2011; Atkin et al., 2019; Reineman et al., 2021).

Thus, it is important to consider not only the direct impacts to a surf break but also impacts to geophysical elements of the surf ecosystem that the surf break depends upon—including the swell corridor, bathymetry, sedimentation, and wind corridor. For example, construction of a breakwater can block swell from reaching a surf break, resulting in the disappearance of surfable waves. Alternatively, construction of a dam or diversion of water from a river upstream of a surf break could impact sedimentation processes and ruin the quality of a river mouth wave that relies on sediment deposits along the shore in order to break properly. Additionally, construction that blocks or changes wind patterns could impact the quality of waves that are good for barrels, airs, or windsurfing and kitesurfing, all of which require specific wind directions for favorable conditions.

Save The Waves has defined the following threat categories for surf ecosystems:

- **Coastal Development:** Coastal infrastructure such as harbors, jetties, seawalls, coastal armoring, breakwaters, and beach-front construction can destroy or alter both waves and coastal ecosystems. Urban coastal development in the area of influence can also cascade into multiple threats, through alteration of natural hydrology, impacts to sedimentation processes, acceleration of coastal erosion, increases in potential sources of pollution, and contributions to overcrowding.
- **Water Quality Degradation:** Industrial waste, fertilizers, sewage, toxic runoff, and pesticides have negative effects on the health of surfers and nearshore marine life around the world.
- **Watershed Degradation:** Degradation of the watershed through water extraction, blockage or diversion (e.g., dams and aqueducts), deforestation, and rock or sediment extraction for development can alter sediment flows and impact wave quality or exacerbate coastal erosion.
- **Sea Level Rise & Coastal Erosion:** While coastal erosion is natural, development along the coast and watershed can exacerbate or accelerate erosion along river banks and shorelines. This increase in erosion alters the natural flow and replenishment of sediment and sand, thus affecting the quality of surf breaks. Climate change-induced sea level rise can amplify these effects, drowning tide-sensitive reefs and point breaks, and worsening the quality of the surf even further.
- **Coral Reef Impact:** Corals can be destroyed through harmful run-off, destructive fishing practices, and climate change-induced ocean acidification and warming. Coral reefs harbor critical ecosystems and provide the structures that create world-class waves, making it essential to protect these vital ecosystems.
- **Plastic Trash & Marine Debris:** Plastic trash and marine debris impact the coastal environment, economy, and the health and safety of surfers and marine life in surf ecosystems.
- **Loss of Access:** Development and privatization of the coast can eliminate local or public access to coastal areas that host important cultural and historical significance and that provide important health and wellbeing value to local communities. Buying and leasing of coastal land adjacent to surf breaks that can remove local community access, authority, engagement, and management.

The Surfrider Foundation (2024) also acknowledges threats to surf breaks and surf ecosystems such as:

- **Overcrowding:** Excessive visitation (including by surfers) can harm the environmental integrity of the surf break, or areas adjacent to it.
- **Climate Change:** Rising sea levels and water temperatures are also affecting tides, currents, swells, banks, and weather patterns, which define surf breaks' ideal conditions.

- **Visual Amenity Impacts:** The visual characteristics of an area, as seen from the shore and out in the surf, are often undervalued or overlooked in most planning decisions. Surfers and coastal users value the views from the water and from the shore, making the visual integrity of an area important to protect.

Additionally, several other broad threats that can impact the balance of coastal ecosystems and the experience of surfers at a surf break include:

- **Overfishing and Destructive Fishing:** Use of overly-efficient or destructive gear types (e.g., surround nets and small mesh nets, or fishing with compressors, chemicals, and explosives).
- **Habitat Alteration:** Deforestation, mangrove cutting, sand and coral mining, boat anchoring, deep sea mining, oil & gas exploration, and drilling.
- **Natural Occurrences:** Tsunamis, earthquakes, and volcanic activity that change and alter the morphology of coastlines.

While this section focuses on best practices and case studies for identifying and categorizing threats to surf breaks and surf ecosystems, specific guidance and considerations for how to address these threats can be found in Sections 2.4 and 2.5.

FOR MORE INFORMATION:

See examples of threats that endanger the surf ecosystem here:
www.savethewaves.org/campaigns

See Save The Waves Coalition's founding story here:
www.youtube.com/watch?v=0f0jKbVjQ-4

See an example of a campaign against harmful infrastructure here:
www.savethewaves.org/two-years-later-the-campaign-to-protect-maldives-waves

BEST PRACTICES

BEST PRACTICE #4:

Early identification of threats to mitigate and prevent negative impacts

Integrating threat identification and risk assessment into the initial surf ecosystem identification process allows for early anticipation and proactive mitigation of potential negative impacts. Knowing the main threats to a surf ecosystem from the beginning of a surf ecosystem conservation initiative can help guide the timely creation of appropriate mechanisms to address those key threats.

Furthermore, early identification of threats can inform strategic partnerships to address those threats. For example, emphasizing synergies and shared threats between biological and socio-economic factors enhances cross-collaboration, increases accountability, and strengthens connections between different groups of stakeholders and their interests. Identifying synergies between surf break protection goals and traditional conservation goals or other stakeholder priorities can strengthen the case for threat reduction and help mobilize resources quickly and effectively to address shared threats.

When possible, concrete or direct threats (such as planned coastal infrastructure projects) should also be mapped in the surf database by identifying their geographical coordinates, extent, and influence area. This mapping should be used to project potential impacts, inform mitigation efforts, and establish clear monitoring indicators.

Additionally, threat identification should include consideration for the threats created by surfers and surfing itself. Acknowledging the impact of surfers on the surf ecosystem, both individually and collectively, is essential. This includes recognizing and assessing the impacts of factors such as: transportation methods (e.g., planes, boats, cars, ATVs, off-road vehicles, etc.), built infrastructure for surf tourism (e.g., accommodations, restaurants, surf schools, surf shops, public bathrooms and showers, parking lots, beach accesses and trails, etc.), and surf gear (e.g. boards, sunscreen, garments, etc.). It is a best practice to consider —and plan sustainably for— the increasing demand for amenities, resources, and facilities as well as the increasing impact or footprint of surfers that will come with the growth of surfing or surf tourism in an area.

BEST PRACTICE #5:

Implementing participatory and inclusive multi-stakeholder threat identification

Engaging a diverse range of stakeholders through participatory methodologies is essential to harness technical and local knowledge effectively. Incorporating the perspectives of gender-diverse individuals, minorities, and vulnerable populations within a participatory approach ensures that their voices are heard alongside those of traditionally represented groups—promoting more inclusive decision-making and equitable representation.

There are several proven approaches to this that are promoted through conservation planning platforms like the Open Standards for the Practice of Conservation. One approach to participatory threat identification is the combination of community mapping and conceptual modeling, also referred to as problem-solution modeling.

Conceptual modeling and community mapping for conservation planning facilitates stakeholders through a consultative process to identify:

- Resources and ecosystems that important to the community (socially, ecologically and economically).
- Threats to these resources, including the root causes of the threats (also sometimes referred to as problems that are causing or perpetuating the threats).
- Potential solutions to the root causes (problems) that are causing the threats.
- Outcomes that will be achieved if the solutions are successful in overcoming the threats.

During the conceptual modeling process, a best practice is to map the various features that are identified—including the location of important ecosystems and natural resources as well as identified threats and their origins. It is also helpful to add other key features that are important to the community or relevant to threat mitigation, including existing or planned infrastructure and other assets.

This simple process forms an excellent foundation of shared knowledge between the community, government, non-government organizations, private sector enterprises, and other stakeholders—from which a comprehensive plan for surf ecosystem conservation can be developed. The conceptual model and community map can inform surf ecosystem conservation project objectives as well as regulations and community actions to overcome threats to surf ecosystems.

This approach has been used successfully in thousands of conservation projects globally, including by Conservation International, Konservasi Indonesia, and the Indonesian Locally Managed Marine Area Foundation in the establishment of 30 surf conservation areas across Indonesia.

The approach can be combined with other threat assessment methods—including both the Save The Waves App (see Case Study #4) and the SurfCAT tool (see Case Study #5)—to provide a strong foundation for the development of management actions and legal regulations for surf ecosystem conservation.

For more detail on how to conduct this process, refer to the following guide: www.fosonline.org/wordpress/wp-content/uploads/2010/09/FOS_Conceptual_Model_Guide_April2009.pdf

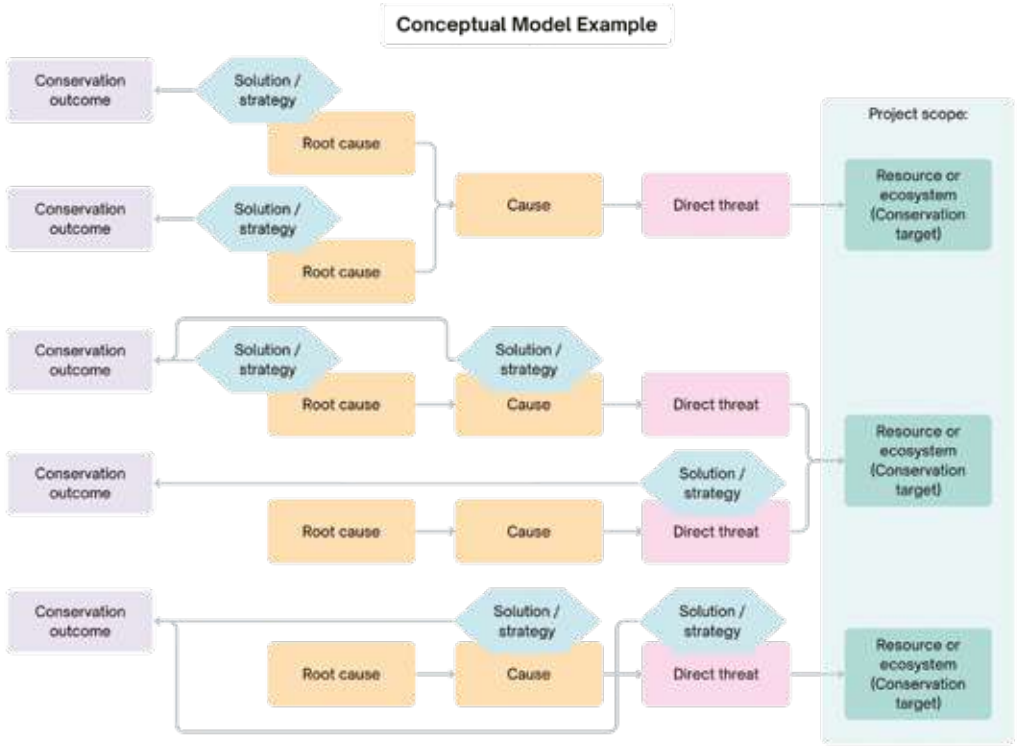


Figure 9. *Example format for conceptual modeling to identify the following: threats, causes of the threats, strategies or solutions to address the threats, and conservation results.*

BEST PRACTICE #6:

Conducting oceanographic and technical studies to demonstrate the impacts a threat poses on surf ecosystem

Scientific studies should be conducted to supplement community-based methods for identifying threats, where possible. Technical studies can help further identify, assess, and mitigate threats, providing evidence-based strategies for environmental impact elimination, reduction, or compensation. Examples of relevant studies include bathymetry baselines and alterations, sediment dynamics, seafloor composition, peeling and breaking points of waves, swell corridor analyses, and other key oceanographic factors. Studies could also focus on evaluating real or potential impacts to water quality or to ecosystems like coral reefs, mangroves, seagrasses, dunes, wetlands, and coastal forests in and around surf breaks.

These studies would be extremely helpful to perform in advance of or during the Environmental Impact Assessment (EIA) stage of marine and coastal development projects, as they can inform how developers might adjust project plans to meet environmental needs and prevent impacts before they occur. The development of these analyses can also establish the legal basis for a surf ecosystem defense process; thus, developing these studies in collaboration with strategic partners can support effective preventative and defensive actions to protect surf ecosystems.

BEST PRACTICE #7:

Promoting science-based communication on the threats and impacts on surf ecosystems

To support the identification and categorization of threats to surf ecosystems, it is helpful to develop compelling visual materials that illustrate, demonstrate, and quantify the impacts of threats on surf breaks and surf ecosystems. Visualizing potential future scenarios for surf ecosystems under threat helps raise awareness and enhance understanding among diverse audiences, which is particularly valuable for advocacy and defense efforts.

Science-based communication materials can serve a variety of purposes in front of different audiences, including: highlighting a new perspective for scientists and practitioners at international conferences, showcasing the extent of impact to surf ecosystems at local councils, supporting testimony in court against a developer, or making concepts tangible and easy to understand for kids learning about conservation in school. Thus, the language, content, and design of communication materials must be oriented and crafted carefully for targeted audiences.

One creative way to communicate information about threats to surf ecosystems is through film-making and story-telling efforts such as the Save The Waves Film Festival, which has shared stories for over 12 years about surf ecosystem threats and protection through an annual collection of short films and documentary features at screenings around the world. The film festival gathers surfing communities together and helps share stories about threats to surf ecosystems in an inspiring and engaging way for diverse audiences.

Another example of science-based communication for surf ecosystem threats is through poster presentations, panels, and workshops at international conferences and events. At the United Nations Decade of Ocean Science for Sustainable Development event, Save The Waves used science based communication to convey information about their work and the importance of surfers' participation in identifying threats to surf ecosystems.

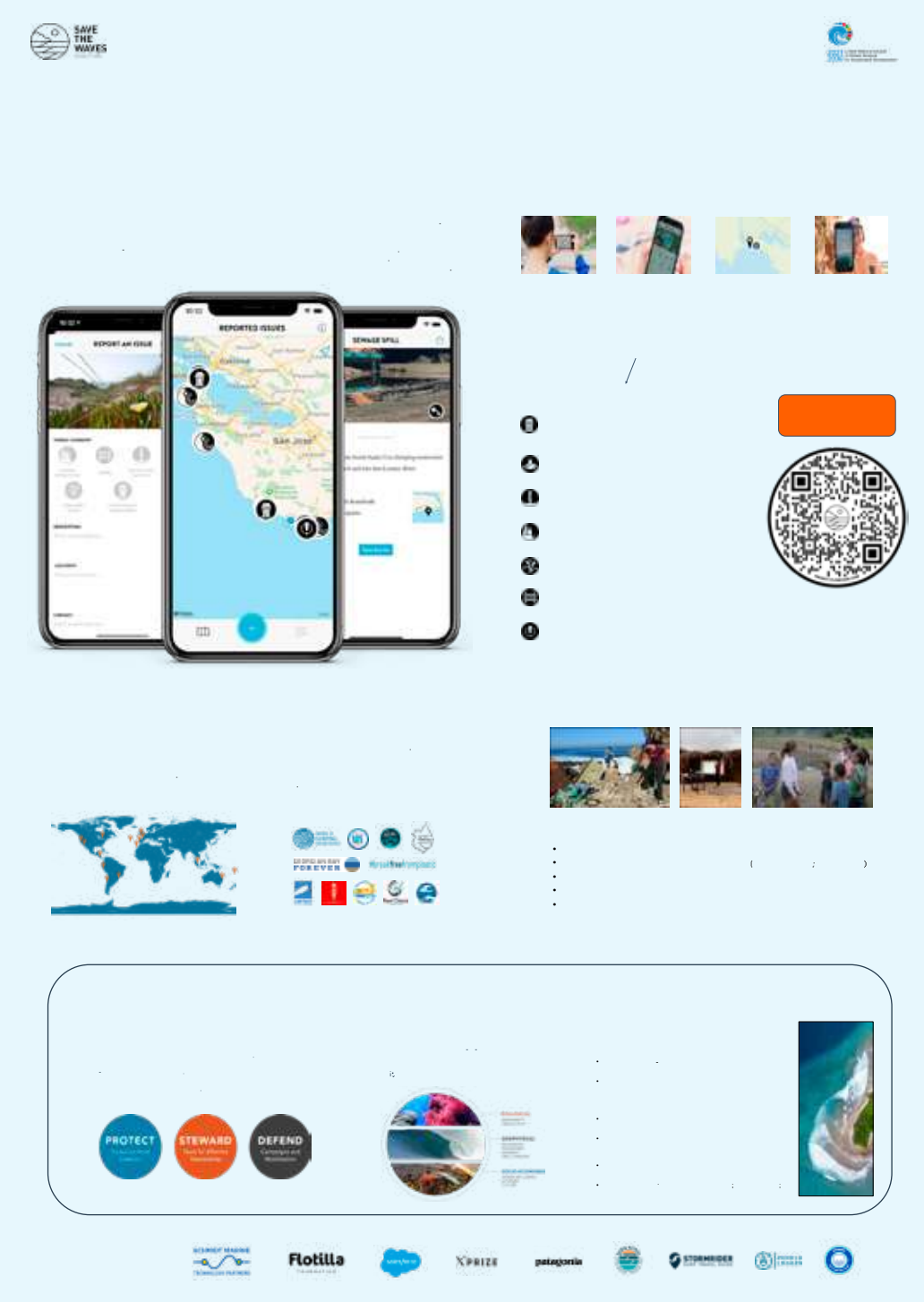


Figure 10. *Poster shared by Save The Waves at the UN Decade of Ocean Science for Sustainable Development event. Source: Save The Waves.*

CASE STUDIES

CASE STUDY #4:

Using the Save The Waves App to identify threats to Santa Cruz World Surfing Reserve

The Save The Waves App is an easy-to-use digital tool and platform for coastal communities and citizen scientists to identify, categorize, monitor, and assess coastal threats to surf ecosystems. The App builds a digital archive of collective records to portray the evolution of coastal threats to a surf ecosystem over time, including the level of intensity and perceptions from community stakeholders. This data can be leveraged by local leaders to build awareness and draw attention to threats and to inform activism, stewardship, government decision-making, and impact assessment reports. Partnerships between communities, Save The Waves, and the private sector have resulted in high engagement and reduction of threats to surf ecosystems, including the creation and implementation of long term monitoring programs leveraging real-time data flows.

In California's Santa Cruz World Surfing Reserve, the erosion impacts from strong winter storms in 2023 were monitored by local surfers and shared with decision-makers at the City of Santa Cruz. These issues reported by surfers on the App have also motivated the involvement of the World Surfing Reserve (WSR) in the City of Santa Cruz's West Cliff Drive Adaptation and Management Plan and its 50-year vision, which aims to chart out a path for the future amidst a changing climate and increasing coastal erosion risk. Additionally, everyday issues such as trash have been identified by App users at key hotspots, such as the San Lorenzo River; in response, the WSR has led beach clean ups and community workshops to address pollution hotspots, working closely with local authorities.

The App provides a platform to facilitate engagement of diverse individuals, organizations, and government agencies in collectively identifying and addressing threats to surf ecosystems. By providing specific, crowd-sourced, and mapped data, the App creates a sense of ownership in communities, supporting the effective stewardship of surf ecosystems and fostering local conservation leaders and locally-led initiatives.

RESOURCES:

Save The Waves App reports and success stories can be seen here:
www.savethewaves.org/app

Available for iOS here:
apps.apple.com/us/app/endangered-waves-by-stw/id1317823560?ls=1

Available for Android here:
play.google.com/store/apps/details?id=org.savethewaves.endangeredwaves

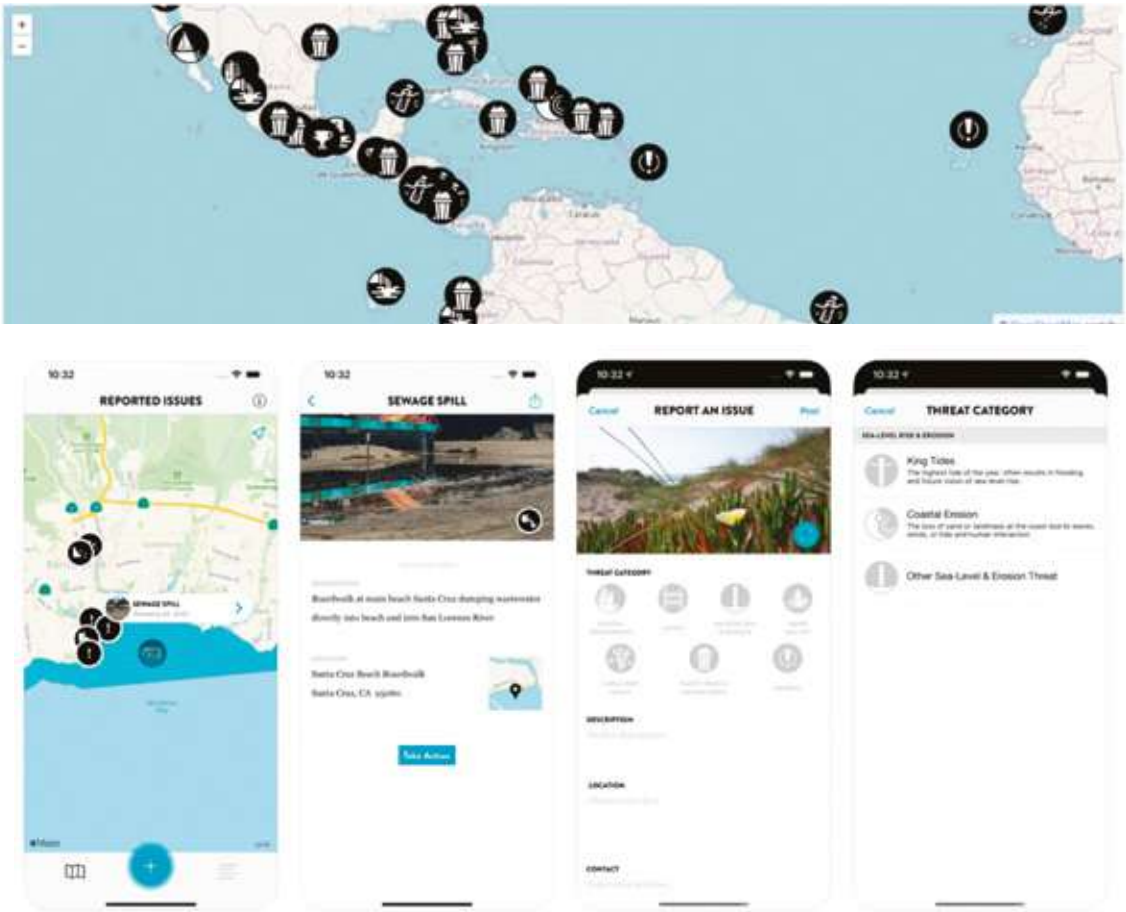


Figure 11. *Save The Waves App imagery.*

CASE STUDY #5:

Using SurfCAT to analyze climate vulnerability in World Surfing Reserves

The Surf Break Vulnerability Climate Change Assessment Tool (SurfCAT) was developed by Sadrpour and Reineman (2023) as a multi-criteria risk assessment tool that leverages local surfers' knowledge and existing literature to evaluate and communicate the vulnerability of surf breaks to climate change. SurfCAT identifies key factors of surf breaks threatened by climate change, including tidal sensitivity, seafloor composition, shoreline resilience, swell sensitivity, biotic substrate, and historical impacts. These help determine whether a surf break faces low, medium, or high risk and guides communities and decision-makers in addressing critical concerns.

SurfCAT was implemented as a digital survey across all World Surfing Reserves (WSRs). Each WSR stewardship council met with relevant stakeholders to analyze and develop the assessments for surf breaks within their respective WSR boundaries. Participant groups ranged from 2 to 9 individuals, with participants averaging between 15 and 40 years of experience surfing the breaks under evaluation.

The results quantified the level of risk for each surf break while simultaneously enhancing the capacity of WSRs to respond to climate-related threats. The next steps will include adjusting WSR management plans to incorporate mitigation and adaptation measures in high-risk areas.

Surf Break Vulnerability – Climate Change Assessment Tool (SurfCAT)

Based on: N. Sadpour & D.R. Reineman. 2023. The impacts of climate change on surfing resources. Shore & Beach 91(1):32-48.

Principal Factor	Determine	Low Risk	Medium Risk	High Risk	Next Step
Tidal Sensitivity	How sensitive are the waves to tidal changes in relation to bathymetric features?	Low Sensitivity: Waves are consistent on all tides.	Medium Sensitivity: Waves are better on most tides but not all.	High Sensitivity: Waves are only consistent on specific tide(s).	Conduct detailed analyses of wave quality tidal sensitivity using local surf knowledge or established guides and overlay available sea level rise scenarios. This sensitivity may vary based on morphological conditions.
Seafloor Composition	Is the wave quality reliant on sediment transport patterns?	Low Reliance: Typically Reef Breaks.	Somewhat Reliant: Typically Beach or Point Breaks.	Very Reliant: Typically Beach Breaks and Sandbottomed Point Breaks.	Identify any proposed activities that may influence sediment transport such as beach nourishment activities, watershed developments, or shoreline features (e.g., groins, etc.). See Management Activities, below.
Shoreline Resilience	Are there space/time and sediment supply/ processes to enable resilient shoreline migration?	Highly Resilient: No backshore development; natural shoreline and sediment processes are intact to support the ability for shorelines to adjust to changing conditions.	Moderately Resilient: Some backshore development and/or limitation to sediment processes with some ability to adjust to changing conditions.	Not Resilient: Hard armored or fixed backshore (by bluff); sediment processes highly constrained limiting the ability to adjust to changing conditions.	Identify opportunities to maintain or restore natural shoreline processes that support the formation of surf resources, including landward migration as well as transport, and accretion of sediment. Investigations of littoral cell processes and impediments (e.g., headlands, structures, etc.) as well as watershed management activities to facilitate sediment supplies may be needed.
Swell Sensitivity	Is the surf spot sensitive to swell directions (i.e., narrow swell corridor)?	Low Sensitivity: Exposed break that receives swell seasonally to year round.	Medium Sensitivity: Mildly constrained swell corridor; break reliably receives waves seasonally.	High Sensitivity: Highly constrained swell corridor: break needs very specific swell to generate rideable waves.	Identify if any predicted changes in direction, magnitude, and frequency of wave generation will affect break. Carefully consider projects/actions that could further constrain a swell corridor.
Resilience Planning Activities	Has surfing been formally included in adaptation planning?	Included: Surfing/wave riding is explicitly identified in plan(s) as an important recreational, cultural, and/ or economic resource.	Indirect: Recreational activities and/ or cultural resources are mentioned as important resources to consider in adaptation planning.	None: Adaptation plans nonspecific or that do not include emphasis on recreational activities and/ or cultural resources.	Identify what adaptation planning is occurring, at what level of government, and how surfing resources could be included or additionally specifically addressed through policy considerations. Consider ways to integrate the above factors into these processes, particularly as next steps relate to adaptation pathway planning.

Other Factors		Considerations
Historic Impacts	Have prior natural events or anthropogenic activities had impacts on surfing resource quality?	Identify causes or mechanisms of action for impacts and feasibility of continued and/or future impacts. Query local board riders or surf group where veteran surfers of specific locations may have local knowledge of past events, management strategies, and impact.
Biotic Substrate	Does the substrate of the surf break depend on a living organism/ecosystem (coral reefs are most common)?	Identify current health and vulnerability of substrate ecosystem; consider local mitigation actions to address global threats, including marine protected area designation, runoff/sedimentation controls, and others.
Management Activities	Are beach nourishment or other nature-based adaptation strategies planned or in place?	Consider the impacts of surfing resources from past nourishment activities spatially and temporally. Is there a consistent, recurring nourishment program? (i.e., Seasonal or regular activities: inlet/harbor dredging and placement, permanent bypass system, etc.). Have some episodic nourishment activities occurred? (i.e., Sporadic nourishment due to extreme events or only minor maintenance activities). Is there an ongoing monitoring program? What have the impacts been? Are the frequency or magnitude of these activities likely to increase? Can pilot projects/ placement protocols be instituted that emphasize surf resource quality?
Access	Will the shoreline/ nearshore be accessible?	Consider the impacts of climate change and development on the ability of surfers to physically access the beach and nearshore.

Figure 12. *The Surf Break Vulnerability Climate Change Assessment Tool (SurfCAT) matrix. Source: Sardpour & Reineman (2023).*

CASE STUDY #6:

Using pressure, state, impact, and response indicators in the Bahía de Todos Santos World Surfing Reserve

Using the Driving Forces-Pressure-State-Impact-Response (DPSIR) framework, Arroyo et al. (2020) proposed indicators to measure human activities affecting three surf breaks located within Bahía de Todos Santos World Surfing Reserve (BTSWSR) in Ensenada, Baja California, Mexico.

To develop these indicators, a learning community was formed where interdisciplinary teams gathered information through document analysis, participatory methods (e.g., transect walks, focus groups, problem tree analysis, and participatory mapping), and participant observations of the actions undertaken by the BTSWSR Local Stewardship Council between 2015 and 2018. Together, academics, surfers and decision-makers defined the parameters and criteria for the assessment of surf breaks, developing a set of indicators that drew on both qualitative and quantitative data.

These indicators enabled the identification of specific anthropogenic activities affecting surf breaks, their impact on the environment, and actual or potential responses to those activities. DPSIR indicators enabled comparison of states and trends in different surf sites, allowed BTSWSR co-managers to focus on critical issues in need of attention at each surf break, and facilitated the development of specific strategies for an adaptive co-management plan at the BTSWSR. This model could be adapted to other surf breaks around the world, providing new strategies for comprehensive assessment of threats to surf breaks and surf ecosystems and informing conservation and management efforts.

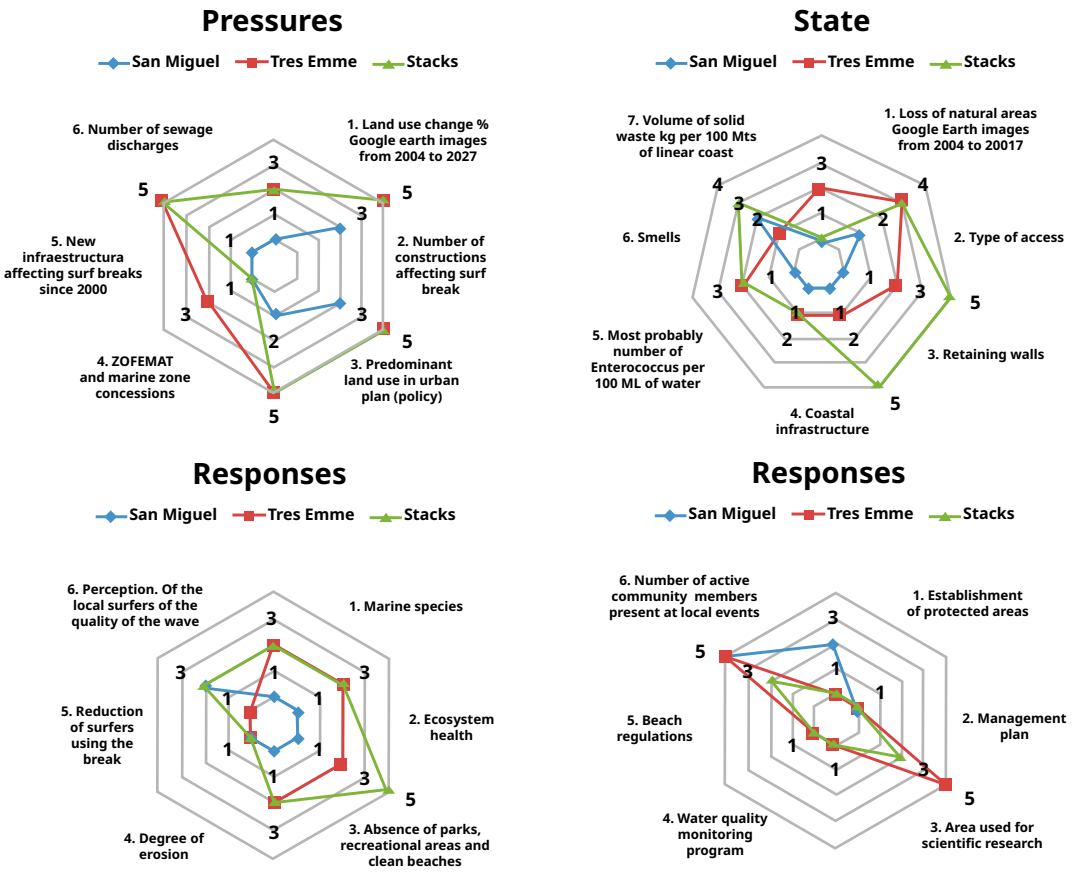


Figure 13. *DPSIR radar chart to compare pressure indicators of the three analyzed surf break sites in Bahía Todos Santos World Surfing Reserve. Note that indicator scores go from lowest (best) level of pressure (1) to highest (worst) level of pressure (5).*

Sumba, Indonesia. Photo by Prastiano Septiawan.

2.3. Strategic prioritization for surf ecosystem protection

Authors: Laura Zumbado, Mara Arroyo, Scott R. Atkinson, Marissa Anne S. Miller

Cite as:
Zumbado, Laura; Arroyo, Mara; Atkinson, Scott R.; Miller, Marissa Anne S. (2025). Strategic prioritization for surf ecosystem protection. In *Guidelines and Best Practices for Surf Ecosystem Conservation*, GEF.

McShane et al. (2011) state that trade-offs are inherent to conservation. The authors discuss how framing conservation as a "win-win" scenario fails to acknowledge trade-offs and their consequences; policy makers, communities, and practitioners need to make difficult decisions and prioritize between competing demands, which often involves sacrifices.

When applying prioritization criteria to decision-making, it is essential to consider, acknowledge, and account for conservation trade-offs. Ideally, prioritization should involve collaborative and multi-stakeholder approaches to optimize objectives and resource allocation (O'Bryan et al., 2023). Community leaders and decision-makers will often face difficult decisions that involve various types of trade-offs, such as: protecting multiple species versus prioritizing an endangered species' habitat; prioritizing biodiversity preservations versus ecosystem service maintenance; or choosing between economic versus environmental needs (e.g., agricultural land-use versus land conservation).

Prioritizing which surf ecosystem—or specific elements within it— to protect can be a challenging task, particularly given the diversity of stakeholder interests in coastal areas surrounding surf breaks. However, given the limited resources available for surf ecosystem conservation, effective prioritization is essential to ensure the efficient allocation of economic, political, and human resources toward impactful conservation efforts. This prioritization process requires: (a) clear definitions of shared conservation objectives and selection criteria, and (b) technical data analysis to determine priorities based on that criteria. Diverse stakeholders may diverge in their perspectives on what to prioritize; thus, establishing shared objectives, developing clear criteria, and articulating the relative weight or importance of selection criteria are all critical to build consensus, align perspectives, and establish a common understanding of how to prioritize surf ecosystems for protection.

BEST PRACTICES

BEST PRACTICE #8:

Defining a set of criteria to guide prioritization

In many countries, surf ecosystem conservation practitioners may have a long-term goal of bringing the majority of the country's surf ecosystems into conservation. However, achieving this goal will take time, making it crucial to begin with locations that hold significant social, political, and ecological importance while also demonstrating a high probability of conservation success. This likelihood of success should be assessed using multiple factors (or criteria), as outlined below. The likelihood of success is particularly important to consider carefully, as early successes in surf ecosystem conservation can inspire continued initiatives to protect surf breaks and surf ecosystems. Early failure, on the other hand, may result in reluctance to pursue additional surf ecosystem conservation efforts.

There are several different tools and examples of criteria that have been used to decide which surf breaks and surf ecosystems to protect first (see Case Study #7-10). Table 1 provides a summary of criteria that may be considered in the prioritization of surf ecosystem conservation or protection efforts.

Table 1. *Potential categories of criteria for surf ecosystem prioritization, adapted from ICLEI, 2023; O'Bryan et al., 2023.*

CATEGORY	CRITERIA	POTENTIAL CHARACTERIZATIONS/RATINGS
Biological and ecological	Habitats	Preserved, Endangered, Eliminated
	Connectivity	Optimal, existent, recoverable, disrupted, eliminated, non-existent
	Endangered species	Nonexistent, protected, existing, threatened, endangered, extinct
	Biodiversity	Globally significant (e.g. Key Biodiversity Area), high, medium, low
	Environmental impacts and threats	Nonexistent, irrelevant, moderate, severe, critical

CATEGORY	CRITERIA	POTENTIAL CHARACTERIZATIONS/RATINGS
Climate adaptation and coastal resilience	Carbon storage or climate change mitigation capacity	Optimal, existent, recoverable, disrupted, eliminated, non-existent
	Climate vulnerability	Minimal, moderate, severe, critical, reduced, worsened
	Coastal resilience	Optimal, disrupted, reduced, non-existent, worsened, improved
Economic	Ecosystem services valuation results and natural capital livelihoods	Dependent, related, independent
	Economic relevance for tourism or sports	Relevant to national economy, relevant to local economy, non-relevant
Political	Alignment with conservation or development policies (at various levels)	In line, relevant, irrelevant, diverging, opposite
	Political leader buy-in or engagement (at various levels)	Understand, support, promote, ambivalent, against, deny
Social	Enthusiasm of surfing community for conservation	Nonexistent, potentially interested, already implementing/executing
	Importance to local culture or history	Very important, somewhat important, not very important, irrelevant
	Diverse and equitable involvement (e.g., participation of women & minorities)	Existing, potential, non-existent, irrelevant
Financial resources	Opportunities for start-up/long-term sustainable financing	Available, reachable, potential, nonexistent
	Sources of sustainable financing	Public, private, international, communal

BEST PRACTICE #9:

Conducting research to inform evidence-based prioritization of surf ecosystems for protection

Prioritization depends on available data, and there are still important gaps in surf ecosystem conservation research. In order to shift away from subjective decision-making, conducting research to showcase the benefits of surf ecosystem conservation is key to informing more science-based and data-driven prioritization and decision-making. This research will also enhance efforts to secure legal protection of surf ecosystems (see Section 2.4) and ensure effective stakeholder engagement (see Section 2.6).

To identify research needs, it is important to first compile existing available data about the surf breaks and surrounding ecosystems in the country, region, or area of interest. Once existing data has been compiled, data gaps and research needs will be easier to identify. It is important to first identify a set of criteria for prioritization before diving into research, as the set of selected criteria will help inform which data gaps are most important to address to inform decision-making. New research should focus on building off of existing research, to strengthen the quality and quantity of relevant data available. Research methods can be adapted to fit the resources, capacities, and time available for conducting research, but methods should aim to follow best practices used in similar studies. A blend of research methods can be used to ensure consideration for a diversity of knowledge systems (e.g., incorporating both western science and traditional ecological knowledge, or both oceanographic science and local surfer knowledge).

For example, if conducting an analysis of biodiversity in surf ecosystems, research methods should utilize existing credible sources of biodiversity data or implement verified methodologies for new biodiversity assessments. It is likely that the former will be less resource-intensive, and the results could be verified by local surf and biodiversity experts from the area to ensure accuracy. If seeking local expert verification or input, it is important to ensure that any local experts consulted are adequately informed of how the information will be utilized, compensated for their time, and recognized for their contributions. It is also helpful to ensure diverse representation when recruiting the participation of local experts (e.g., consider recruiting experts of different genders, ages, and other backgrounds).

When publishing new data about surf ecosystems to inform prioritization, it is critical to be cautious about sharing sensitive information. Thus, it is important to consult with the local community and other stakeholders to ensure that data is utilized and shared appropriately. For example, secret surf breaks might be removed from research publications to minimize the potential for attracting crowds of new surfers or new development nearby.

Lastly, when conducting research, it is important to consider who the audience or stakeholders are. If local decision-makers care deeply about economic profit, it may be important to conduct research on the economic impacts or benefits of protecting target surf ecosystems. If local decision-makers care deeply about biodiversity conservation, it may be important to conduct research on the biodiversity in target surf ecosystems. The interests of stakeholders may also inform where research should be published or communicated to be most effective in informing prioritization for protection.

Stewardship and SurfCAT workshop from Santa Cruz World Surfing Reserve. Photo by Save The Waves.

CASE STUDIES

CASE STUDY #7:

Global prioritization for surf ecosystem conservation efforts to address biodiversity loss and climate change

Conservation International's mission is to protect nature for people, and its surf conservation program is focused on protecting the planet's surf breaks and surrounding ecosystems with the highest biodiversity and carbon storage. To prioritize where to focus its surf ecosystem conservation efforts, the organization collaborated with researchers from California State University Channel Islands, Oregon State University, and Save The Waves Coalition to conduct research aimed at demonstrating where surf ecosystem conservation efforts may be best positioned to help achieve global conservation targets and address the dual biodiversity and climate crises.

These collaborative research initiatives resulted in two peer-reviewed scientific papers. The first paper illustrates that 26% of 3,755 surf breaks assessed are located within five kilometers of Key Biodiversity Areas and at least 63% are not yet within protected areas (Reineman et al., 2021). The second paper shows that there is more than 88 million tonnes of irrecoverable carbon stored within one kilometer of the shoreline in coastal watersheds surrounding 4,830 surf breaks assessed globally, 17 million tonnes of which is within Key Biodiversity Areas and not yet protected (Bukoski et al., 2024). Building from this data, Conservation International and other organizations can better prioritize where surf ecosystem conservation efforts can contribute most effectively to safeguarding biodiversity and securing important carbon storage.

CASE STUDY #8:

Prioritizing efforts to save Endangered Waves

Save The Waves Coalition's Endangered Waves program focuses on supporting local communities and movements to mitigate and defeat immediate threats to waves, or to preemptively protect surf ecosystems before they can be destroyed or altered. This program aims to respond to these situations in a variety of ways, including providing expert advice, strategies, and a global platform to the issues local communities request support with. Communities can submit a request for support through Save The Waves' "Report a Wave" form, found on: www.savethewaves.org/report-a-wave.

The Endangered Waves program utilizes a matrix-based assessment of surf ecosystems at risk to identify the appropriate action to be taken. A variety of categories are considered, including: surfing assets at risk, factors for success, environmental assets at risk, and cultural and economic assets (see Table 2). An extenuating circumstances multiplier for waves of regional or international significance may be included on a case-by-case basis for world-class or famous waves (e.g., Rincon, Teahupo'o, or Pipeline). Scores are based on information provided by local communities and a subjective assessment from a surf ecosystem conservation expert, drawing from Save The Waves' two decades of experience with these types of campaigns. Based on the scores for each indicator in each category of the threat matrix and the threat multiplier, an overall score is assigned to each surf ecosystem at risk, determining the immediate level of engagement required.

Table 2. *Save The Waves' Endangered Waves Threat Matrix Indicators.*

CATEGORY	EXAMPLE INDICATORS
Surfing assets at risk	• Water quality • Bathymetry • Public access • Marine debris • Coastal development • Erosion and coastal armoring
Factors for success	• Active local coalition • Credible environmental data • Progression of threat • Government support
Environmental assets at risk	• Biodiversity • Endangered species habitat • Migratory corridor • Habitat linkage • Critical wetlands/watersheds
Surfing, culture, economic assets	• Quality of waves • Consistency of waves • Size of surf community • Surf tourism impact on economy • Surfing/ocean-based economy

Depending on the score assigned to each support request, one of the following levels of action is taken: (1) passive campaign, (2) active campaign, or (3) branded campaign. The decision for which level of support to provide is based on the score received, but the decision is also discussed with the local community requesting support.

CASE STUDY #9:

New Zealand surfers' participation in the identification of important surf breaks for protection

In New Zealand, when identifying which waves are important to protect under the New Zealand Coastal Policy Statement, the Department of Conservation and New Zealand's Board of Inquiry relied on the "Wavetrack Method Stoke Meter" (Reiblich, 2013). This metric rates surf breaks from 1-10 based on the break's quality of waves, with 10 representing an optimal surf break. Based on the surfer input, the Board listed all the surf breaks in New Zealand that scored 10/10 on the Stoke Meter, and one "high performance big wave break" that scored 8/10 for protection. In all, the Board listed 17 of the 470 breaks rated by the Stoke Meter as priority breaks for protection. While this methodology represents surfer participation, this scoring system has been criticized because of its subjectivity and because it resulted in protection for more famous and difficult surf breaks while overlooking lesser known but more vulnerable ones.

Playa Hermosa, Costa Rica. Photo by Dixiana Salas.

CASE STUDY #10:

Applying the Surf Conservation Index for strategic prioritization for Costa Rica

The Surf Conservation Index (SCI) is a tool developed by Save the Waves (Arroyo et al., 2023) which is based on the pressure–state–response framework for prioritizing surf ecosystems protection. (See Case Study #1 for more details on the SCI framework and how to utilize the SCI methodology for identification and mapping of surf breaks).

The SCI framework is based on the following prioritization criteria:

- **Pressures on the surf ecosystem:** including population density, land use, and infrastructure development.
- **State of the surf ecosystem:** including surf break characteristics, marine and terrestrial biodiversity or other ecosystem values, and local socioeconomic data.
- **Response to pressures:** including existing mechanisms employed by local communities or governments, such as: protected area designations, other effective conservation measures (OECMs), and local stewardship initiatives.

The SCI tool can be applied both regionally and nationally, utilizing open-source or publicly accessible data. In Costa Rica, the index resulted in a national surf break database, ranking 73 sites based on various indices and subindices. The study identified potential priority surf ecosystems on Costa Rica's Central Pacific coast, around Playa Hermosa. This was a result of multiple factors, including: a high percentage of the population there relying on the service industry for a living, a high diversity and quality of surf breaks in the area, and mild anthropogenic pressure with strong indicators of the local community's capacity to respond to environmental degradation (Sancho & Arroyo, 2021). Following this analysis, there has been a strong focus on elevating surf ecosystem conservation efforts in the Playa Hermosa region, recognizing its relative importance.

While the SCI does not provide a final decision on where to initiate conservation efforts, it serves as a support tool for decision-makers by identifying key factors such as overlapping anthropogenic pressures, important biodiversity or environmental values, the economic importance of surfing, wave quality, accessibility, and community engagement. These factors —when considered alongside other political, financial, and cultural dimensions or enabling conditions— help ensure that investments in surf ecosystem conservation are strategic and effective.

Photo by José Javier Barragán.

Image from protegetusolas.com, Cabo Blanco, Peru. Photo by Javier Larrea.

2.4. Legal protection for surf breaks

Author: Bruno Monteferri

Cite as:
Monteferri, Bruno. (2025). Legal protection for surf breaks. In *Guidelines and Best Practices for Surf Ecosystem Conservation*, GEF.

Legal protection has become essential for effectively managing and protecting the world's surf breaks, much as it has for other marine and coastal ecosystems (Orchard et al., 2023). Although non-statutory approaches to surf ecosystem conservation have achieved some protection outcomes, there is demonstrable need for enforceable and legally-binding mechanisms to ensure effective protection of surf breaks (Orchard 2020; Reiblich 2013).

This section provides a deep dive into legal protection of surf breaks by describing the main legal mechanisms used and providing examples from around the world. This section builds on the work of Orchard, Rieblich, and Dos Santos (2023), who published a systematic review of legal protections schemes for surf breaks in 6 countries (including Australia, Chile, New Zealand, Peru, Spain, and the United States), as well as on a review led by the Peruvian Society for Environmental Law on existing and proposed protection schemes in 11 countries (see www.protegetusolas.com). This section should be read as a menu of

options to select from for the protection of surf breaks and surrounding ecosystems, depending on each unique context.

WHAT LEGAL MECHANISMS ARE CURRENTLY BEING USED FOR THE PROTECTION OF SURF BREAKS?

Current surf break protection includes a wide range of strategies (summarized in Table 3), such as national level laws for the protection of surf breaks, dedicated surfing reserves with the specific objective of protecting surf breaks, and conservation tools like marine protected areas that indirectly protect surf breaks within their boundaries. Orchard et al. (2023) developed a typology of legal protection mechanisms (see Figure 14), which provides a useful way of summarizing the differences and commonalities of the various legal approaches.

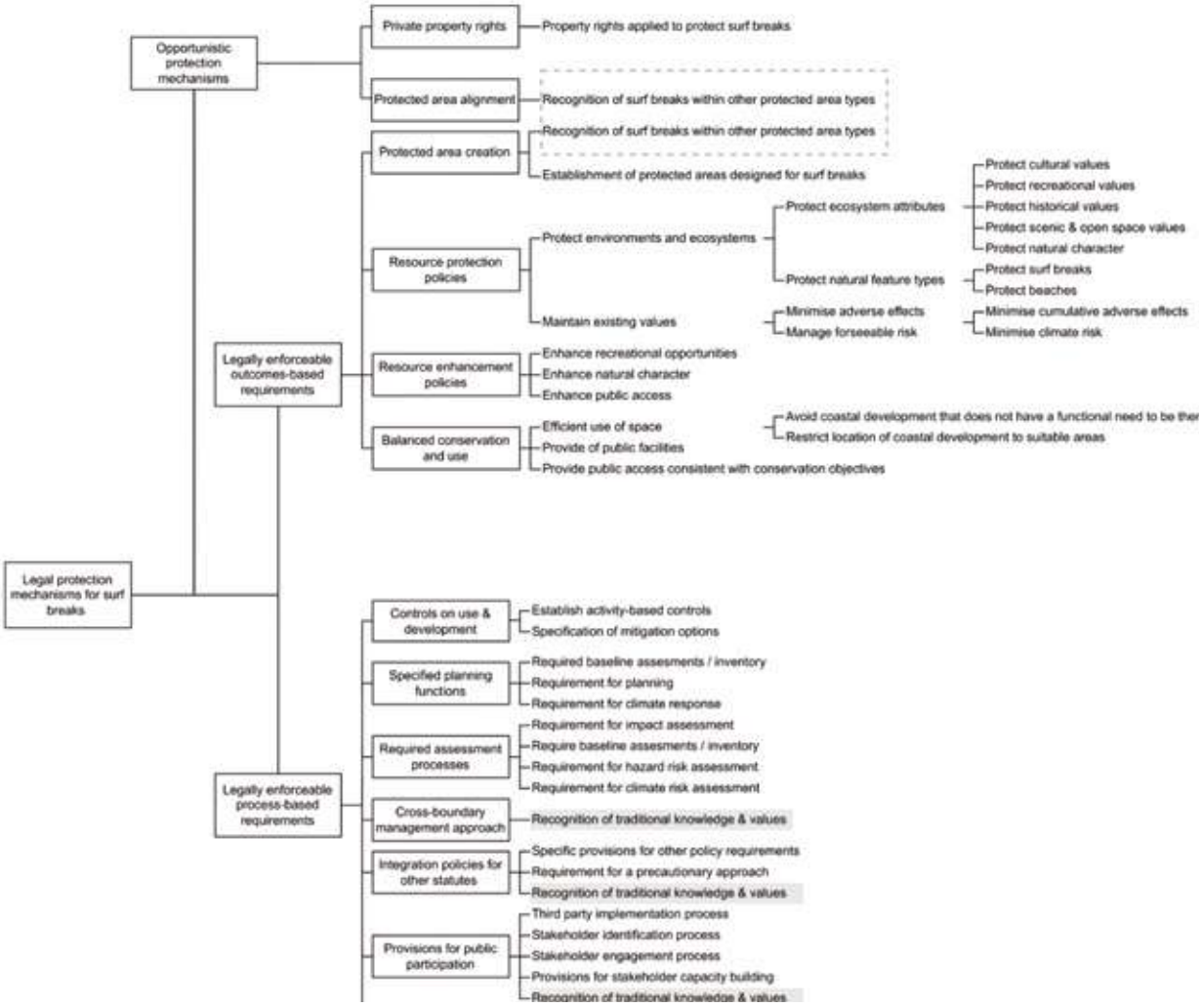


Figure 14. *A typology of legal protection mechanisms that highlights a distinction between outcomes-based and process-based requirements for the management of surf breaks. Source: Orchard et al. (2023).*

This typology highlights a major dichotomy between process- and outcome-based protection mechanisms with direct management implications. Process-based requirements do not constitute or necessarily lead to protections; for example, they establish procedural requirements for new planning processes that must include surf breaks or the participation of surf communities in the scope of their deliberations. Outcome-based requirements represent the most direct form of legal protection because they generate explicit obligations and objectives that regulate the impact or result of stakeholder activities.

Additionally, Orchard et al. found a clear distinction between protection mechanisms that are specifically designed for surf breaks versus the successful application of other (non-specific) legislation to achieve surf break protection goals, which they classify as opportunistic protection mechanisms. Finally, they also found distinctions between single-location mechanisms and protection mechanisms addressing multiple surf breaks.

Table 3. *Summary of legal tools and strategies for the protection of surf breaks.*

LEGAL TOOLS AND STRATEGIES	DESCRIPTION	EXAMPLES
National or subnational laws designated specifically for surf break protection (see Best Practice #12).	Creation of systematic national or subnational legal framework that enables protections for surf breaks across the national or subnational jurisdiction. These laws can include a list of protected surf breaks or define the process by which surf breaks attain protection.	The Peruvian Surf Breaks Law (Ley de Rompientes) (see Case Study #11).
Site-specific protection for targeted surf breaks (see Best Practice #13).	Regulations approved individually for protection of each specific surf site, often based on municipal or local-level regulations.	Surfing reserves in Australia (see Case Study #12) or Surf Protected Area Networks in Indonesia (see Case Study #13).
Integrating surf ecosystem conservation into marine spatial planning and coastal zone management (see Best Practice #14).	Including protections or consideration for surf breaks and their components in marine spatial planning processes and/or integrated coastal zone management plans.	Gold Coast Surf Management Plan in Australia, inclusion of surf breaks in the MSP process in Indonesia (see Case Study #14) and New Zealand Surf Break Registry (see Case Study #15).
Creating new protected areas that include surf ecosystem conservation as an objective (see Best Practice #15).	Creating a protected area that lists the sustainable management of surf breaks as part of its main components or that includes specific surf ecosystem management measures.	Piedra del Viento National Sanctuary in Chile (see Case Study #16).

LEGAL TOOLS AND STRATEGIES	DESCRIPTION	EXAMPLES
Integrating surf ecosystem conservation into existing protected areas (see Best Practice #15).	Where surf breaks are coincidentally located within protected areas, management plans can be updated or improved to include specific protections and conditions for the sustainable practice of surfing, to both protect the surf break and mitigate the impacts of surfing on the protected area.	Improvement of management plans in Todos Santos, Mexico (see Case Study #17) and Paracas National Reserve, Peru.
Historical and cultural regulations for surf break protection (see Best Practice #16).	Site protections based on the recognition of places as significant or important because of their historic and cultural aspects.	Malibu Historic District in the United States National Register of Historic Places (see Case Study #18).
Private conservation for surf ecosystem conservation (see Best Practice #17).	Voluntary conservation mechanisms based on the use of property rights and concessions granted by the government, for surf ecosystem conservation.	Punta de Lobos in Chile (see Case Study #19).
Strengthening procedural protections to prevent the impacts of infrastructure projects (see Best Practice #18).	Establish requirements to provide information, ensure key stakeholder participation, or ask for specialized technical opinion within decision-making processes for development that could impact surf breaks. Impact mitigation measures should be included, when appropriate.	Environmental impact assessments requiring developers to identify historic sites in the United States.
Strategic litigation to safeguard directly threatened surf ecosystems (see Best Practice #19).	Filing lawsuits to courts to prevent direct threats or negative impacts to surf ecosystems and their enjoyment.	Surfrider has filed lawsuits to ensure public access to surf breaks.

BEST PRACTICES AND CASE STUDIES

BEST PRACTICE #10:

Ensuring comprehensive protections for surf breaks and surf ecosystems in laws and policies

As explained in Section 1.5, comprehensive protection of surf breaks should include the protection of the surf break's physical components, the conditions that enable its safe recreational use, and, ideally, measures and policies to enhance biodiversity conservation in surrounding ecosystems and to mitigate and prevent negative impacts of unsustainable urban development.

Monteferri (2021), in collaboration with Save The Waves Coalition, developed a framework that seeks to provide guidance to policy makers, conservation organizations, and activists interested in establishing legal protection for surf breaks. This framework considers the following subset of best practices for comprehensive protection of surf breaks and surf ecosystems in laws and policies:

1. **Formally recognizing surf breaks in the legislation, including a comprehensive definition.** A surf break should be recognized in formal regulations as objects or subjects of the law with their own legal rights and/or protections. Depending on the legislation, this could mean describing surf breaks as natural resources, as vulnerable coastal sites, as a provider of cultural ecosystem services, etc.

   We propose to use the following definition, adapted from Peryman (2011), on policies:

   > A surf break is a natural feature where the hydrodynamic character of the ocean (swell, currents and water levels) interacts with seabed morphology and winds to generate waves that can be caught and ridden by surfers. Surf breaks components include: the seafloor, the swell window and the swell corridor (path of groundswell). The presence of a surf break requires specific geophysical conditions to be met; thus, wave quality can be impacted if sedimentation processes, wind corridors, seafloor morphology, or sea level are affected.

   Finally, it is a best practice that this kind of recognition, where feasible, should be accompanied by specific outcome-based protections and procedural requirements for surf break protection.

2. **Providing clear coordinates of surf breaks.** Surf breaks should be mapped with clear geographic coordinates (see Section 2.1 on identification and mapping of surf breaks), enabling their inclusion in official maps shared between governmental authorities and informing decision-making on coastal development. Clear maps will highlight the area(s) within which specific considerations need to be made to prevent impacts to protected surf breaks. Recognizing that there are some policies that establish specific protections for a list of surf breaks and other policies that establish the process by which surf breaks will be registered and protected, when a list of surf breaks is approved within a policy or law, it is important to also establish what the process will be for adding surf breaks, who has the mandate to register new surf breaks, and what criteria needs to be met for surf breaks to be included on the list in the future.

3. **Establishing protections that prevent impacts to surf breaks.** Prohibitions must be established to prevent activities that could negatively impact the surf break's physical components and the conditions on which wave quality depends, especially incompatible coastal developments. These protections should aim to address the categories of threats mentioned in Section 2.2. For specific examples of restrictions, see Table 4.

Table 4. *Suggested outcome-based protections for surf breaks and surrounding ecosystems. Source: Monteferri (2021).*

PROTECTION AIMS	
Protect the physical components of surf breaks	Avoid blocking the swell window and the wave course
	Avoid impacts on sedimentation processes
	Prevent changes to the submerged lands or the bathymetry of the surf break areas
	Prevent shifts in the wind corridor
Enabling safe recreational use of surf breaks	Prohibit activities that are dangerous for surfers
	Ensure public access to surf breaks
	Protect healthy water quality
Conserving surrounding ecosystems and aesthetic values	Maintain biodiversity and ecosystem services provided by surf breaks
	Conserve historical and cultural values related to the surf break

4. **Enabling safe recreational use.** Regulations that protect the enabling conditions for the safe recreational use of the surf break must be implemented. These should include:

    - Prohibiting activities that are dangerous for surfers (e.g., fishing lines in the course of the wave, exposed pipelines in the sea bed, or maritime transport or fishing routes that could cause collisions).

    - Recognizing by law the public's right to access the surf break and ensuring public coastal access through multiple entry zones (including equitable access for a diversity of users).

    - Developing, and effectively enforcing, water quality regulations that both prohibit and monitor point source and nonpoint source pollution.

5. **Creating clear mandates for authorities.** Governing bodies and their responsibilities related to protecting surf breaks must be clearly defined, and penalties must be established and imposed on those responsible for any harmful effects. This requires clarifying the roles of institutions responsible for defending surf breaks, as well as establishing administrative sanctions when surf breaks are affected, including the remediation of impacts when feasible.

6. **Establishing citizen participatory mechanisms and processes.** Proposals and decision-making processes that affect surf ecosystems should consider different levels of engagement and awareness of interested stakeholders, including: mechanisms to hold decision-makers accountable, creating formal spaces for civil society to propose and make their voice heard, providing timely information (ahead of meetings and in simple language) as a basis for effective participation, providing feedback to citizens' contributions, and more. For more information see Table 5 and Section 2.6 on Stakeholder Engagement.

Table 5. *Levels of engagement in citizen participatory mechanisms and processes (Adapted from Nguyen, 2019).*

LEVELS OF ENGAGEMENT	DESCRIPTION AND EXAMPLES
Empowering processes	Promote stakeholders' knowledge and experience to lead or hold authority in decision-making processes. This could include, for example, providing space and time for stakeholders to lead in creating, outlining, and designing local surf ecosystem conservation policies or development frameworks.
Collaborative processes	Invite stakeholders to participate and collaborate in joint efforts, actions, and solutions. For example, participating in co-design workshops, collecting data for co-decision-making processes, or contributing to collaborative planning.
Consultative processes	Seek public opinions to inform decisions, provide options to select from, and seek feedback on final decisions about the policy, plan, or projects from stakeholders. For example, request community input on project objectives and allow stakeholders to propose ideas or alternatives through formalized input processes. It is also important to create grievance mechanisms for stakeholders to submit formal complaints without risk of retaliation.
Informative processes	Provide clear, informative, and timely information (ahead of meetings and in simple language) to promote transparency and accountability in the decision-making process. For example, host public hearings, publish notices and announcements, share key information about timelines and decision-making processes, and convey information to the public through relevant channels.

7. **Adopting an ecosystem approach to surf conservation.** Aligning surf break protection with broader conservation strategies can allow for the implementation of legal protections that achieve multiple goals simultaneously. For example, protecting surf breaks can also result in positive outcomes for the conservation of ecosystems such as coral reefs or sand dunes. Conversely, protecting coral reefs or sand dunes to meet ecosystem conservation goals can result in positive outcomes for surf break conservation. Site-level protections can also contribute to outcomes for surrounding ecosystems, while broader ecosystem protections can achieve outcomes for surf breaks at the site level too. Collectively, a surf break's surrounding ecosystems and their associative features and landmarks make a site unique and should be considered together when seeking protection (e.g., adopting a surf ecosystem approach to protection). This approach also requires considering the impact of surfing in local ecosystems and wildlife, to establish regulations that prevent and mitigate negative impacts caused by surfers. This has been the main approach used to establish the Surf Protected Area Network in Indonesia (see Case Study #13).

BEST PRACTICE #11:

Using a patchwork of legal tools to ensure comprehensive protections

Rieblich (2013) states that surf breaks are uniquely amphibious and prone to external threats. They also tend to straddle the divide between public and private property. Because of these unique characteristics, traditional legal mechanisms and frameworks often fail to comprehensively protect surf breaks. Thus, adequate protection of all components of surf breaks and their surrounding ecosystems will likely require the use of a systemic approach that relies on a diversity of legal tools which, pieced together, can provide more comprehensive protection.

For example, Lobitos is a surf break in northern Peru protected by Peruvian Surf Breaks Law (see Case Study #11). Peruvian Surf Breaks Law protects the surf break area and the swell corridor, but healthy water quality and sand dune or coastal forest ecosystems depend on legislation and enforcement in a variety of other sectors. For instance, the oil sector is responsible for enacting regulations to avoid oil spills and the local municipality is responsible for domestic sewages. Additionally, to protect sand dunes, the municipality can establish restrictions to urban growth, while the forestry service is responsible for protecting dry forest relicts. Thus, a patchwork of legal tools are necessary in order to comprehensively protect all the elements of Lobitos' surf ecosystem. In each case of surf ecosystem conservation, the best tools for comprehensive and effective protection will depend on the target ecosystems for protection and the area's legal or regulatory framework.

Panic Point, Peru. Photo by Javier Larrea.

BEST PRACTICE #12:

Developing national laws to protect surf breaks

The importance of developing national or subnational laws is that they create the foundation for scaling surf break protection measures by providing a systematic approach to surf ecosystem conservation across the jurisdiction of an entire country or region. Furthermore, a law designed for the protection of surf breaks provides the ideal space for policy makers to develop more comprehensive protection for surf ecosystems. However, national or subnational laws can take a long time to be developed and approved.

Peru was the first country to have a specific law to protect surf breaks (see Case Study #11). Chile, Panama, and Ecuador have been inspired by this law and are seeking to replicate and innovate the Peruvian standard. In such a national or subnational law, it is a best practice to promote a comprehensive definition of surf breaks, to ensure that all their physical components are protected and that the enabling conditions for recreational use are also considered (see Best Practice #10). The first laws that were established to protect surf breaks only focused on securing the wave corridor. To address this gap, policymakers could enact new legislation which protects all components of a surf break or expands existing protections. The current proposal for a law in Chile is already integrating learnings from the Peruvian example and is considering a more comprehensive definition of surf breaks and its components.

CASE STUDY #11:

Peruvian Surf Breaks Law

In Peru, as a result of significant threats to the surf breaks of La Herradura (in Lima) and Cabo Blanco (in Piura) in the 1990s, the Law for the Protection of Surf Breaks Suitable for Sports Practice (Peruvian Surf Breaks Law) was approved in 2001. This law defines surf breaks as Natural Heritage of Peru, recognizes them as state property, and assigns the Peruvian Navy the task of creating a registry to protect them: the National Surf Breaks Registry (RENARO). The regulations of this law were passed in 2013, when the process and requirements for registering a wave in RENARO were finally clarified.

To protect each surf break, the National Surfing Federation (FENTA) submits an application to the Navy, which manages the allocation of usage rights over aquatic areas. The application includes: the name of the surf break, its location, its geographical positioning and universal coordinates, a map of the area to be protected, a descriptive report, and the technical and bathymetric studies that justify the existence of a surf break suitable for surfing.

If the application is approved, the Navy issues a Directorial Resolution that approves the surf break's protection by including it in RENARO. By including a surf break in this registry, the Navy can no longer grant other usage rights over the same aquatic area. This creates legal restrictions on other forms of use in the area, mainly related to infrastructure, as it prevents granting of the area to oil and gas exploration or pipelines, fishing ports or jetties, or aquaculture concessions. The law also establishes the possibility of including an "adjacent zone" or buffer zone —up to one kilometer along the coastline, measured from both sides of the surf break— which must include measures to prevent or mitigate damage to the surf break.

To help prioritize which breaks to add to the Register first, the National Surfing Federation compiled a comprehensive national surf break database, which defined 144 surf breaks along the coast and prioritized three tiers of priority, with groups based on three criteria: the level of threats, the quality of waves, and their frequency of use.

The registration of a surf break in RENARO costs around US $5,000-8,000 because the Navy requires a technical file justifying the existence of a surf break, including bathymetric studies of the area to be protected. In practice, although the Surf Breaks Law and its regulations were already in force, the registration of surf breaks in RENARO did not begin until the Peruvian Society for Environmental Law (SPDA), in alliance with FENTA, launched the "Hazla por tu Ola" campaign. When

the Hazla por tu Ola team started fundraising for surf break protection under Peruvian Surf Breaks Law, they added another criteria for prioritizing which waves to save first: local engagement.

The citizen fundraising campaign led by Hazla por tu Ola has created a social movement to protect Peruvian waves through the Surf Breaks Law. To date, 48 surf breaks have been registered in RENARO, thanks to contributions from thousands of citizens, companies, foundations, and municipalities that donated resources to cover the costs of the technical files. In the Peruvian case, the protection of surf breaks was made possible through collaboration between the government and civil society. The existence of this participatory process has also given greater legitimacy and social support to the protected surf breaks.

The effectiveness of the law in protecting the surf breaks registered in RENARO has already been tested in cases of poor coastal infrastructure planning. For example, Panic Point, one of the best waves in Peru, was protected from the construction of a new fishing pier in Cabo Blanco fishing town, which —in its original design— would have completely destroyed the wave. As a result of a multilateral dialogue process between fishermen, surfers, and state entities, the fishermen and the government implemented changes to the original pier design, although it has still created impacts to the Cabo Blanco wave (for more information, visit: www.alamar.pe).

Another example is in the Huanchaco World Surfing Reserve, a surf tourism destination in northern Peru, known for the artisanal fishermen who have been riding waves on their “caballitos de totora” (traditional watercraft made from reeds) for 5,000 years. Huanchaco’s surf break was the second to be registered in RENARO; it was threatened by the proposal to build nine breakwaters along the beach to prevent coastal erosion caused by a stone jetty built kilometers away in front of the Port of Salaverry. The initial proposal was modified and reduced to just three breakwaters, thanks to the members of the Huanchaco World Surfing Reserve using the Surf Breaks Law as one of their legal arguments to protect the Huanchaco wave.

It is worth noting that, in a country like Peru, where there are no adequate marine spatial planning processes or integrated coastal zone management, and decisions are made with little intersectoral coordination, having a site protected by law helps reduce threats but is not enough to fully prevent impacts to surf breaks. It is crucial to also have organized groups of surfers and civil society actively defending the surf breaks and ensuring compliance with the established regulations. The great advantage of the Surf Breaks Law is that it provides these groups with a solid legal tool to face such situations.

BEST PRACTICE #13:

Creating site-specific protections for surf breaks

Surfing reserves and similar designations are the main tool currently being used for creating site-specific protections for surf breaks, usually by enacting specific restrictions, regulations, or protections for a site through subnational or municipal policies, or even community-based regulations (depending on the legal context of the place). This site-by-site approach, because it utilizes more localized mechanisms, can often be achieved faster than a national-level law for protecting surf breaks.

Australia has historically been a leader in designating surfing reserves, which their National Surfing Reserves organization define as "iconic places of intrinsic environmental, heritage, sporting and cultural value" (see Case Study #12 for more information on Australia's surfing reserves).

Other places with iconic surf breaks and a strong surf culture, like Hawai'i, have attempted to follow suit. In 2010, Hawai'i's Governor, Linda Lingle, established the state's first two surfing reserves by executive order. The Executive Order was inspired by an unsuccessful bill that defined designated surfing reserves in Hawai'i as: "the coastal environment recognized for the cultural and historical quality and consistency of its surf and its long-term and ongoing relationship between the surf and surfers; and [...] the beach adjacent surf zones from the high water mark and may include features of the marine and coastal zone that intrinsically enhance any aspect of the surfing experience." However, practical implementation of these measures has not been as expected.

In Spain, the Surf Nature Alliance collaborated with the Mundaka Surf Club to designate Mundaka as a Surf Reserve in 2015. This world-class wave was recognized as a natural heritage and a strategic socio-economic and cultural asset for the municipality. The initiative also highlighted the commitment to integrate the wave into the existing protected natural area of Urdaibai. The legal protection proposal was accepted, and in 2016, the Vizcaya General Assemblies approved a non-legislative proposal for the public declaration of the Mundaka wave as a protected area for its "natural and cultural heritage." By the end of 2016, the Department of Environment and Territorial Policy of the Basque Government approved the inclusion of Mundaka's surf break as a "singular natural element" within the Decree of approval of the new Master Plan for Land Management (PRUG) of the Urdaibai Biosphere Reserve.

In recent years, organizations like Conservation International and Save The Waves Coalition have been promoting others kind of site-based protection, called surf conservation areas or Surf Protected Area Networks (SPANs), in partnership with local organizations in places like Indonesia (see Case Study #13). These surf conservation areas are similar to surfing reserves but aim to establish legally enforceable mechanisms for protecting not only surf breaks themselves but also much larger areas of surrounding ecosystems.

While the mechanisms for establishing surfing reserves and similar designations vary from place to place, the primary objective is to formally recognize the importance of surf breaks and surf ecosystems and enhance their protection or mitigate threats through the legal mechanisms available in each site.

Kite surfing in Paracas, Peru. Photo by Walter Wust.

CASE STUDY #12:

Australia's National Surfing Reserves

Australia established its first surfing reserve in 1973—a land-based reserve at Bell's Beach. After a considerable amount of time had passed, Australia established two other surfing reserves under the National Surfing Reserve (NSR) program, at Maroubra in 2006 and Angourie in 2007, followed by 19 other locations by 2018. In order to become an NSR, a surf break must meet three criteria similar to Save The Waves Coalition's World Surfing Reserve (WSR) criteria: the wave must be of national class quality, it must be considered sacred by the local and national surfing community, and it must have a significant history of use by the local and national surfing community.

Unfortunately, the designation of a surf break on the NSR list is largely symbolic in most of Australia. In order for an NSR to have any legal protections, it must be accompanied by state or national legislation to protect that NSR. New South Wales is the only state in Australia that provides legislation to protect its NSRs under the Crown Lands Act of 1989. This classification protects surf breaks in these reserves from the beach to 500 meters seaward of that mark.

In addition to its NSR system, Australia also features a Regional Surfing Reserves (RSR) program. These reserves are similar to NSRs, but they protect less-famous, lower-profile surf breaks, which are nonetheless important to their communities. Nevertheless, these breaks will only be dedicated if there is sufficient local community support to do so.

CASE STUDY #13:

Surf Protected Area Networks in Indonesia

Surf Protected Area Networks (SPANs) are defined as a collection of individual marine and coastal protected areas around surfing locations, operating cooperatively and synergistically at various spatial scales and with a variety of legal mechanisms enforced by local communities and governments. Surf conservation areas (such as SPANs) protect surf breaks and their surrounding ecosystems, which host important biodiversity, store critical carbon, or are important for other coastal conservation goals—thus linking surf break protection with broader conservation goals, protected areas, and planning frameworks where possible.

In Indonesia, a group of national and international organizations are working with local partners, communities, and governments to develop a network of surf conservation areas. The establishment of surf conservation areas in Indonesia is fundamentally rooted in the Locally Managed Marine Area (LMMA) approach (Rocliffe et al., 2014), which is focused on developing and deploying locally-identified solutions and can be characterized by a five-step process: (1) conceptualization, (2) inception, (3) implementation, (4) monitoring and management, and (5) ongoing adaptive management (Kawaka et al., 2017). In Indonesia, the LMMA approach has been pioneered and implemented by the Indonesia Locally Managed Marine Area Foundation (Yayasan Pengelolaan Lokal Kawasan Laut Indonesia), or ILMMA. With over two decades of experience in supporting community-based conservation across Eastern Indonesia, the LMMA approach has laid the institutional and methodological groundwork for surf conservation areas. Designed to be adaptive and locally driven, the LMMA model is not limited to traditional conservation but is inherently flexible and applicable to a wide range of coastal management needs. This includes the integration of recreational and economic activities —such as surfing— into broader conservation frameworks. The success of surf conservation areas underscores how the LMMA approach can be extended beyond fisheries to include tourism management, environmental education, and habitat protection, while remaining deeply anchored in grassroots leadership and customary tenure systems.

For the creation of surf conservation areas, the LMMA process facilitates communities to develop community-based natural resource regulations in villages with surf breaks. Indonesian Law Number 6, passed in 2014, provided all villages in Indonesia with the right to establish these village-based natural

resource regulations (called “peraturan desa”). When combined with geospatial maps of their marine and terrestrial territory, these regulations comprise Locally Managed Marine Areas. All surf conservation areas to-date in Indonesia have used an adaptation on the LMMA process to protect coastal and marine ecosystems as well as waves. While conventional LMMAs focus just on natural resource regulations, surf conservation areas include regulations to manage tourism, development, and waste management. There are several advantages as well as shortcoming to this approach to protecting surf ecosystems.

Advantages of this approach include:

1. Communities lead the process of developing regulations with the support and facilitation of non-governmental partner organizations. As a result, the communities feel a strong sense of ownership for the regulations and are typically enthusiastic to implement them.

2. Given the 2014 law, the village-based regulations are legally approved at the local government (district) level and are recognized at the provincial and national level.

3. In the eastern part of Indonesia, where communities have had recognized tenure over marine resources for decades, the regulations were easily approved by the local district government and enforced by the communities and local police.

4. While typically small individually, at about 3,000 to 4,000 hectares each, the surf conservation areas have been established adjacent to one another and, as a result, can cover miles of coastline and bring entire islands into conservation. To date, the network of surf conservation areas in Indonesia has protected over 50 miles of coastline and 100,000 hectares of coastal and marine habitat

Shortcomings of this approach include: :

1. The LMMAs are not yet recognized by the Indonesian Government as a contribution to the marine protected area system of the country. However, there is a movement and consortium now working to include LMMAs and surf conservation areas (as a subset of LMMAs) as Other Effective Conservation Measures (OECMs), which will allow them to be counted in Indonesia’s 30x45 goals, and thus, provide them with greater authority and recognition.

2. In the west of Indonesia, where there is not an established tradition of recognizing community marine tenure, local authorities are often reluctant to legally approve community-based natural resource regulations in the marine space. The group of organizations that are promoting surf conservation areas is working to address this issue through several potential policy approaches, including passing regulations recognizing the community right to manage marine areas and securing concessions for community-based management.

The surf conservation areas in Indonesia vary in terms of their maturity, but generally are in the early stages of development, ranging from the conceptualization to implementation phases. As of early 2025, a total of 30 surf conservation areas have been established across four islands —Biak and Supiori in Papua Province, Morotai in North Maluku Province, and Sumba in East Nusa Tenggara Province— through collaborative efforts led by ILMMA, with support from national and international partners like Konservasi Indonesia.

The surf conservation area regulations developed by communities focus on improved management of both marine and terrestrial resources, including surf breaks, coral reefs, seagrass beds, beaches, mangroves, and coastal forests. The specific interventions undertaken parallel those found in other LMMAs more generally (Jupiter et al., 2014). For example, local communities have worked with local governments to establish regulations that restrict destructive gear types or prevent overfishing, establish no-take areas, restrict coral and sand mining, and restrict harvesting of mangroves or conversion of other coastal forests. Moreover, community members within the surf conservation areas have developed regulations on tourism and development, including restrictions on the sale of coastal land, regulations on new developments and visitor accommodation, management of waste, and establishment of fees to support conservation activities.

On Morotai, a total of 25 surf breaks of significance have been identified, with all 25 of these breaks now located in surf conservation areas. With a network of surf conservation areas already legally established, the main effort in Morotai is now shifting towards building the durability of these surf conservation areas by:

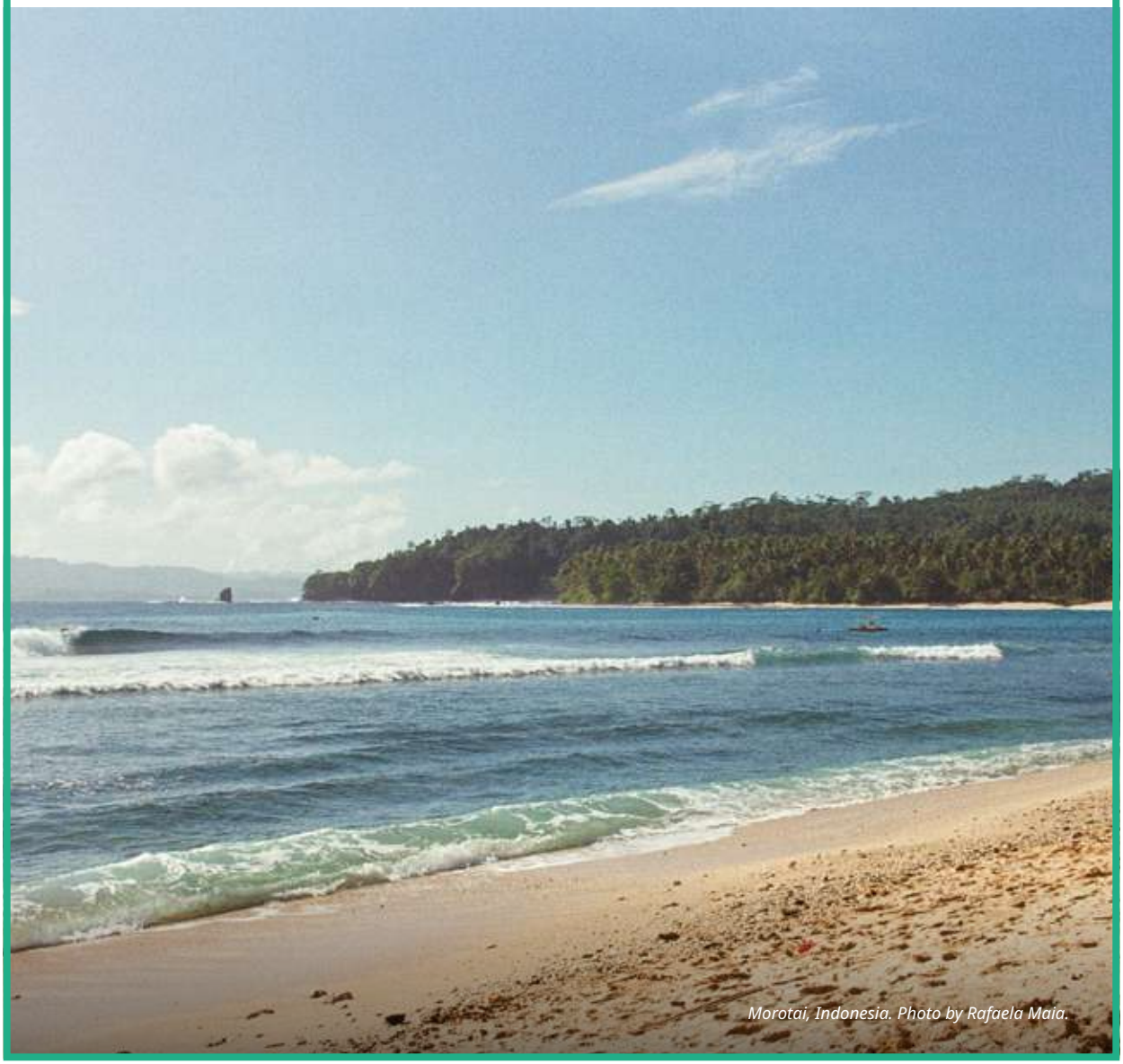
1. Building the capacity of local communities to raise awareness of the regulations and their benefits, to encourage compliance.

2. Training community members on how to conduct patrolling and enforcement in collaboration with government authorities.

3. Supporting communities to benefit economically from conservation and surfing by establishing sustainable small businesses.

4. Coordinating sustainable financing schemes, including local government budget appropriations, user fees, and tourism businesses (see Case Study #29 in Section 2.8).

5. Building community enthusiasm and long-term support by focusing on education of youth through surf conservation camps and classes (see Case Study #25 in Section 2.6).



Morotai, Indonesia. Photo by Rafaela Maia.

BEST PRACTICE #14:

Integrating surf ecosystem conservation into marine spatial planning and coastal zone management

Marine spatial planning strategies and integrated coastal zone management processes are key tools that can be utilized for the protection of surf breaks, as both of these processes involve diverse stakeholders in discussing, prioritizing, and planning the uses for coastal and marine areas. Marine spatial planning (MSP) is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process (Ehler & Douvere, 2009). Similarly, integrated coastal zone management (ICZM) is a dynamic, multidisciplinary and iterative process to promote sustainable management of coastal zones—seeking to balance environmental, economic, social, cultural, and recreational objectives (European Environment Agency, 2000).

In this context, protection measures should be established to prioritize the recreational use of surf breaks over other potentially incompatible uses. There are several examples of countries that have incorporated the protection of surf breaks into their integrated marine or coastal zone management processes and plans (see Case Study #14). New Zealand has adopted perhaps the most progressive approach to protecting surf breaks, at least when it comes to incorporating surf break protection in coastal development planning decisions. In fact, New Zealand is the first country to protect its surf breaks by requiring consideration of surf breaks in coastal development decisions and explicitly including surf breaks in marine and coastal zone planning (see Case Study #15).

CASE STUDY #14:

Successful inclusion of surf breaks in Marine Spatial Planning and Coastal Zone Management Processes

Around the world, there are several examples of how strategic planning processes can incorporate measures and actions to ensure the preservation of surf breaks.

In Australia, the Gold Coast City Council in Queensland enacted the Gold Coast Surf Management Plan in 2015. It is the first planning instrument of its kind, where a local government and community have together developed a comprehensive and detailed plan for the management of surfing and, in particular, for surf breaks.

In California, the Coastal Act of 1976 is the state's governing framework protecting coastal resources and access to them (2007). The California Coastal Act recognizes sensitive coastal areas as "areas that possess significant recreational values," and important surf breaks can qualify under this general category. The Coastal Act's "surfing sections" promote and prioritize: (1) access to low cost coastal recreation opportunities, and (2) recreation which cannot be easily replicated elsewhere (California Coastal Commission, 2008 & 2012). Activist campaigns have successfully employed the "surfing sections" of the Coastal Act to oppose activities with potentially significant effects on surfing. Still, the Coastal Act only protects access to surfing rather than protecting the surf breaks themselves (Blum & Orbach, 2021). However, the primary responsibility for enforcing the Coastal Act lies with the California Coastal Commission (CCC), which has the power to plan and regulate land and water use in the coastal zone within its jurisdiction. Thus, the CCC is responsible for taking actions to: prevent ocean pollution, ensure public access to the waves, and avoid constructions that harm the landscape and ecosystem services.

Reiblich (2013) explains that states in the United States could also use the Coastal Zone Management Act of 1972 (CZMA) to protect surf breaks and even receive incentives for such efforts. The CZMA offers monetary incentives in the form of federal grants to states that develop protection plans to protect coastal resources. Because waves are coastal resources, protecting them could qualify states as eligible to receive incentives under the system.

Similarly to California, the Coastal Zone Management Program in Hawai'i includes references that indirectly contribute to the protection of surf breaks. In this case, specifically facilitating the right of access to beaches and enjoyment of coastal spaces.

In Indonesia, the government has committed to protecting 30% of its marine territory by the year 2045. As part of this effort, the government is leading a multi-agency marine spatial planning (MSP) process to identify and prioritize the ecosystems and biological diversity that will be included in their expanded protected area system. In 2023, staff from Conservation International and Konservasi Indonesia met with the government agency leading this MSP process and shared information about the surf ecosystem conservation approach. Immediately thereafter, the Government of Indonesia requested maps of all the surf breaks of Indonesia, which were provided and have now been included as key assets to be considered in the MSP process.

Photo by Prastiano Septiawan.

CASE STUDY #15:

New Zealand Surf breaks registry

Under the 1991 Resource Management Act, the New Zealand Coastal Policy Statement was enacted and implemented, specifically addressing the protection of nationally significant surf breaks. The Resource Management Act stipulates that surf breaks should not be affected by coastal development activities, while the Coastal Policy Statement determines that access, use, and enjoyment of surf breaks should not be negatively impacted by coastal development activities. Essentially, the New Zealand Coastal Policy Statement states the policies adopted in order to achieve the goals of the Resource Management Act.

Prior to 2010, the New Zealand Coastal Policy Statement was silent regarding surf breaks. However, in 2010, the Coastal Policy Statement was amended to specifically include preservation of surf breaks, especially surf breaks of national significance, among its goals. Due to lobbying by the Surfbreak Protection Society (SPS), the 2010 amendments included formal protection of 17 surf breaks of national significance (see Case Study #9 for how these surf breaks were selected) and mandated consideration of surf breaks in coastal development decisions. These legal instruments recognize that marine-coastal development (e.g., piers, marinas, docks, urbanizations, and infrastructure in general) can have adverse effects on surf breaks and, to address this, safeguard the status of surf breaks and protect them from such developments.

BEST PRACTICE #15:

Integrating surf ecosystem conservation and protected areas

According to IUCN, a natural protected area is a clearly defined geographical space, recognized, dedicated, and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values (Dudley, 2008). Since the declaration of what is considered the first natural protected area, in the late 19th century in the United States, protected areas have been utilized as the main tool for biodiversity conservation worldwide. Given the importance of protected areas globally as a tool for conservation, it is important to integrate surf ecosystem conservation into both new and existing protected areas.

There are two main pathways to integrate surf ecosystem conservation in protected areas:

1. **Creating new protected areas that include protections for surf breaks and/or their surrounding ecosystems from their inception.**

   According to Scheske et al. (2019), there are four categories particularly suitable for the protection of surf breaks within the framework of the IUCN categories for protected areas: Category III (natural monument or feature) for cases where the surf break itself is the primary objective of protection, and Categories II (wilderness area), V (protected landscape/seascape), and VI (protected area with sustainable use of natural resources) where the surf break is one element of broader marine and coastal features considered important for protection.

   There are few cases of protected areas created specifically to protect a surf break. Two examples are found in Chile. First, the Marine Sanctuary of the Municipality of Natividad included the protection of the Natividad surf break for recreational purposes such as surfing, windsurfing, and kitesurfing. Second, the Piedra del Viento National Sanctuary included the protection of surf breaks as part of its conservation objectives (see Case Study #16).

2. **Realigning the objectives and function of existing protected areas to better recognize surf breaks that have opportunistically been protected within them, by including surf ecosystem conservation in their management plans.**

There are at least 565 surf breaks located within existing marine protected areas (MPAs) around the world, a conservation outcome that, in most cases, has happened coincidentally (Bukoski et al., 2024). Nevertheless, protected areas, even in such coincidental cases, have often provided a set of benefits for surf ecosystem conservation (Dedina, 2012) by creating robust restrictions that have also protected surf breaks from incompatible uses.

One of the main challenges and opportunities for surfers and their representative organizations is to participate and engage in the processes to update existing MPA management plans to include specific regulations to explicitly protect surf breaks and establish clear rules to prevent and mitigate the impacts of surfing on marine biodiversity.

By engaging in these decision-making processes, surfers can increase their awareness of the impacts they pose to biodiversity conservation and offer alternatives to mitigate such impacts. For instance, in San Gallan Island, in Peru's Paracas National Reserve, surfing was once prohibited. Only when surfers discussed the issue with the MPA manager was surfing allowed and even promoted through surf contests, under the condition that surfers would not enter the island and would stay in anchored vessels when not surfing.

Surfing, as a non-consumptive and relatively non-destructive activity, is often a compatible recreational use within MPAs, and protections from habitat-destroying activities indirectly extend to surfing there too (Smallwood et al., 2012; Towner, 2016). Where possible, MPA zoning for areas that include surf breaks should allow recreational activities and promote the implementation of sustainable nature-based tourism approaches to generate funds for protected areas.

Given that MPAs are areas of high biodiversity value, it is particularly important to also apply rules to reduce or mitigate the impacts that surfing can generate. Protected areas might not always align with the promotion of recreational activities, such as surfing, because they can cause impacts on marine biodiversity if not properly managed (Davenport & Davenport, 2006). To prevent negative impacts, MPA

management plans should prioritize natural resources and biodiversity conservation above recreational uses such as surfing, where necessary, and implement measures or establish conditions to mitigate surfing's impacts. This could include, for example, designating access routes to beaches and the sea to avoid disturbing marine wildlife, avoiding the use of motorized vehicles in bird and turtle nesting areas, implementing waste management best practices, reducing light pollution, and more. In Galapagos National Park, surfing is even prohibited in some areas. In Monterey Bay National Marine Sanctuary, motorized personal watercraft use is only allowed to assist surfing or surf rescues within defined portions of Central California's 14,000 square kilometer protected area (Scheske et al., 2019). Thus, it is important to analyze and assess how best to balance natural resource protection with recreational access to minimize the environmental impacts of surfing.

Pico Alto, Peru. Photo by Javier Larrea.

CASE STUDY #16:

Piedra del Viento National Sanctuary

In Chile in 2019, Fundación Rompientes, in coordination with the Union of Artisanal Fishermen of Topocalma and the Federation of Unions of Artisanal Fishermen of the Province of Cardenal Caro, submitted a request to the Ministry of the Environment of Chile to declare Topocalma Beach a Nature Sanctuary, which features iconic waves for surfing and windsurfing. Finally, the request for a protected marine area was realized with the creation of the Coastal Marine Sanctuary "Piedra del Viento y Topocalma," officially declared by the authority in 2021, through Supreme Decree No. 10 of the Ministry of the Environment (DSMA).

The DSMA included the following environmental conservation objects under the official protection of the Sanctuary:

- The Topocalma wetland
- The marine-coastal biodiversity
- The dunes
- The coastal edge
- The traditional practices of artisanal fishing and seaweed collection
- The surfable waves, suitable for sports

Through this instrument, the DSMA managed to protect social, cultural, and environmental aspects, which can be considered protection of a full "surf ecosystem." With the DSMA, for the first time, the official protection of surfable waves suitable for sports is recognized in Chile, constituting a historic milestone that opens the door to the protection of many other surfable waves across the country.

CASE STUDY #17:

Bahía de Todos Santos Management Plan

Bahía de Todos Santos is located at the north end of the city of Ensenada, on the Pacific side of the Baja California peninsula in Mexico. The limits of the bay include Punta San Miguel to the north and Punta Banda Peninsula to the south, with a few islands in the center (Islas Todos Santos). Bahía de Todos Santos was officially designated as a World Surfing Reserve (WSR) in 2014. The WSR includes five surf breaks, four located within Bahía de Todos Santos (San Miguel, Tres Emes, Stacks, and the Todos Santos surf breaks) and one located at Bahía de Salsipuedes. The reserve is known for its high-quality waves for surfing and a landscape with towering cliffs and headlands, islands, natural bays and points, and a Mediterranean climate. The Islands of Todos Santos are located about 19.3 km (12.0 mi) off Ensenada's coast and are home to one of the world's most famous big wave spots: Killers. The islands have some species of cactus and a species of endemic poppy only found on a few Pacific islands near California in the United States and Baja California in Mexico. As kelp forests and rocky reefs surround the islands, local fishermen specialize in small-scale fishing, using both the islands as dry docks and storage. A permanent shellfish cultivation operation, mostly of mussels and abalone, is located on the southern island.

Todos Santos Islands are now part of the Biosphere Reserve of the Islands of the Pacific Ocean. After a local effort to remove solid waste and marine debris from the northern area of the Todos Santos Islands, the Local Stewardship Council of the Bahía Todos Santos WSR received an invitation to collaborate with the National Commission of Protected Natural Areas (CONANP) on the Management Plan for the Pacific Islands Biosphere Reserve and a monitoring program for the Islands of Todos Santos. The management plan includes surfing as one of the main recreational activities in the Todos Santos islands, together with scuba diving, kayaking, surfing, hiking, wildlife observation, sport and recreational fishing, and nautical tourism. This is a primary example of the integration of surf ecosystem conservation into protected area or reserve management plans.

BEST PRACTICE #16:

Using historical and cultural regulations for surf break protection

In some places —like Australia, the United States, and South Africa— norms and legal systems have been developed to recognize cultural and emblematic elements and dimensions of certain marine-coastal spaces, in some cases due to the presence of iconic surf breaks.

For example, in San Diego, Santa Cruz, and Los Angeles in California, the principles of the Historic Preservation Act (under federal law) have been used to protect historical sites through registry recognition (see Case Study #18 for more detail). This includes sites such as Malibu Beach Town or the Windansea Surf Shack—with recognition that the significance of these sites is inextricably linked to the role that the nearby surf breaks played in forging their cultural and historical importance. In Hawai'i, the small town of Hale'iwa on the north shore of O'ahu has also been recognized since 1984 as a Historic, Cultural, and Scenic District, largely because of its iconic surf break.

In Australia, the High Court decided in 1992 to recognize customary territorial rights to the indigenous population of the Murray Islands in the Torres Strait, indirectly generating the protection of various surf breaks that are even surfed by Aboriginal inhabitants and have helped strengthen local culture.

In places where surf breaks have played an important role in the local history and culture, seeking recognition and protection of the surf break through historical or cultural regulations is a prime opportunity to achieve legal protection through mechanisms less directly linked to biodiversity or natural resource conservation. This approach acknowledges the sociocultural and historic value of surf breaks and the deep place-based connection that surfers have with surf ecosystems.

CASE STUDY #18:

Malibu Historic District in the United States' National Register of Historic Places

People are deeply connected to places, and this is especially true for surfers and their favorite surf breaks. This connection has led surfers to attempt listing iconic surf breaks like Trestles and Malibu in California on the United States' National Register of Historic Places. The National Register, established by the National Historic Preservation Act in 1966, is the official list of historic properties worthy of preservation in the United States. It serves as a planning tool for historic preservation initiatives at federal, state, and local levels (Blum & Orbach, 2021).

Most of the National Register's 95,000 listed properties represent built environments or archaeological resources. Recently, there has been a focus on underrepresented themes and communities, including landscapes rich in story, narrative, or memory (Blum & Orbach, 2021). Eligibility for the National Register depends on three criteria: historic significance, historic context, and maintaining historic integrity. While the nomination for Trestles was unsuccessful, Malibu was accepted for its historic significance to the growth of surfing in the United States.

The Malibu Historic District is the first National Register listing centered on surfing history and the first United States mainland surfing area protected for its cultural and historic significance (Blum & Orbach, 2021). The district identifies Malibu's three surf breaks—First Point, Second Point, and Third Point— as well as the adjacent Malibu Pier, as defining resources (Blum & Orbach, 2021). The boundaries include 500 meters seaward of Mean High Water, enough to incorporate all areas where surfing occurs at Malibu (Blum & Orbach, 2021).

This model of surf break protection is site-specific, aims to secure legal protections, and acknowledges surfing's historical, cultural, and economic significance. Listing a surf break on the National Register of Historic Places also offers some procedural protections, as federal agencies are required to follow certain procedural requirements in order to pursue any actions that might affect listed places. These procedural requirements are known as the Section 106 process, which have been described as "stop, look, and listen" requirements. Section 106 has two requirements. First, the agency must consider the impact of proposed actions on historic properties. Second, the agency must seek comments from the Advisory Council on Historic Preservation. The goal of the Section 106 process is to "accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties,

commencing at the early stages of project planning." By requiring public input during project review and creating opportunities for advocacy, this process has successfully prevented many National Register listed properties from alteration or demolition.

Reiblich (2013) has criticized the National Register for two main reasons: i) the scheme is feasible only for a limited number of surf breaks that qualify as "historic," making it unattainable for most surf breaks; and ii) the National Historic Preservation Act provides primarily procedural protection. Even if an agency complies with Section 106 requirements, it may still proceed with an action that could negatively affect a historic property.

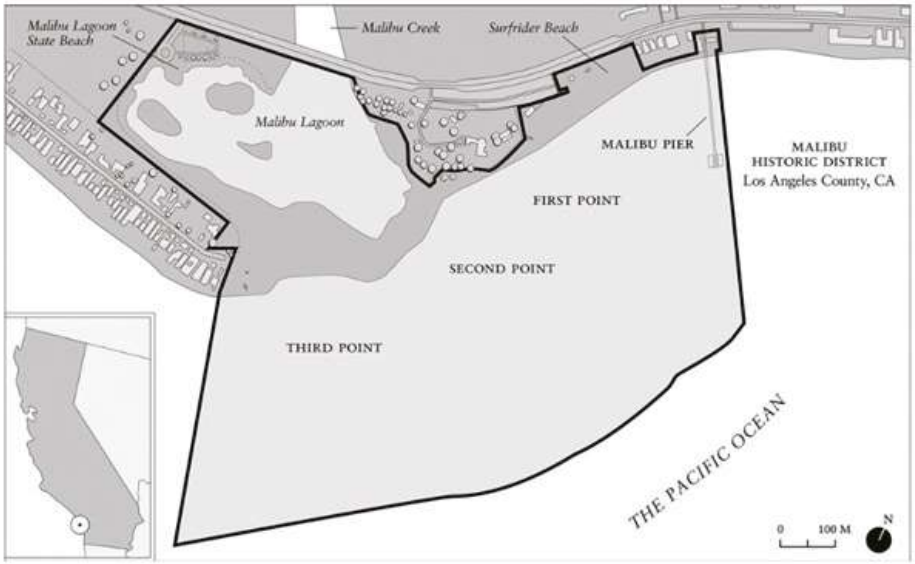


Figure 15. *Map of the Malibu Historic District. Source: Blum & Orbach, 2021.*

BEST PRACTICE #17:

Private conservation for surf ecosystem conservation

Private conservation is another widely used approach for biodiversity conservation, leveraging the growing interest of the private sector in environmental stewardship. This tactic has been employed for decades, involving conservation organizations that collaborate with landowners, communities, cooperatives, and businesses to establish local groups dedicated to protection of privately owned lands. Key tools for achieving these conservation goals include land trusts, conservation easements, other private reserves, and various financial incentives.

- **Land trusts:** Non-profit organizations that actively work to permanently conserve land by acquiring property or conservation easements. Often, land trusts also aim to provide equitable access to nature and create opportunities for recreation and education on their land.
- **Conservation easements:** Voluntary, legal agreements that permanently limit uses of the land to protect its conservation values (sometimes also known as a conservation agreement).
- **Financial incentives (e.g., taxes and funding):** Financial benefits and funding opportunities that encourage landowners to engage in conservation. This can include tax deductions or credits for conservation easement donations, property tax relief, or payments for participation in conservation programs. These financial incentives can be crucial for enabling participation in private land conservation, especially for families of farmers, fishers, or ranchers to maintain and pass their land from generation to generation.

These tools collectively support the preservation of natural habitats located on private lands, ensuring long-term biodiversity conservation and sustainable land use. However, in marine environments, these tools have not been as widely used because most surf breaks and marine areas around the world fall under public domain regimes; thus, property rights are not granted to these spaces. However, private land conservation can protect the terrestrial ecosystems near surf breaks and limit urban development in coastal areas that could otherwise impact surf breaks.

For example, in Chile, several organizations, led by Fundación Punta de Lobos, used a private conservation scheme specifically to facilitate the legal protection of the coastal area surrounding the Punta de Lobos wave. The land in question was purchased with this outcome in mind and they have used an innovative private conservation instrument to protect the surf break's surrounding area. This example, which is further explored in Case Study #19, has the potential to be replicated in other jurisdictions with similar contexts.

Punta de Lobos, Chile. Site of World Surfing Reserve. Photo by Rodrigo Farias Moreno.

CASE STUDY # 19:

Parque Punta de Lobos

Punta de Lobos, on the central coast of Chile, is one of the most emblematic global big wave surf breaks. Punta de Lobos Park, with more than 600,000 visitors a year, is a 2.2-hectare space that borders the Pacific Ocean at the Punta de Lobos surf break, where long incredible waves break against a backdrop of cliffs full of native vegetation. The conservation model of Punta de Lobos Park is designed based on a set of strategies and practices aimed at protecting and conserving biodiversity, traditional activities, the landscape, and free access to the beaches of Punta de Lobos, consolidating it as a privately protected area in perpetuity.

This park is a conservation project that arose from the need to protect this place from two invasive real estate projects, approved in 2013, that were targeted for development on the lands and cliffs of Punta de Lobos. At the beginning of 2014, with the support of the international organization Save The Waves Coalition, the Punta de Lobos Defense Committee was formed, aimed at protecting the area. Among other things, they managed to modify the existing regulatory plan in 2016, restricting the permitted uses to "Green Areas" for the lands bordering the sea.

At the end of 2017, through philanthropic actions and collaborative work, Fundación Punta de Lobos managed to raise the funds necessary to acquire the most emblematic property in the area, called "Mirador de Punta de Lobos," guaranteeing its protection and free access in perpetuity. This area is where the "Punta de Lobos Park" is located today, also declared a World Surfing Reserve by Save The Waves in 2017.

This model is based on the voluntary implementation of a Real Right of Conservation (DRC), under which the owner (Corporación Parque Punta de Lobos) establishes a series of voluntary obligations and prohibitions on the property that constitutes the Park, in favor of the holder or guarantor of the DRC, which is the Fundación Punta de Lobos. The Fundación can enforce these obligations and prohibitions both against the owner who signed the constitutive contract of the DRC and against those who succeed them in ownership, indefinitely. This is based on Chilean Law No. 20930, which enables private property owners to establish protective measures that survive in perpetuity irrespective of the future ownership of that land and results in legal protections similar to the concept of conservation easements provided under other legal regimes, like United States law.

Thus, the Corporación Parque Punta de Lobos assumes the responsibility of managing and administering Punta de Lobos Park, in line with the management plan defined in conjunction with Fundación Punta de Lobos and restricted to what is permitted in the DRC. Meanwhile, Fundación Punta de Lobos must approve of the management plan and must supervise and evaluate compliance with both the DRC and the management plan.

Additionally, the fact that the owner is a non-profit legal entity formed by a group of local people allows for robust governance and greater legal protection in the long term. There is a periodic incorporation of members (both individuals and legal entities) who participate in decision-making through General Assemblies—accommodating the interested community on one hand, and providing the possibility of financing through membership fees to ensure the sustainability of the model in perpetuity on the other.

Topocalma, Chile. Site of Piedra Del Viento Marine Sanctuary. Photo by Pablo Palma Calderon and Fundacion Rompientes.

BEST PRACTICE #18:

Ensuring that environmental impact assessments of infrastructure projects analyze and mitigate potential impact on surf breaks

The list of surf breaks sacrificed to development is long and growing. The most obvious human threat to surf breaks is coastal development, particularly the construction of coastal protection structures such as breakwaters, which prevent swells (and thus waves) from reaching wave-forming reefs and sandbars, or coastal dredging —the removal of sand from offshore in order to re-nourish a degraded or eroded beach— which can also destroy a surf break.

One of the most famous examples of a coastal construction project killing a surf break was Killer Dana's demise in 1966. Killer Dana was a famous surf break off of Dana Point in southern Orange County, California, which produced the biggest surf in southern California during south swells. Killer Dana's destruction was the direct result of the construction of a breakwater to create Dana Point Harbor. The breakwater effectively blocked swells and switched off the waves that had made the surf break so popular with surfers.

Another emblematic example occurred in Madeira, Portugal. The local government effectively destroyed Ponta Jardim, a legendary big-wave point break, when it built a large seawall and road directly through the heart of the break. The break and surrounding geomorphological features had served as a natural buffer zone and coastal protection feature for millennia. Construction of the seawall at Ponta Jardim not only destroyed the wave but also destabilized the area by eliminating the buffer zone that the surf break provided. Furthermore, the seawall could exacerbate future coastal erosion in the area rather than reduce it.

Ensuring the complete protection of a surf break is difficult to achieve, because there are a myriad of uncontrollable phenomena that affect and determine its existence. We can protect the main physical components that allow a surf break to exist (e.g., submerged lands and swell corridor) through the establishment of a surf reserve, but this tool might not be sufficient to fully protect the sedimentation dynamics on which the wave quality depends. Coastal erosion, created or exacerbated by the construction of dams in the rivers that fed sediments to the coastlines or seawalls built several kilometers away from the waves in the coast, can change the sediment dynamics and alter the quality of the wave, especially in the case of highly dynamic surf breaks that rely on sandbars and free-flowing sediment.

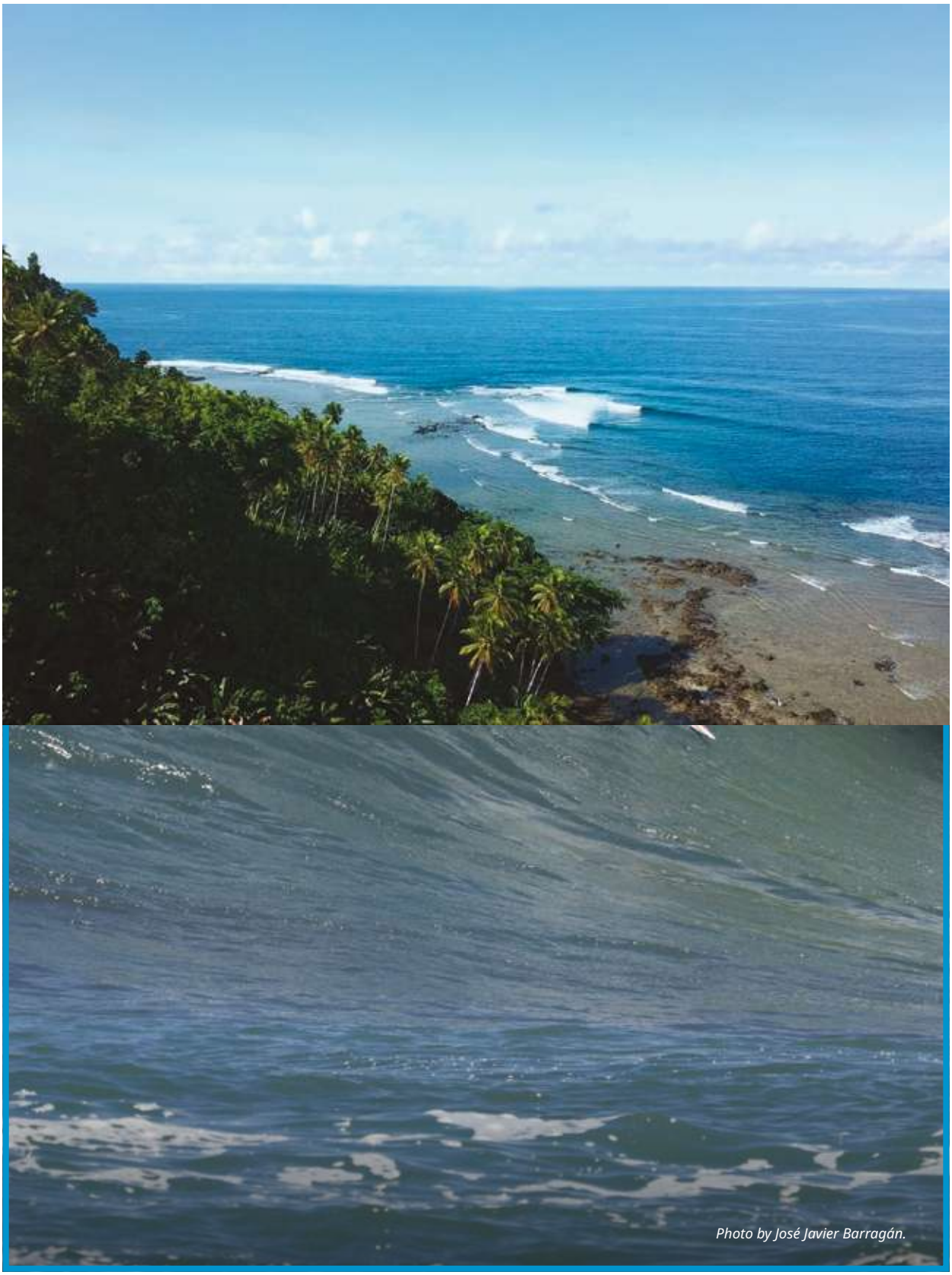


Photo by José Javier Barragán.

BEST PRACTICE #19:

Using strategic litigation to prevent direct threats to surf breaks and surf ecosystems

During the past several decades, litigation has played a major role in the attempt by citizens to realize environmental objectives, as many citizens and organizations around the world have found the courts to be a useful avenue for environmental action and enforcement. The historic development of environmental litigation has been vastly covered in academic research and has also become the focus of movies (e.g., A Civil Action from 1998, Erin Brockovich from 2000, and Dark Waters from 2019) and emblematic books like Houck's (2011) Taking Back Eden, which presents eight environmental cases that changed the world. In the past decade, there has been an increase in the field of climate litigation and in the number of environmental organizations focused on litigation as a key strategy.

Surfers have not been isolated from this approach of taking governments and companies to court when surf breaks, or their rights to access surf breaks, have been threatened. Litigation is usually a reactive legal strategy, which is typically only activated when a threat becomes tangible and imminent. Litigation can be based on constitutional or administrative pathways, depending on each particular case.

Strategic litigation can be used to effectively defend surf breaks from development and environmental threats, but it requires adequate preparation, rapid reactions, and strong campaigning, making it resource intensive. Some notable litigation cases to defend surf breaks include:

- **Trestles, California:** In 2008, the Surfrider Foundation and other environmental groups filed a lawsuit against the California Coastal Commission to stop the construction of a toll road that would have impacted the famous Trestles surf break in Orange County. The lawsuit argued that the project violated the California Coastal Act. The court ruled in favor of the plaintiffs, and the toll road project was halted.
- **Rincón, Puerto Rico:** In 2004, the Surfrider Foundation's Rincón chapter successfully campaigned for the creation of the Tres Palmas Marine Reserve. The campaign included legal actions to protect the area from development and pollution, ultimately leading to the establishment of the reserve.

Morotai, Indonesia. Photo by Mickey Pauole.

- **Mā‘alaea, Hawai‘i:** In 2012, the Surfrider Foundation and other groups filed a lawsuit against the United States Army Corps of Engineers and the Hawai‘i Department of Transportation to prevent the expansion of the Mā‘alaea Harbor, which threatened the surf break known as “Freight Trains.” The lawsuit argued that the project would cause significant environmental damage. The court issued a temporary injunction, and the project was eventually modified to protect the surf break.
- **El Segundo, California:** In the 1980s, the California Coastal Commission required Chevron to build an artificial surfing reef if their proposed jetty project caused a substantial decrease in surfable waves. When the jetty did impact the waves, Chevron funded the construction of Pratte’s Reef, the first artificial surf reef in the United States.

La Herradura, Peru. Photo by Javier Larrea.

2.5. Integrating surf ecosystem conservation into public policies

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Despite its generally positive economic and cultural impact, surfing has not been consistently included in formal processes for coastal management decision-making and other policies (Johnson & Orbach, 1986; Nelsen et al., 2008). However, the past decade has seen a major growth in surfing globally, alongside increased recognition for the benefits of integrating surf ecosystem conservation into broader nature conservation strategies and coastal management policies.

In addition to explicitly incorporating surf ecosystem conservation into coastal and marine spatial planning documents and environmental impact assessments, it is also key to include surf ecosystem conservation into tourism plans, urban and coastal development plans, biodiversity strategies, and other relevant policies, to ensure that surf ecosystems are considered in all the various public policies and decision-making processes that could impact surf breaks and their surrounding ecosystems.

Table 6 summarizes the main types of planning instruments or public policies that impact surf ecosystems and proposed actions for incorporating surf ecosystem protection into each of them. Several of these planning instruments are discussed in more detail in Best Practices #20-22. It's important to note that the type of plans and their scales may vary from country to country, based on political jurisdictions and governance structures.

Table 6. *Planning instruments relevant for surf ecosystem conservation and proposed surf ecosystem protection measures.*

TYPE OF PLAN	PLANNING LEVEL	PROPOSED SURF ECOSYSTEM PROTECTIONS
Tourism plans	National, regional or local	Promoting the protection of surf ecosystems in areas of high tourism, ensuring accessibility to surf breaks, and promoting the sustainable development of tourism-related infrastructure to adequately accommodate the needs of tourists while minimizing negative impacts to surf ecosystems.
Biodiversity strategies	National or regional	Ensuring plans and actions to protect and enhance biodiversity and promote sustainable use of natural resources also explicitly mention and include consideration for surf breaks and surf ecosystems.
Climate resilience and adaptation plans	National, regional, or local	Incorporating surf ecosystem considerations into climate resilience, adaptation, and risk mitigation strategies. This includes monitoring and addressing climate impacts to surf breaks as well as ensuring climate adaptation measures do not negatively impact surf breaks (e.g., coastal protection infrastructure does not impact surf breaks).
Urban planning and coastal development plans	National, regional or local	Ensuring surf break protection and mitigation of impacts to surf ecosystems as well as enabling recreational access and sustainable use of surf breaks through urban planning (which includes zoning and land use planning, infrastructure plans, transportation plans, and more).

BEST PRACTICES AND CASE STUDIES

BEST PRACTICE #20:

Including surf ecosystem conservation into tourism plans

Tourism and surfing are intrinsically linked. A growing number of surfers are traveling around the world in search of good waves, and international surf tourism expenditure is estimated to be between US $31.5 to US $64.9 billion per year (Mach & Ponting, 2021). Given the growing importance of surfing to tourism economies in countries with good waves, tourism plans are an important place to ensure protection for surf ecosystems, accessibility to surf breaks, and sustainable development of tourism-related infrastructure to minimize impacts to the coastal environment and surf breaks.

McGregor and Wills (2016) estimated the contribution of over 5,000 surf breaks to economic activity and growth, finding that high quality surf breaks boosted local activity in the area, especially in emerging economies, where it is particularly important to ensure that tourism development is sustainable and socially responsible. They propose that policymakers should use natural amenities—like surf breaks —to promote local economic growth by investing directly in them or creating incentives and enabling conditions for investment. By incorporating surf ecosystem conservation into tourism plans, policymakers can build in necessary protections for the natural assets that enable tourism.

El Salvador is one country that is standing out for its investments in surf tourism. The country's stunning beaches and consistent waves make it an ideal location for surfing, drawing enthusiasts from around the world. In 2022, El Salvador welcomed over 2 million international tourists, significantly contributing to the country's GDP. By promoting its world-class surf breaks, El Salvador aims to rebrand itself as a premier travel destination, moving away from its past associations with conflict and instability. The country is investing in four main areas, which aim to collectively position itself as a top destination for surf tourism, benefiting both the local economy and the global perception of the country. These include:

1. **Infrastructure Development:** The government is investing in roads, airports, and public transportation to improve access to surf breaks and other tourist attractions.

2. **Marketing Campaigns:** The country is actively promoting itself through international marketing, social media campaigns, and participation in global tourism fairs to attract a diverse audience.

3. **Safety Improvements:** Significant investments in security infrastructure have made the country one of the safest travel destinations in Central America, which is crucial for attracting tourists.

4. **Surf Schools and Facilities:** The growth in surf tourism has led to the establishment of surf schools and related services, catering to the increasing interest in surfing.

As covered in Section 2.8, surf-related tourism can play a key role in motivating and sustainably financing surf ecosystem conservation, but it is both challenging and extremely important to find an appropriate balance between tourism development and surf ecosystem protection. This is why surf ecosystem conservation must be incorporated into tourism plans.

CASE STUDY #20:

Promoting surf tourism investments and government engagement through the World Surf Cities Network

An iconic program that promotes the development of surf tourism in coastal cities around the world is the World Surf Cities Network. This program focuses on leveraging the natural surfing assets of these cities to boost local economies, enhance community engagement, and promote environmental conservation. The main objectives of the Surf Cities Network are:

- **Economic Development:** By attracting surfers and tourists, the program aims to stimulate local businesses, create jobs, and generate revenue.
- **Community Engagement:** The program encourages local communities to participate in and benefit from surf tourism, fostering a sense of community pride and ownership.
- **Environmental Conservation:** Protecting and preserving coastal and marine ecosystems through ensuring sustainable tourism practices.

The main approaches and components to promote the development of surf tourism within the Surf Cities framework are:

- **Infrastructure Improvement:** Enhancing access to surf breaks through better roads, public transportation, and facilities.
- **Marketing and Promotion:** Highlighting the unique surfing opportunities and cultural experiences of each city through national and international marketing campaigns.
- **Surf Schools and Events:** Establishing surf schools and hosting competitions to attract surfers of all levels and promote the sport.
- **Environmental Initiatives:** Implementing conservation projects to protect beaches, reefs, and marine life.

Currently, there are 16 cities in eight countries that are part of the World Surf Cities Network, as listed in Table 7.

Table 7. *Surf cities in the World Surf Cities Network, by country.*

COUNTRIES	SURF CITIES
Chile	Arica
Portugal	Ericeira, Nazaré, Viana Do Castelo, and Matosinhos
Ecuador	Manta, Salinas and Montañita
Costa Rica	Garabito
France	Lacanau
Spain	Las Palmas de Gran Canaria, San Sebastian, and Ribamontán al Mar
Argentina	Mar del Plata
Peru	Miraflores and San Bartolo

Ericeira, Portugal. Headquarters of the World Surfing Reserve. Photo by Ryan Chachi Craig.

BEST PRACTICE #21:

Including surf ecosystem conservation in biodiversity strategies

Most governmental biodiversity strategies do not yet formally recognize surf breaks and their surrounding ecosystems as an important place to implement biodiversity conservation. Only recently, mainstream conservation practitioners and international conservation organizations —such as Conservation International— have started to explicitly include surf ecosystem conservation in their strategies. Given that 26% of the world's surf breaks are located within 5 km of a Key Biodiversity Area and are not yet under protection (Reineman et al., 2021), there is a need to further integrate surf ecosystem conservation into formal biodiversity strategies to achieve global biodiversity targets. Furthermore, formal inclusion of surf ecosystems in biodiversity strategies can help mobilize resources and support for their protection.

Scheske et al. (2019) argues that several surf ecosystem protection mechanisms should be recognized as Other Effective Conservation Measures (OECMs) and could contribute meaningfully to countries' progress toward the Convention on Biological Diversity's targets. As an example, in Indonesia, the national government, in collaboration with a consortium of non-governmental organizations, is currently reviewing and developing a national policy framework on OECMs. Among these, the Indonesia Locally Managed Marine Area Foundation (ILMMA) plays a vital technical advisory role, given its leadership in establishing over 300 Locally Managed Marine Areas (LMMAs) across Eastern Indonesia. These areas —10% of which are considered surf conservation areas— collectively cover nearly 2 million hectares of marine and coastal ecosystems. While they are not yet formally recognized in Indonesia's 30x45 targets due to the absence of an OECM policy, these community-led areas already meet key conservation criteria. The advocacy goal is to ensure that LMMAs and surf conservation areas are formally recognized as OECMs, reflecting their measurable contributions to biodiversity protection, cultural preservation, and sustainable resource management.

BEST PRACTICE #22:

Including surf ecosystem conservation in urban and coastal development plans

Surf breaks can be found anywhere on the coast —both in highly populated urban areas as well as rural or remote areas. Therefore, surf ecosystems are subject to impacts from varying levels of coastal development— from highly developed coastal cities with expansive urban infrastructure to new or early-stage development in rural coastal towns with natural ecosystems largely still intact. Wherever surf breaks are located, they play a key role connecting surfers with the ocean and nature. Thus, urban planning and infrastructure design should aim to prevent or eliminate threats to surf ecosystems and preserve the character or enhance the features of surf ecosystems that enable this human connection with nature.

As surfing grows in popularity, surf ecosystems in both urban and rural areas are subject to increasing demand and pressure from coastal infrastructure development related to surfing and surf tourism—including new housing, accommodations, businesses, roads, beach facilities, and other services. This growing popularity of surfing and scarcity of land available adjacent to surf breaks drives up the real estate value of land nearby and makes prime property locations near quality surf highly sought after (Scorse et al., 2013). Scorse et al. found that, in California, close proximity to a surf break can lead to, on average, a US $106,000 increase in property value compared to an equivalent home just 1 mile away. This high demand for coastal real estate near surf breaks further necessitates adequate planning to protect surf ecosystems from potential negative impacts of coastal development nearby.

Although early-stage coastal development may seem inoffensive to the area's ecosystems or biodiversity, poorly planned development can pose very real and direct threats to surf ecosystems. We provide three case studies of this, including in: Puerto Escondido, Mexico (Case Study #21); Playa Hermosa, Costa Rica (Case Study #22); and Pichilemu, Chile (Case Study #23). Thus, urban planning at all levels (from local to national) should incorporate measures to protect surf ecosystems as well as incentivise design elements that mitigate impact to surf ecosystems, helping to synergize conservation goals and sustainable development goals. Table 8 considers ways to integrate surf ecosystem protection into urban planning at three main planning levels and in various urban planning instruments.

Table 8. *Urban planning levels and recommended surf ecosystem protection measures.*

URBAN PLANNING LEVEL & EXAMPLE PLANS/ INSTRUMENTS	RECOMMENDED ACTIONS OR MEASURES TO INTEGRATE SURF ECOSYSTEM PROTECTION
Provincial or state level Examples of instruments: • Spatial planning frameworks • Regional development plans • Transportation plans • Economic development plans	• Encourage low scale development orientation and sustainability requirements. • Ensure high quality networks of public/open spaces for wellbeing and enjoyment. • Provide alternative or active transportation networks within/ towards surf ecosystems. • Promote green networks and connectivity of remaining intact ecosystems. • Secure recognition for surf ecosystems as important assets for economic development and societal well-being.
Municipal or district level Examples of instruments: • Land use regulations • Zoning ordinances • Utility infrastructure planning (e.g., water, electricity, sewage, etc.) • Housing or building policies • Opportunity area or regeneration area plans • Integrated watershed planning • Resilience and adaptation plans	• Prioritize balanced land use designations. • Create zoning categories (such as protected areas, open space, or culturally significant areas) that protect surf ecosystems. • Plan utility infrastructure in a manner that minimizes impact to surf ecosystems. • Develop restrictions or specifications on allowable building size, shape, and features. • Designate set-backs or buffer areas around sensitive zones. • Designate nature regeneration areas. • Designate climate resilien.
Local or specific to a surf ecosystem Examples of instruments: • Local plans / detailed master plans • Supplementary planning documents • Urban design codes • Construction codes	• Design urban form, layout, and typologies to minimize surf ecosystem impacts. • Promote green infrastructure or sustainable urban drainage • Encourage sustainable construction and bioclimatic considerations. • Create restrictions on area coverage, height, and green area ratio for new developments. • Develop grants or financial incentives for using sustainable design/construction.

CASE STUDY #21:

Community campaigning to guide urban development in Puerto Escondido, Mexico

Puerto Escondido, a unique tubular surf break in Mexico, has experienced the impacts of surf tourism since the area gained popularity with international surfers in the 1970s. Sudden growth in visitation was accompanied by rapid urban development without adequate planning or design. Currently, the area faces multiple challenges—such as wastewater discharge, inadequate solid waste management, habitat loss, and land use change. However, the most concerning threat to the surf break at Playa Zicatela is that urban construction and infrastructure too close to the high tide line has altered sand replenishment patterns and quantities, impacting the wave's form and consistency.

As a result, a local coalition of surfers, community members, and organizations —including COSTA UNIDA and Salvemos Colorada— is urging the government to protect the waves and the coastal ecosystems of Zicatela and Punta Colorada. This coalition, through the Salvemos Puerto Escondido Campaign (part of the Endangered Waves Program, described in Case Study #8), aims to unite local partners to amplify the community's voice and advocate for protection of the area's surf breaks.

One main focus of the campaign has been supporting urban and terrestrial planning for Playa Colorada, which hasn't faced as much urbanization as Playa Zicatela yet. Through community campaigning and engagement in legal processes, the area has achieved official "Environmental Value Area" status at the Oaxaca district level, which limits permits and construction licenses in the area, thus protecting natural capital. Additionally, the coalition has successfully campaigned for the protection of their coastal forest, public beach access, and elimination of raw wastewater discharges through measures included in the urban and development plans of their municipality. To recognize all the work the community here has done to protect their iconic surf breaks and to support them in achieving their long term goals, Puerto Escondido has been nominated as the 13th World Surfing Reserve in 2025.

See a short documentary of Puerto Escondido's story here.

CASE STUDY #22:

Playa Hermosa participatory urban planning for surf ecosystem protection

Playa Hermosa World Surfing Reserve has conducted two urban planning processes for surf ecosystem protection—the first to understand development pathways that the community envisions for the area, and the second to acquire input for strengthening the area's urban regulatory plan.

These processes included participatory workshops in which multiple tools were utilized to detail the working groups' understanding, desires, and hopes for the area. The maps, technical sheets, and proposals produced from the workshops were included into a Wave Oriented Urban Design Framework and community reports for the urban regulatory plan.

Urban design and planning tools such as axonometric zoning plans, drawn representations, and written regulations worked as useful tools to promote community visions and expectations for the future. These tools were also valuable for the municipality to be able to incorporate the community's vision for urban planning that integrates surf ecosystem protection.

As a result of this process, the municipality has formally withdrawn the urban plan proposal originally approved by the Costa Rican Institute of Tourism and the National Housing and Urban Development Institute, in search of a more balanced approach that incorporates surf ecosystem protection.

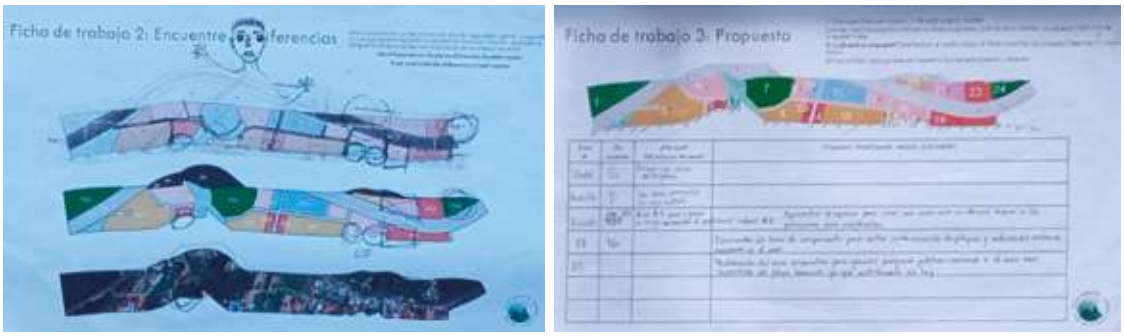

Figure 16. *Examples of participatory tools utilized to acquire input for the strengthening of the urban regulatory plan.*

Figure 17. *Examples of results from community visioning for Playa Hermosa development pathways.*

Community demonstration in Playa Hermosa, Costa Rica. Photo by Ramiro Cardozo.

CASE STUDY #23:

Modification of Pichilemu's urban plan to incorporate surf ecosystem protection

In 2014, in Pichilemu, Chile, the Punta de Lobos Defense Committee was formed with the support of Save The Waves Coalition to protect the Punta de Lobos surf ecosystem (see Case Study #19 for more details on Parque Punta de Lobos). Among other things, the committee successfully advocated in 2016 for a modification to the area's existing regulatory plan. The regulatory plan establishes two main zones: Zone E1 (Green Areas), which limits land use to sports activities associated with surfing (and other water sports) and imposes restrictions on real estate development; and Zone A7, which is residential and touristic in nature, allowing for real estate projects of up to 200 inhabitants per hectare and up to 8 stories high under certain conditions. The modification restricted permitted uses to "green areas" on land adjacent to the sea, including the property on which Parque Punta de Lobos is now located (Parque Punta Lobos, 2024). This change will help mitigate or avoid the potential impact of new urban development on the Punta de Lobos wave and surf ecosystem.

Huella Positiva activation in Punta Roquitas. Photo by SPDA.

2.6. Stakeholder engagement

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In response to the loss and degradation of surf breaks, surfers and coastal communities around the world have mobilized grassroots campaigns and organized themselves to protect their favorite waves. This includes many regional and national level initiatives (e.g., National Surfing Reserves in Australia, Surfbreak Protection Society in New Zealand, Hazla por tu Ola in Peru, and Fundación Rompientes in Chile) and international NGOs (e.g., Save The Waves Coalition, Surfrider Foundation, Surf & Nature Alliance, and Surfers Against Sewage), supported by a network of research groups and institutions. These collective efforts have spearheaded most of the major developments in surf break protection and stewardship, which includes improving public awareness of their protection needs (Nelsen et al., 2013; Orchard, 2017).

While legal protection (see Section 2.4) and the integration of surf ecosystem conservation into public policies (see Section 2.5) are essential, they alone cannot ensure fully effective and sustainable protection of surf breaks and surf ecosystems. The active participation of individuals and local communities is vital for effectively defending and managing surf ecosystems. Strengthened civil society groups play a key role in facilitating and catalyzing the engagement of a larger number of individuals and holding governments accountable. Their efforts not only amplify the voices of surfers but also facilitate the inclusion of a wider range of stakeholders in conservation initiatives.

WHY STAKEHOLDER ENGAGEMENT IS KEY FOR SURF ECOSYSTEM CONSERVATION

Effective surf ecosystem conservation requires a collaborative approach. Stakeholder engagement is vital for building consensus, incorporating diverse perspectives (e.g., women, Indigenous People, and other minorities or under-represented populations), fostering a sense of shared ownership, and ensuring that conservation efforts are locally relevant, sustainable, and effective. A collaborative approach maximizes the chances of success and promotes long-term stewardship of these valuable resources. Effective engagement must be multi-leveled, encompassing both local communities and government authorities. The surfing community, while passionate and knowledgeable, represents a niche interest. Therefore, building broader support requires emphasizing surfing's multifaceted nature—including its cultural, spiritual, sporting, and conservation values.

One critical reason to develop strong stakeholder engagement is to enact the role of civil society in the compliance and continuity of conservation policies, especially in contexts where political instability threatens long-term environmental commitments. In countries like Peru, where there have been six presidents and 147 ministers in just six years, civil society organizations, local communities, and grassroots movements have played an essential role in maintaining conservation initiatives despite governmental turnover.

In New Zealand, organizations like the Surfbreak Protection Society, through media campaigns and activism, have actively participated in the implementation of the Resource Management Act and Coastal Policy Statement, successfully preventing dangerous projects in coastal areas and including the protection of surf breaks in planning and policy formulation agendas at different levels.

These examples highlight the need for conservation strategies that are not solely dependent on shifting political agendas but are instead embedded in long-term societal commitments.

EFFECTIVE STAKEHOLDER ENGAGEMENT AT DIFFERENT LEVELS

Effective stakeholder engagement is crucial for the success of surf ecosystem conservation initiatives. To ensure that all participants contribute towards a common goal, it is essential to design involvement opportunities that align with the capacities and interests of each individual or group. This encompasses a spectrum of activities, from information dissemination and public awareness to active participation in decision-making and the implementation of conservation strategies.

The initial step in this process involves identifying the key stakeholders who must be involved. This can be achieved through a systematic analysis that recognizes, evaluates, and prioritizes individuals or groups with an interest or influence in the conservation project. Such analysis aids in understanding each stakeholder's interests, anticipating potential conflicts, and designing appropriate engagement strategies.

Once stakeholders are identified, understanding their interests and motivations is key to fostering meaningful engagement. By recognizing what drives each group, conservation advocates can tailor messages and communication strategies that align with stakeholders' values and concerns. For instance, local communities may be primarily interested in how conservation initiatives impact their livelihoods, while environmental organizations focus on ecosystem health and biodiversity. When engaging with governmental environmental agencies or conservation groups, emphasizing the ecological importance of surf ecosystems —such as their role in carbon sequestration and marine biodiversity— can strengthen advocacy efforts (see Case Study #7). Meanwhile, discussions with broader governmental institutions and local businesses may be more effective when highlighting the economic benefits of surf tourism, including job creation, revenue generation, and community investment. Framing surf ecosystem conservation in terms of stories and statistics that resonate with each audience can significantly enhance stakeholder buy-in and long-term commitment to protecting surf ecosystems.

Tailoring the format, style, and presentation of information to the audience is vital. Some stakeholders may be best engaged through educational materials and public awareness campaigns, while others may be more effectively involved through collaborative planning workshops and technical working groups. Employing diverse participation and communication methods is crucial for reaching a broad audience and ensuring that all voices are heard.

Fostering collaboration among different groups also promotes a sense of shared ownership and increases the likelihood of success in conservation initiatives. Creating an inclusive environment where each stakeholder feels their contribution is valued and their concerns are addressed is essential. This collaborative approach enriches the decision-making process and ensures that conservation strategies are more comprehensive and sustainable in the long term.

HOW TO DO STAKEHOLDER MAPPING

Effective stakeholder engagement begins with a thorough mapping exercise to identify and understand all relevant individuals and groups who influence or are influenced by surf ecosystem conservation. This process should initially focus on key stakeholders within the surfing community itself, such as surf institutions, communities, businesses, and representatives. However, a broader perspective must also encompass a wider range of stakeholders at national, regional, and local levels, including government officials (e.g., environmental and tourism ministries, sports and cultural agencies, and economic development authorities), local communities, scientists, environmental organizations, and tourism businesses. To ensure an equitable and holistic approach to stakeholder mapping, it is also important to consider and incorporate often under-represented stakeholders such as women, Indigenous People, and other minority groups.

After a thorough identification is done, stakeholders should be categorized and prioritized based on their level of influence, potential roles, and demonstrated interest in surf ecosystem conservation. Building a comprehensive stakeholder database, using methods such as power-interest grids, influence network analysis, relationship mapping, and engagement matrices, will support this process and enable the development of targeted engagement strategies.

BEST PRACTICES AND CASE STUDIES

BEST PRACTICE #23:

Implementing surf ecosystem conservation advocacy campaigns

Effective surf break conservation relies on strategic communication and advocacy throughout all phases. While surf ecosystem conservation is often perceived as "cool," it is rarely a priority for decision-makers. To elevate it on political and policy agendas, successful advocacy campaigns must seize political opportunities, adapt strategies to different contexts, and unify diverse stakeholders—sometimes through highly visible, public campaigns and, at other times, through behind-the-scenes negotiations. A strong advocacy campaign: (a) provides regular updates on progress, threats, and successes to keep stakeholders engaged; (b) maintains transparent communication of goals, strategies, and decision-making processes to build trust; (c) creates opportunities for public participation and feedback to foster community ownership; and (d) develops strong advocacy messaging backed by data to influence policy and garner broader support.

A strong example of effective surf ecosystem conservation advocacy is the work of Surfers Against Sewage (SAS) in the United Kingdom. Through a combination of grassroots organizing, media campaigns, petitions, and direct engagement with policymakers, SAS has successfully influenced various government decisions. Their "Protect Our Waves" campaign placed surf break protection on the legislative agenda, demonstrating that well-structured advocacy can lead to concrete policy changes. Other initiatives, such as the "End Sewage Pollution Manifesto" and "Ban the Bailouts," have leveraged public petitions and community mobilization to hold water companies accountable for pollution, showing how coordinated pressure can drive systemic change.

From experience implementing surf ecosystem conservation campaigns in Peru, Chile, and Ecuador, we have identified key areas of expertise that contribute to successful advocacy, including the following:

- **Legal Counsel:** To analyze existing legislation, identify opportunities for legal protection, and advise on policy development.
- **Communications Specialist:** To develop and implement strategies for disseminating information, engaging stakeholders, and building public support.
- **Surfer Representative:** A knowledgeable individual connected to the surfing community to provide insights into surfers' concerns and perspectives, facilitating effective communication and collaboration within this specific niche.
- **Coordinator:** A skilled project manager to coordinate the team, liaise with diverse stakeholders, and drive the initiative forward.

The key to success in surf ecosystem conservation advocacy is strategic adaptability. Political timing matters—aligning efforts with elections, policy discussions, or environmental crises can create windows of opportunity. Decision-makers respond to different arguments, so framing surf break protection in terms of economic benefits, global conservation commitments, and public health can expand support. Building alliances across sectors —uniting environmentalists, local businesses, economists, and athletes— strengthens advocacy efforts. Most importantly, grassroots mobilization and advocacy ensures that conservation is not just a policy discussion but a movement with broad societal backingl.

BEST PRACTICE #24:

Create strategic partnerships and clearly define roles and responsibilities of stakeholders

Strategic partnerships are essential for effective surf ecosystem conservation, ensuring that different stakeholders contribute their expertise and resources while minimizing conflicts and inefficiencies. Clearly defining roles and responsibilities from the outset fosters accountability and maximizes impact, especially when developing conservation strategies or campaigns. While collaboration is necessary throughout the process, the nature of partnerships may shift depending on the stage of the initiative. In the planning phase, engagement with NGOs, research institutions, and advocacy groups is often key, as they provide technical expertise, legal guidance, and strategic direction. During the implementation phase, collaboration with local communities, businesses, and authorities becomes crucial, as they ensure that on-the-ground actions align with social, environmental, and economic needs.

Successful surf ecosystem conservation initiatives have demonstrated the importance of partnerships from the very beginning. In Puerto Escondido, Mexico, local conservationists reached out to Save The Waves to support the implementation of their campaign (see Case Study #21), leveraging the organization's experience in surf break protection. Similarly, in Ecuador, the grassroots initiative Mareas Vivas sought guidance from Peruvian Society for Environmental Law (SPDA), benefiting from its legal and policy expertise to strengthen their efforts. These cases highlight that conservation is rarely a solo endeavor—engaging with the right partners at the right time can determine a campaign's success.

Additionally, different actors play distinct roles in surf ecosystem conservation efforts. Table 9 outlines common roles and responsibilities taken by different stakeholders:

Table 9. *Common roles and responsibilities taken by stakeholders in surf ecosystem conservation initiatives.*

STAKEHOLDER	COMMON ROLES & RESPONSIBILITIES
Surfers	Raise awareness, monitor environmental health, and participate in advocacy and campaigning.
NGO's	Support governmental agencies, promote surf ecosystem protection stewardship and resilience projects, raise awareness, and conduct technical analysis and research.
Businesses	Build sustainable practices while financially supporting surf ecosystem protection.
Citizens	Participate in awareness-raising campaigns and other strategies to demand surf ecosystem protection. Propose and participate in initiatives to restore and recover surf ecosystems.
Universities	Conduct research on surf ecosystem elements and its benefits, bridging the gap between academia and community action.
Local government	Integrate surf ecosystem conservation into local development plans and public policies, promoting surfing as a sport and supporting funding mechanisms.
Federal or National Government	Enact nationwide policies and strategies that enable or mandate surf ecosystem conservation.

Multiple methods and tools can be used to define responsibilities amongst team members—such as the RACI Matrix, RAPID model, process flow and responsibility mapping, and more. In detail, tools like the RACI matrix visually clarify each stakeholder's role concerning specific tasks or decisions related to surf ecosystem conservation, to further enhance clarity and coordination during the stakeholder engagement process. A RACI chart uses four key designations:

- **Responsible (R):** The person or group ultimately responsible for doing the work or completing the task.
- **Accountable (A):** The person or group ultimately answerable for the correct and thorough completion of the task. They usually delegate the task to those marked as 'Responsible.'

- **Consulted (C):** Individuals or groups whose input is required before a decision is made.
- **Informed (I):** Individuals or groups who must be kept updated on progress and decisions.

Using a Responsibility Assignment Matrix (e.g., a RACI chart) is highly recommended, as it ensures transparency and accountability. Each stakeholder's responsibilities are clearly defined, preventing confusion and overlaps. This fosters efficiency and promotes a collaborative approach.

Surf camp in Sumba, Indonesia. Photo by Prastiano Septiawan.

BEST PRACTICE #25:

Creating cross-sectoral committees responsible for surf break conservation at the national, regional, or local level

Establishing a national, regional, or local committee dedicated to surf break conservation is crucial for safeguarding these natural assets. Such a committee can be formalized through various approaches —either led by civil society, government entities, or a collaborative effort between both. These committees usually aim to engage representation from multiple sectors or areas of expertise to help ensure active responsibility and accountability for surf break protection— thus supporting the successful implementation of laws, policies, or community-led initiatives.

For example, Peru's innovative approach to surf break conservation centers on registering waves under Peruvian Surf Breaks Law (see Case Study #11 for details). However, ongoing threat to both protected waves and not-yet-protected waves necessitates a complementary active response mechanism. To fill this critical role, the Surf Break Defense Commission, a committee composed of legal, technical, and coastal experts, was created. While primarily activating as an emergency response team to address imminent threats, the Commission also proactively provides valuable technical and legal advice when required, ensuring comprehensive protection of Peru's surf breaks.

In Australia, the National Surfing Reserves (NSR) initiative exemplifies a successful civil society-led approach to surf break conservation (see Case Study #12 for details). NSR is a voluntary collaboration dedicated to recognizing iconic surfing sites across the nation, who operate through a National Reference Group (NRG) composed of experienced individuals from various regions in Australia. This group facilitates the nomination and management of National Surfing Reserves, ensuring that significant surf breaks receive formal recognition and protection.

Save The Waves Coalitions' World Surfing Reserves also create local committees to engage local government, community members, and other relevant stakeholders, to create consensus and partnerships for driving surf ecosystems conservation in each WSR (see Case Study #24 for more details).

CASE STUDY #24:

World Surfing Reserves and their local stakeholder engagement process

The World Surfing Reserves (WSR) program proactively identifies, designates, and preserves outstanding waves and their surrounding environments around the world. The program is managed and administered by Save The Waves Coalition, providing a platform and tools for stakeholder engagement to support community-led projects that protect iconic or world-famous surf breaks. As of 2025, 13 WSRs have been approved and officially dedicated around the world, representing a global network of surfing reserves that are managed, implemented, and protected by the local community.

The WSR process is initiated by demonstrated interest from the local community and stakeholders in protecting their surf break or surf ecosystem. To be eligible to become a WSR, applicants must demonstrate strong community support and capacity. Applications must be submitted to Save The Waves and undergo a thorough selection process conducted by an international WSR Vision Council. If selected to move forward as a WSR, community leaders must actively identify community interests and assess the feasibility of desired stewardship projects through an awareness raising and stewardship planning process that engages community members, government officials, and other stakeholders.

In this process, for example, North Devon community members involved the University of Plymouth, Surfing England (the National Governing Body for surfing in England), and the local district council. In the case of Guarda do Embaú in Brazil, the community rallied support from the local surf association, the Guarda community association, the fisher association, the Ministry of Environment, the tourism secretariat of Palhoça, and the local chamber of commerce, among others. Meanwhile, the Manly Freshwater WSR relaunch involved pro surfers, politicians, and the Surfrider Foundation. These examples showcase the diversity of organizations, community members, and stakeholders that must come together to successfully support a WSR.

Once a location is nominated to become a WSR, a local stewardship council is established, often including the community leaders who led the application process alongside a wider array of stakeholders that support surf ecosystem protection. The local stewardship council regularly includes the following representation: a surf ambassador, the surfing community, the business and commercial sector, the tourism sector, local government, academia, and environmental organizations. These representatives commit to supporting the stewardship planning process for a year or longer. Together, they organize their

working structure and conduct the planning necessary to pursue legal protection, stewardship actions, and surf ecosystem protection projects. This process facilitates diverse local stakeholder involvement, strengthens local organizations and leadership, and engages the local government, bringing stakeholders together under the common goal and interest of protecting their surf ecosystem, lifestyle, and livelihoods.

Signing of Peruvian Surf Breaks Law. Photo by SPDA.

BEST PRACTICE #26:

Creating or strengthening local organizations responsible for surf ecosystem conservation, stewardship, and management

Beyond the establishment of cross-sectoral committees to support surf ecosystem conservation, it is also helpful to create or strengthen local, community-led organizations or entities responsible for surf ecosystem conservation and stewardship. These community-based organizations dedicated to the protection and sustainable management of surf ecosystems are fundamental to achieving effective long-term conservation. These local organizations not only lead initiatives to safeguard surf breaks but also play a crucial role in advocating for supportive policies, engaging local communities, and ensuring the resilience of these ecosystems in the face of new or unique local threats, pressures, or challenges.

Section 2.4, highlights legal protection as a powerful and necessary tool to protect surf resources, but laws are not effective without robust institutions and engaged citizens. For example, in New Zealand, surf breaks of 'national significance' including Mangamaunu and Aramoana already have a high level of protection under the law, yet they have remained exposed to recent threats from poorly planned development proposals involving land reclamation, seawall construction, dredging, and offshore spoil deposition (Mead & Atkin, 2019). These cases have required considerable NGO advocacy and input to avoid adverse effects, demonstrating the key role that an organized civil society plays for durable and effective protection in practice.

Strengthening local organizations should be approached through a structured, evidence-based process. Several frameworks have been developed to assess and guide the growth of community-based conservation organizations. For example, one such tool is The Nature Conservancy's Organizational Maturity Index, designed to evaluate and support the development of fisher organizations in Peru (TNC, 2024). This index provides a structured methodology to assess key dimensions of institutional maturity, ensuring that organizations grow holistically across multiple areas critical to their effectiveness. Table 10 lists possible criteria to consider, adapted for surf ecosystem conservation organizations.

Table 10. *Criteria for organizational maturity, adapted from The Nature Conservancy to fit the context of surf ecosystem conservation organizations.*

CRITERIA FOR ORGANIZATIONAL MATURITY	KEY ASPECTS
Political-organizational	Leadership, governance, and decision-making structures.
Strategic Planning	Vision, goals, and long-term sustainability planning.
Sociocultural	Community engagement, social cohesion, and inclusivity (including gender equity).
Communication	Internal coordination and external outreach effectiveness.
Economic-financial sustainability	Revenue streams, funding strategies, and financial management.
Administrative	Operational processes and resource allocation.
Infrastructure	Access to necessary facilities and tools for conservation.
Commercial	Economic opportunities linked to conservation, such as sustainable surf tourism.
Participatory Management	Inclusion and representation of key stakeholders in decision-making and governance.

To ensure that local community-led organizations can effectively steward surf ecosystems, capacity-building efforts should prioritize the establishment of transparent governance mechanisms, clearly delineated roles and responsibilities, and accountability among members. It is also essential to develop financial and operational sustainability, ensuring organizations can secure and manage funding to sustain long-term conservation efforts. Inclusivity and equity must be at the core of these initiatives, actively promoting the participation of women and underrepresented groups in leadership and decision-making roles. A science-based approach should also be emphasized, incorporating ecological monitoring, socio-economic data, and participatory research to inform conservation strategies and policy advocacy. Lastly, fostering multi-stakeholder collaboration with community-led organizations by engaging government agencies, NGOs, and private sector actors as partners helps enhance local impact and provide institutional support.

BEST PRACTICE #27:

Communication on surf ecosystem conservation tailored to engage government officials

Integrating surf ecosystem conservation into government policy requires building strong relationships with relevant officials at all levels. When engaging the government, it's vital to emphasize that protecting surf breaks offers significant environmental, cultural, and economic benefits beyond recreational use.

The arguments in favor of surf ecosystem conservation are abundant and compelling. Surfing is more than a sport; it is a powerful economic driver, a cultural and recreational asset, and an essential part of coastal ecosystems. With more than 35 million surfers worldwide and the industry continuing to grow—especially since its inclusion in the Olympics—the economic significance of waves is undeniable. Studies in Surfonomics have shown that, in places like Australia's Gold Coast, surfing-related tourism alone generates US $180 million annually (Lazarow et al., 2008).

Beyond economic benefits, wave protection aligns with international conservation commitments under the Convention on Biological Diversity and supports broader environmental and social well-being. Surfing fosters a deep connection with nature, raises environmental awareness, and promotes pro-conservation attitudes. It also has proven psychological benefits, acting as a therapeutic and revitalizing activity. In addition, waves function as natural stadiums, providing outdoor recreation opportunities without the need for costly infrastructure—underscoring the importance of preserving them as essential natural assets.

Building on the diversity of arguments in favor of surf ecosystem conservation, it is crucial to leverage key stories and statistics in strategic communication with government officials to garner political support (see Best Practice #7). Tailoring communication to link surf ecosystem conservation with existing priorities of political figures or government agencies can strengthen the case for supporting surf ecosystem conservation.

BEST PRACTICE #28:

Engaging stakeholders in decision-making processes to advocate for integrating surf ecosystem conservation into government policies

Ensuring the explicit inclusion of surf ecosystem protection within broader coastal and marine spatial planning, development strategies, regulatory policies, and environmental impact assessments is crucial for long-term conservation efforts. A best practice is to support active engagement of local stakeholders in committees and decision-making processes where possible to ensure that surf ecosystems are considered at multiple governance levels. This includes participation in public forums or town hall meetings, submitting testimony to support or oppose draft legislation, writing to government officials to advocate for needed policies, and more.

Many environmental governance structures do not traditionally include surf ecosystems as key conservation targets. Therefore, a critical first step is to map legally established working committees, governmental initiatives, and ongoing projects related to marine and coastal management that could benefit from the integration of surf ecosystem considerations. Once these opportunities have been identified, it is important to organize strategic stakeholder engagement in participatory processes to advocate for mainstreaming surf ecosystem conservation into these different policy areas.

It is also important to consider avenues beyond traditional environmental forums, to further strengthen surf ecosystem protection in a diversity of policies and sectors. For example, participating in economic development commissions at local or national levels provides an opportunity to highlight the economic and social benefits of surf ecosystems and advocate for their inclusion in tourism and sustainable development policies. Similarly, integrating surf ecosystem conservation into climate adaptation strategies, coastal resilience plans, and sustainable blue economy initiatives can further enhance recognition and institutional support. Section 2.5 outlines the various opportunities for integrating surf ecosystem conservation into public policies, where stakeholder engagement is critical to advocate for such integration.

BEST PRACTICE #29:

Organizing public events and festivals to promote positive social interaction, community cohesion, and awareness of surf ecosystem conservation

Organizing public events and festivals is an effective strategy to foster positive social interaction, strengthen community cohesion, and raise awareness about surf ecosystem conservation. These gatherings create shared experiences that unite individuals, instilling a collective sense of shared purpose and responsibility toward preserving surf ecosystems.

In his book, Drive: The surprising truth about what motivates us (2009), Daniel H. Pink emphasizes the human desire "to be part of something bigger than ourselves, something that matters." This insight shows the motivational power of communal activities centered around meaningful causes like surf ecosystem conservation.

A notable example of leveraging public events for environmental awareness is the Save The Waves Film Festival, the world's only international surf and environmental film festival, which features inspiring documentary films about surf and water sports, travel and adventure, conservation, and climate. These film screenings not only entertain and inspire but also educate audiences about the importance of protecting surf breaks and coastal ecosystems. Similarly, in Peru, Conservamos por Naturaleza collaborates with various partners to host the Festival Conservamos. This event brings together thousands of individuals to celebrate and support conservation efforts, demonstrating the power of community engagement in environmental initiatives.

Integrating surf ecosystem conservation into cultural and artistic events can communicate the significance of preserving these environments from diverse perspectives. Involving musicians, artists, and ethically committed brands that support conservation efforts enriches the experience, appeals to the emotional sensibilities of attendees, and broadens the reach to diverse audiences. This multifaceted approach not only raises awareness but also fosters a deeper connection to the cause, encouraging sustained community involvement and support.

BEST PRACTICE #30:

Involving and investing in local youth through opportunities to learn and participate in surfing and surf ecosystem conservation

Conservation organizations around the world have recently started to focus more on mainstreaming youth engagement and intergenerational partnership to ensure that all generations' voices are heard and are actively contributing to addressing global conservation challenges (Zurba et al., 2023). To ensure the longevity of surf ecosystem conservation efforts and to promote intergenerational equity and inclusivity, it is a best practice to engage youth from local communities in surfing and surf ecosystem conservation. To not only enhance intergenerational equity, but also gender equity, it is particularly important to involve young women and girls in these opportunities—especially considering the gender gap and cultural barriers for women in surfing, science and conservation, and leadership positions.

Learning to surf from a young age fosters a strong connection to the ocean, cultivates an interest in learning about surf ecosystems, and motivates people to protect them. Offering camps, classes, and other forms of hands-on learning experiences can equip youth with ocean safety, surfing, and conservation knowledge and skills, preparing them to become the next generation of surf ecosystem conservation leaders in their community.

Additionally, providing opportunities for youth to be involved in surf ecosystem conservation projects, stewardship activities, and decision-making processes can introduce them to the management of surf ecosystems and ensure their unique voices and perspectives are heard. In the conservation sector, it is often emphasized that we must safeguard all that nature has to offer for the benefit of future generations; therefore, it is imperative to invest in and involve youth as key stakeholders and participants to ensure that surf ecosystem conservation measures are sustainable, relevant, and long-lasting.

CASE STUDY #25:

Youth engagement through surf conservation camps in Indonesia

Surf conservation camps are an effective way to invest in and involve local youth as important stakeholders in surf ecosystem conservation efforts. In Indonesia, Konservasi Indonesia and Conservation International have supported local organizations to implement these camps for youth on two islands with active surf ecosystem conservation projects—Morotai and Sumba. The camps aim to provide youth with the opportunity to fall in love with the ocean through surfing and to build the skills to protect it.

Targeting youth ages 6 to 18 who live in and around community-based surf conservation areas, these camps provide hands-on learning focused first on building foundational ocean safety knowledge and survival swimming skills, then progressing to more advanced swimming and surfing skills, while integrating elements of surf ecosystem conservation, stewardship, and advocacy. The program also promotes connections between youth from neighboring villages and supports them in developing leadership and interpersonal skills through group activities and learning, thereby strengthening the network of surfers and ocean stewards across adjacent villages.

These experiences have proven to build confidence in youth and cultivate their strong connection to the ocean. Several participants from the early implementation of these camps are now older teens and young adults who support as assistant instructors and are passing on their knowledge and passions to the next group of youth. Some participants have chosen to pursue surfing competitively or join local surf clubs and organizations through which they lead and participate in local beach cleanups and other stewardship activities throughout the year.

Thus, these camps and related experiences not only invest in local youth by building their surfing and conservation skills and knowledge, but also provide an avenue to involve them in surf ecosystem conservation activities and decision-making as well as to participate in the blue economy related to surfing and surf tourism. Furthermore, the camps typically gather entire communities together, including families of the participants and village leadership, helping to generate renewed excitement and support for surf ecosystem conservation within the broader local community.

BEST PRACTICE #31:

Crowdfunding for surf ecosystem conservation

Innovative funding mechanisms are essential for surf ecosystem conservation (see Section 2.8 for more on sustainable financing), and crowdfunding has emerged as a powerful tool for both raising funds and fostering community engagement. Successful campaigns, such as Hazla por tu Ola in Peru and the Punta de Lobos campaign in Chile, demonstrate how collective fundraising can go beyond financial support to build a strong, engaged community around conservation efforts. However, for crowdfunding to be effective, several key factors must be considered:

1. **Building Trust, Transparency, and Accountability**

   Accountability is essential for any successful crowdfunding initiative. Donors need to trust that their contributions will be used effectively, and clear mechanisms for financial oversight and reporting can help establish that trust. Providing updates on fund allocation, publishing financial reports, and demonstrating tangible outcomes can significantly enhance credibility and encourage more people to donate.

   In Latin America, where philanthropy is not deeply ingrained in the culture and public trust in organizations is often low, crowdfunding efforts must go even further to ensure transparency. Clearly defining how funds will be used is crucial. For example, in Peru, Hazla por tu Ola adopted a 100% charity model, ensuring that all donations went directly to technical studies required for legal protection of surf breaks under Peruvian Surf Breaks Law, without covering salaries or overhead costs (see Case Study #11 for details on Peruvian Surf Breaks Law). This level of accountability reassures donors that their contributions have a direct impact. Additionally, financial incentives such as tax deductions can encourage larger donations, making it important to explore legal frameworks that support philanthropic giving.

2. **Community/Donor Engagement and Recognition**

   Crowdfunding is not just about raising money—it is about creating a movement. A successful campaign should make donors feel like they are part of something bigger. This can be achieved through personalized engagement, public acknowledgments, and incentives. Recognition is particularly important for corporate donors, who may contribute larger amounts in exchange for visibility. For instance, offering branding opportunities in conservation-related events or featuring their contributions in campaign materials can encourage further support.

3. Strategic Communication and Incentives

How the fundraising goal is communicated can make a significant difference in engagement levels. Instead of stating that a campaign needs $100,000, framing it as a goal of 1,000 people donating $100 each makes it feel more achievable and relatable. Perks such as limited-edition merchandise —such as t-shirts, stickers, or exclusive surf gear— can also incentivize contributions. Offering experiences, such as surf sessions with a renowned athlete or access to conservation fieldwork, can further motivate donations.

4. The Role of Ambassadors and Public Figures

Surfing is a niche community, and having a trusted ambassador can significantly boost a campaign's reach and credibility. In Chile, big wave surfer Ramón Navarro played a key role in the Punta de Lobos campaign, leveraging his reputation to attract international attention and support. Similarly, selecting public figures or ambassadors to represent the campaign who resonate with different audiences —whether they are professional surfers, environmental activists, or influencers— can help broaden the campaign's appeal.

5. Choosing the Right Crowdfunding Platform

For individuals or small organizations, using established platforms such as GoFundMe, Kickstarter, or Indiegogo can provide added visibility and credibility. Larger organizations may opt to host crowdfunding directly on their own websites, allowing for greater control, minimal platform fees, and long-term engagement with donors. Regardless of the platform, having a strong campaign narrative, engaging visuals, and clear calls to action is essential for success.

BEST PRACTICE #32:

Engaging Indigenous communities in surf ecosystem conservation

Recognizing the significant connection between various Indigenous cultures and the evolution of surfing around the world, it is crucial to meaningfully engage Indigenous communities in surf ecosystem conservation efforts. Indigenous peoples in Hawai'i, Peru, and other locations around the world were not only the world's first surfers but also extremely knowledgeable "water people" in many ways. Indigenous peoples hold a deep, ancestral connection to their lands and waters and hold extensive traditional ecological knowledge (TEK) gathered from generations of direct relationships with the land (and ocean), which is critical to informing effective and culturally appropriate surf ecosystem conservation and management. Incorporation of TEK into conservation approaches through the participation and leadership of Indigenous peoples can lead to more effective and resilient conservation outcomes.

When collaborating with Indigenous communities, it is extremely important to build trust and establish long-term relationships built on mutual respect. At minimum, it is critical to ensure free, prior, and informed consent (FPIC) from Indigenous communities before engaging in projects that would impact Indigenous lands and waters or their traditionally owned or managed natural and cultural resources. It is important to follow protocol outlined in the United Nations Declaration on the Rights of Indigenous Peoples and other guidelines informing how to respectfully and equitably engage with Indigenous communities.

See UNESCO's resources on "Engaging indigenous peoples and local communities, and embracing indigenous and local knowledge in marine spatial planning" for more relevant guidance.

CASE STUDY #26:

The Cultural Impact Assessment in New Zealand

The Cultural Impact Assessment (CIA) is a crucial instrument within New Zealand's planning framework, designed to incorporate Māori cultural values and perspectives into environmental management and decision-making processes. Originally developed to facilitate Indigenous participation, the CIA enables Māori communities to articulate their connections and interests regarding specific areas or resources, thereby influencing outcomes that may affect their cultural heritage.

In the context of surf break protection, the application of CIAs has been instrumental in acknowledging and preserving the cultural significance of these coastal features (Atkin et al., 2019). Surf breaks are not merely recreational assets; they embody spiritual, historical, and social values for many communities, particularly the Māori. Recognizing this, researchers have emphasized the necessity of incorporating cultural considerations into coastal management practices to safeguard their multifaceted values.

The implementation of CIAs involves a comprehensive assessment of how proposed developments or activities might impact the cultural, environmental, and recreational attributes of surf breaks. This process includes identifying the cultural importance of specific surf breaks, evaluating potential disruptions, and recommending measures to mitigate adverse effects. Such assessments ensure that the voices of Indigenous communities are integral to decision-making, promoting outcomes that respect and uphold their cultural heritage.

Despite the clear benefits, challenges persist in the consistent application and effectiveness of CIAs. Variations in assessment quality, resource constraints, and the need for greater integration into broader planning processes are areas requiring attention. Addressing these challenges is essential to enhance the protection of surf breaks and to honor the cultural values they represent.

Playa Hermosa, Costa Rica. Photo by Dixiana Salas.

2.7. Assessing and capturing economic benefits of surf ecosystems

Author: Lucas Lepinard

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Developing the blue economy emphasizes the sustainable use of marine and coastal resources to achieve long-term economic growth, environmental resilience, and social well-being. While the blue economy encompasses a wide array of sectors —including fisheries, shipping, offshore renewable energy, and marine biotechnology— many of which can significantly impact surf ecosystems, this section specifically focuses on economic activity based directly in surf ecosystems as a critical subset of the blue economy. As discussed in Section 1.6, economic activities based in surf ecosystems were chosen as the focal point of this section because they provide a unique entry point for balancing economic development with conservation outcomes. Surfing contributes to the blue economy not only through direct revenue generation and job creation but also

by strengthening cultural identity, supporting local entrepreneurship, and catalyzing marine conservation efforts. Community-based blue economy initiatives that are directly linked to surf ecosystem conservation create a powerful incentive for local communities to continue to implement conservation measures, as it benefits them economically

The importance of surfing to the blue economy at the national and regional level

Surfing generates substantial economic benefits for coastal nations, particularly through tourism-related activities. Surf tourism attracts both domestic and international visitors, generating revenue for local businesses, creating employment opportunities, increasing property values, and stimulating investment in coastal infrastructure. Studies from various regions have demonstrated the significant economic contribution of surf-related activities:

- **Playa Hermosa, Costa Rica:** Surf tourism is the primary reason that 88.3% of visitors come to Playa Hermosa. Data collection shows that surf tourists spend US $112.76 per day, leading to an annual total local expenditure of US $14.3 million (Bosquetti & Hodges, 2021). (See Case Study #27 for more detail).
- **Gold Coast, Australia:** Surf-related activities contribute AU $3.3 billion annually, supporting 20,000+ jobs in tourism, retail, and recreation (Lazarow, 2009).
- **Santa Cruz, California:** Real estate studies show that proximity to high-quality surf breaks increases property values by hundreds of thousands of dollars (Scorse et al., 2015).

These studies illustrate how surf ecosystems can act as engines of local and national economic development. By generating consistent streams of revenue, attracting both public and private investment, and supporting diverse local businesses, surfing is increasingly recognized as a vital component of the blue economy.

To fully capture the economic benefits of surf ecosystems, policymakers and stakeholders need to: (a) conduct robust economic assessments to understand surfing's full economic value (as described in this section), (b) recognize and legally protect the economic value of surf ecosystems (as described in Section 2.4), (c) integrate surf ecosystem considerations into public policies and sustainable infrastructure planning (as described in Section 2.5), and (d) ensure meaningful local stakeholder engagement (as described in Section 2.6).

Surfonomics, a natural resource economics methodology, helps assess surf ecosystems' direct, indirect, and non-market values, including tourism revenue, employment, real estate impacts, and ecosystem services. Such assessments provide evidence to support sustainable tourism policies and conservation investments.

The best practices in this section are structured in two main categories: (1) Assessing the blue economy benefits of surf ecosystems, and (2) Capturing the blue economy benefits of surf ecosystems.

BEST PRACTICES FOR ASSESSING THE BLUE ECONOMY BENEFITS OF SURF ECOSYSTEMS

Surfonomics is the primary methodology that has been used to date to assess the blue economy benefits of surf ecosystems. However, it is important to note that previous Surfonomics studies have typically focused on local-level analyses rather than on regional or national scales. Thus, this section draws from best practices identified from existing Surfonomics applications at the community-level, while also summarizing high-level best practices suitable for broader economic assessments of surfing's contribution at regional or national scales. The examples of Playa Hermosa, Costa Rica (Case Study #27) and Meos Manggwandi, Indonesia (Case Study #28) illustrate how community-level economic assessments and diversified livelihood initiatives can serve as foundational models for scaling such analyses nationally or regionally.

BEST PRACTICE #33:

Define a clear scope and objectives for economic assessments

Clearly defining the scope and objectives of an economic assessment is critical for generating actionable insights and ensuring that the resulting data effectively supports decision-making and conservation planning. A well-defined scope clarifies the purpose of the study, aligns stakeholder expectations, helps select appropriate methodologies, and ensures the results directly inform policy and management actions.

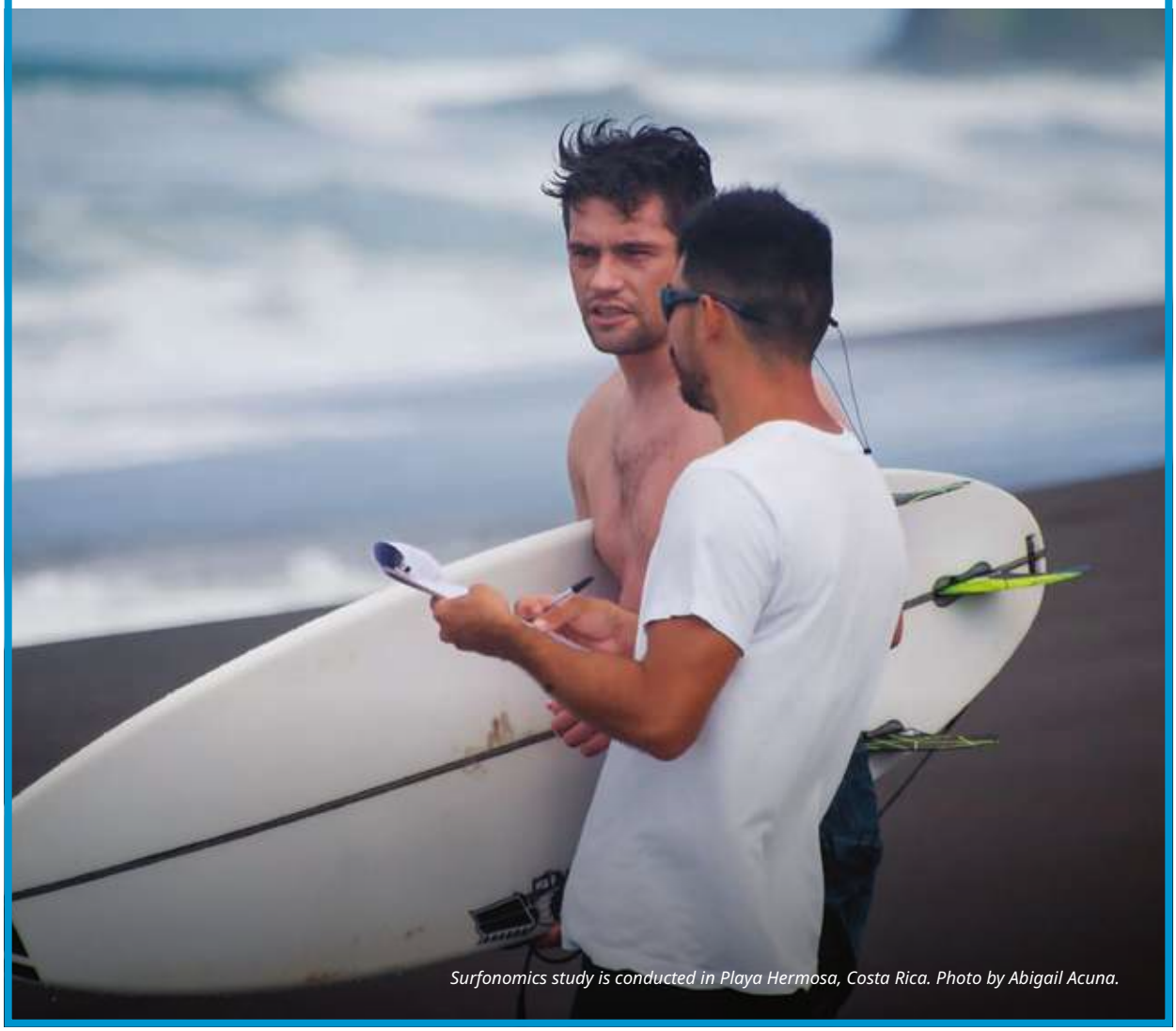
When setting the scope, practitioners should consider the following value categories:

- **Direct Values:** These are measurable, market-based economic contributions directly linked to surf tourism, such as visitor spending on accommodations, restaurants, transportation, and surf-related activities (e.g., surf schools, gear rentals). It is important to assess direct values if the primary goal is to communicate immediate economic impacts to local businesses and tourism authorities.
- **Indirect Values:** These capture the broader economic effects that surfing and surf tourism has on related sectors and infrastructure development, such as increased property values, job creation in auxiliary industries (e.g., hospitality suppliers and construction), and investment in public services (e.g., road improvements or sanitation facilities). It is important to assess indirect values if the objective is to demonstrate surfing's wider economic contributions and inform regional development strategies.
- **Non-Market Values:** These represent the intangible benefits provided by surf ecosystems, including cultural heritage, recreational enjoyment (consumer surplus), ecosystem services, and overall quality of life improvements. It is important to assess non-market values if the goal is to strengthen arguments for promoting community well-being, ecological health, and policy decisions that balance economic development with environmental sustainability.

Deciding which values to assess should be guided by:

- **Intended use:** If the assessment aims primarily to justify immediate investments in surf tourism infrastructure or attract tourism funding, then assessing direct and indirect values may be most relevant. For community wellbeing, conservation-focused initiatives, or long-term sustainability planning, assessing non-market values can highlight broader ecosystem and social benefits.

- **Stakeholder priorities:** Early engagement with relevant stakeholders can clarify priorities and inform which data types will be most useful and impactful.
- **Time and effort considerations:** Available data, budget constraints, expertise, and timelines may influence what kinds of assessments are feasible to conduct. Direct value assessments are typically more straightforward and faster to conduct, while indirect and especially non-market valuations often require more specialized methods and bigger time and resource commitments.



Surfonomics study is conducted in Playa Hermosa, Costa Rica. Photo by Abigail Acuna.

BEST PRACTICE #34:

Engage stakeholders early and often in economic assessments

Engaging a broad coalition of stakeholders —including national ministries, local governments, surf NGOs, businesses, and academic institutions— from the outset is essential for successful economic assessments. Early involvement improves data access, ensures that the study reflects on-the-ground realities, and increases the likelihood that findings will inform meaningful policy and conservation action. For additional guidance and methods for stakeholder engagement, see Section 2.6, which outlines best practices for fostering inclusive, equitable, and sustained community participation in surf ecosystem conservation.

Surf camp in Sumba, Indonesia. Photo by Rafaela Maia.

BEST PRACTICE #35:

Apply diverse valuation methods to capture economic value and environmental risk

To fully assess the economic importance of surf ecosystems—and strengthen arguments for their protection—practitioners should utilize a blend of established valuation methodologies that capture both the benefits of healthy ecosystems and the risks of their degradation. Doing so supports more accurate assessments, informs sustainable policy design, and helps make the case for conservation investment. This best practice complements the threat identification methods in Section 2.2 by linking those threats to measurable economic outcomes.

Core valuation methods include:

- **Direct Expenditure Method (DEM)** - DEM estimates the direct financial contributions of surf tourism by measuring visitor spending on lodging, food, transport, services, and more.
    - *Example:* In Playa Hermosa, this method revealed an estimated US $14.3 million in annual visitor spending (Bosquetti & Hodges, 2021).
    - *How to use:* Design visitor surveys to capture expenditure categories, trip duration, group size, and visit frequency.
- **Ecosystem Services Valuation (VSE**) - ESV quantifies non-market values such as clean water, scenic beauty, and biodiversity, which are core components related to the appeal of surf ecosystems.
    - *Example:* In Nosara, willingness-to-pay surveys showed strong visitor support for annual conservation fees that would preserve ecosystem services (Anning et al., 2024).
    - *How to use:* Use contingent valuation or choice modeling to assess how much visitors are willing to pay to preserve or improve specific ecosystem services.

- **Travel Cost Method (TCM)** - TCM estimates consumer surplus by measuring travel-related costs that visitors incur to access surf breaks. These can be used to model recreational demand and infer the economic value of surf breaks.

    - *How to use:* Collect data on travel distance, transport modes, duration of stay, and trip frequency to build a demand curve and calculate use value.

Translating environmental threats into economic risk:

Surf ecosystem degradation can lead to measurable economic losses. To demonstrate this:

- **Assess the impact of perceived threats on tourist behavior.** In both Playa Hermosa and Nosara, many tourists said they would not return if water quality declined—signaling real financial risk to local economies (Bosquetti & Hodges, 2021; Anning et al., 2024).
- **Use visitor surveys to model behavior under different degradation scenarios.** Pair this data with spending data from the Direct Expenditure Method or value estimates from the Ecosystem Services Valuation to project potential economic losses.
- **Where available, pair perception data with ecological indicators.** For example, water quality data or reef health metrics can help validate or inform estimates generated by economic studies and surveys.

By applying these methods for assessing the value of surf ecosystems together with understanding the economic risk of threats, practitioners can build a multi-dimensional case for surf ecosystem conservation—grounded in economic realities, sensitive to local threats, and aligned with policy needs.

BEST PRACTICE #36:

Contextualize economic assessments to account for local and regional variations

Economic assessments must reflect local and regional differences, such as visitor demographics, tourism infrastructure, surf culture, and socio-economic conditions. Failing to account for these variations can result in inaccurate economic valuations, misguided policies, and ineffective resource allocation. For example, the Nosara Surfonomics study found that its visitor demographic —primarily international tourists and expatriates seeking wellness experiences— spent roughly three times more daily than visitors to nearby Playa Hermosa, despite their geographic proximity (Anning et al., 2024). These significant variations underscore the necessity of site-specific assessments to accurately capture economic realities and inform appropriate local and regional strategies.

Thus, national-level assessments should be validated and refined through site-specific data collection methods, such as:

- Conducting local surveys or interviews to verify the accuracy of broader estimates.
- Collaborating with local stakeholders to confirm assumptions and contextual accuracy.
- Cross-referencing national or regional estimates with available local economic, ecological, and social data.

Additionally, it can be beneficial to collect additional demographic information that allows for disaggregating data to better understand social and economic dynamics. For example, this could include gender-disaggregated data to understand different gender roles in the local surfing economy.

BEST PRACTICES FOR CAPTURING THE BLUE ECONOMY BENEFITS OF SURF ECOSYSTEMS

BEST PRACTICE #37:

Support and strengthen community-led businesses and enterprises

Supporting the creation and strengthening of community-led businesses and enterprises ensures that the economic benefits from surf ecosystems and surf tourism reach local populations. When local communities directly benefit economically from surf ecosystems, this reinforces incentives for sustainable resource management. This can include promoting capacity-building programs, facilitating regional coordination and knowledge exchange, integrating community-based enterprise development into economic plans, and facilitating access to financing and investments. It is also important to promote and enable equitable participation or access to these opportunities (including, for example, gender equity and access for Indigenous Peoples).

Training and capacity-building programs can help empower local community members with the knowledge and skills necessary to create and manage successful, sustainable surf-related businesses. Training and capacity-building programs can cover topics such as business planning and management, financial management, marketing, sustainable business practices, business ethics, environmental monitoring programs, and conservation-oriented entrepreneurship.

Furthermore, establishing or strengthening networks that facilitate regional coordination and knowledge exchange between community-led business owners is also key to supporting their success. These networks help set standards, disseminate best practices, promote networking, and provide platforms for peer learning on relevant topics. The Global Sustainable Tourism Council (GSTC), for example, sets global standards for sustainable tourism and provides training, certification programs, and networking opportunities for destinations and businesses. Built on the standards set by GSTC, the Sustainable Tourism and Outdoors Kit for Evaluation (STOKE) is the world's first sustainability certification body with standards built specifically for surf (and ski) tourism operators, destinations, and affiliated events. STOKE Certification provides a framework for businesses in the surf tourism industry to engage in sustainability best practices and become part of a network of businesses committed to environmental stewardship. These types of networks, associations, or certifications not only

promote sustainable business practices but also can help promote locally-owned businesses by marketing them to target consumers, such as international surf tourists. One key challenge is that certification programs can be expensive to participate in; thus, lowering the barrier-to-entry or waiving fees to participate could be one way of supporting small community-led businesses.

Another way to support and strengthen community-led businesses and enterprises is to explicitly incorporate support through national economic plans or strategies, coastal zone management policies, and sustainable tourism frameworks. This could include zoning designations that prioritize local ownership of prime business real estate near surf breaks. It could also include facilitating access to business financing and start-up investments. With the surf tourism industry often dominated by foreigners or expatriates, providing additional support for local community-led businesses to thrive is crucial.

Developing funds, investments, subsidies, or tax incentives for sustainable start-ups is one concrete way to simultaneously support local entrepreneurship and promote sustainable business practices. One example of this is a revolving fund. Revolving funds help address the critical challenge of obtaining initial capital for developing surf tourism enterprises. They operate by providing low-interest or interest-free loans to local businesses that repay the loan over time. The repayments replenish the pool of funds, making capital continuously available for reinvestment into other community-led projects. This creates financial support for locally-owned businesses and also fosters financial stewardship, autonomy, and long-term resilience within the community. See Section 2.8 for details on other sustainable financing mechanisms to support surf ecosystem conservation.

BEST PRACTICE #38:

Align infrastructure to support both environmental goals and sustainable blue economy development

To sustainably capture economic benefits, national and regional infrastructure planning must proactively balance surf tourism development with environmental sustainability. Key actionable steps could include: developing zoning regulations, creating incentives for sustainable infrastructure, and facilitating national or regional public-private partnerships.

Land use designations and zoning regulations can help protect high-value surf breaks and surf ecosystems from incompatible development (e.g., large-scale coastal engineering, industrial projects). Zoning should clearly designate protected or low-impact development areas to safeguard wave quality and coastal ecosystems. Regulations can also require thorough environmental impact assessments for all coastal development projects to mitigate impact. (Refer to Section 2.5 for more detail on integrating surf ecosystem conservation into public policies and urban planning).

Offering incentives at the national or regional level (e.g., tax breaks, reduced permit fees, or subsidies) for eco-friendly infrastructure projects such as renewable energy facilities, sustainable wastewater treatment, and low-impact surf lodge construction can help further minimize damage to the surf ecosystem while creating the necessary infrastructure to enable sustainable blue economy development.

Additionally, facilitating the creation of public-private partnerships (PPPs) can help align diverse stakeholder interests to balance economic development with ecosystem protection around surf breaks. PPPs are contractual agreements between a public agency and a private entity to deliver a public service or facility, leveraging the expertise and resources of both sectors. PPPs should be structured to achieve environmental, social, and economic goals by simultaneously maintaining the ecological integrity and recreational value of surf ecosystems while promoting surf-based businesses and sustainable economic activity.

BEST PRACTICE #39:

Systematically communicate surf-related economic data to key decision-makers to advocate for supportive policies and investments

Regular economic reporting can provide national or regional decision-makers with a clear and consistent understanding of the economic benefits derived from surf ecosystems, facilitating more informed policy decisions and targeted investments.

This could be achieved by integrating the value of surf ecosystems into existing economic reports, leveraging existing national or regional economic reporting structures (e.g., tourism sector economic reports or coastal economy reports) to systematically include data on surf tourism revenue, employment, and infrastructure investments.

Another option is to periodically disseminate surf-related economy data to policymakers and investors. Developing concise economic briefings specifically highlighting surf-related economic activity and disseminating them to key policymakers, regional development agencies, and potential investors could help promote more supportive policies and investments.

Economic data and reports can also be cross-referenced or linked with data on environmental threats, demonstrating the economic risks of ecosystem degradation and reinforcing conservation priorities (see Best Practice #35).

CASE STUDIES

CASE STUDY #27:

A Surfonomics study of Playa Hermosa, Costa Rica

The Surfonomics study conducted in 2021 for Playa Hermosa, Costa Rica, provides a clear demonstration of the significant economic contributions of surf ecosystems to local communities. Playa Hermosa, designated as the 10th World Surfing Reserve, is renowned for its consistent, high-quality waves and vibrant surf culture. This study employed the Direct Expenditure Method (DEM) to quantify surf tourism's contributions to the local economy.

Researchers collected primary data through extensive face-to-face interviews with 274 surf tourists, 22 local lodging managers, 20 local surfers, and 3 surf travel agencies. They gathered information on spending patterns, demographics, and visitor perceptions regarding environmental threats and willingness to pay for conservation. Secondary data from tourism boards and online platforms were utilized to strengthen and verify the results.

Key findings from the study include:

- Playa Hermosa attracts approximately 14,500 surf tourists annually, generating around US $14.3 million for the local economy.
- International tourists, predominantly from the United States, Brazil, and Spain, spend an average of US $112.76 per day over stays averaging 8.3 days.
- Day-trip surfers, mostly domestic, contribute an additional US $3.3 million annually, reinforcing the importance of local visitation alongside international tourism.
- Surfers identified environmental issues such as water pollution, wave quality changes, and inadequate waste management as critical threats that could negatively impact their decision to return. Nearly 90% expressed willingness to contribute financially to environmental protection, with a majority favoring annual conservation fees as the mechanism.

These results underscore the importance of surf ecosystems not just as recreational and ecological assets but also as vital economic resources. The Playa Hermosa Surfonomics case provides compelling evidence to support integrating surf tourism and conservation policies into broader national economic planning. In fact, the study was used to support efforts to prevent potentially damaging development in Playa Hermosa and to promote urban planning that adequately incorporates surf ecosystem conservation (see Case Study #22). Community-level economic assessments like these create a foundation for future national assessments and sustainable development strategies that more effectively leverage surf tourism for long-term economic and environmental benefits.

Chicama, Peru. Photo by Nikki Brooks.

CASE STUDY #28:

Capturing blue economy benefits in Meos Mangguandi, Indonesia

The Indonesia Locally Managed Marine Area Foundation (ILMMA), an organization that works to strengthen coastal marine resource management in Indonesia, has successfully implemented effective conservation efforts while generating improved blue economy livelihood benefits in Meos Mangguandi Island, in Papua, Indonesia. On this island, the two villages of Meos Mangguandi and Supraima, which historically relied almost entirely on fish and other marine resources for subsistence, were vulnerable to the poverty trap—a downward cycle where the overexploitation of marine resources to meet immediate needs depletes ecosystems, reduces biodiversity, and diminishes incomes. The cycle perpetuates poverty and forces continued unsustainable practices, further straining both the environment and the community's long-term well-being.

To break this cycle, ILMMA collaborated with the community to communicate the impacts of overexploitation and establish a no-take zone around part of the island that would enable fish stocks to recover. ILMMA also supported the development of traditional ('adat') and village ('desa') regulations to govern the sustainable management of marine and coastal resources. Recognizing the immediate economic impact of restricted fishing, ILMMA employed Participatory Rural Appraisal (PRA) techniques to work closely with the community in identifying diversified livelihood opportunities. These efforts led to the development of alternative income streams, including coconut oil production —a value-added commodity— and seaweed farming, with products sold at local markets.

Over time, these initiatives have created a virtuous cycle. The recovery of fish stocks has led to increased catches, while diversified livelihoods such as coconut oil production and seaweed farming provide additional income and reduce reliance on overfishing. Furthermore, the restored marine biodiversity has opened up opportunities for sustainable tourism, including snorkeling and diving tours. In 2025, surfers began visiting Meos Mangguandi and surrounding islands, creating a new tourism opportunity that further supports the local economy.The success of Meos Mangguandi and Supraima has inspired other villages across the Padaido Islands to establish their own LMMAs. This case demonstrates how effectively combining conservation efforts with community-led livelihood diversification can capture the full spectrum of blue economy benefits, ensuring long-term ecological and economic resilience.

Cabo Blanco, Peru. Photo by Javier Larrea.

Photo by Javier Larrea.

2.8. Sustainable financing schemes for surf ecosystem conservation

Author: Scott R. Atkinson

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As described in Section 1.7, sustainable financing for the conservation of surf ecosystems refers to recurring, predictable, long-term funding from reliable sources that fully or partially cover the costs of ongoing surf ecosystem conservation initiatives. This is important to reduce dependency on short-term or unpredictable funding sources and ensure that surf ecosystem conservation efforts are financially viable in the long-term.

Sustainable financing is thus a critical component of building the long-term durability of surf ecosystem conservation efforts. However, it is most impactful and long-lasting when combined with other critical elements of durability, including: local community and stakeholder leadership and support, socioeconomic and cultural benefits for communities, and a strong enabling environment that includes governmental, legal, and private sector support.

Establishing sustainable financing mechanisms is one of the most challenging elements of any conservation project. While a variety of long-term sustainable financing mechanisms have been established across the world, the overall number of conservation projects that operate without a consistent source of sustainable financing is significant.

Many site-based conservation efforts rely almost exclusively on government appropriations or user fees for funding, especially in the case of government-led protected areas. However, both of these funding sources are subject to major fluctuations—government priorities can change under new leadership, government budgets are often cut in times of economic downturn, and user fees depend on consistent visitation.

Due to the influence of uncontrollable factors on funding sources, it is highly recommended to combine or layer sustainable finance mechanisms to ensure diversified and secure funding streams that are resilient to disturbances (e.g., economic downturns, global pandemics, or changes in political leadership).

Types of Sustainable Financing:

There are numerous options for sustainable financing, including but not limited to the options described here (and summarized in Table 11). It is key to acknowledge the importance of assessing the feasibility of each mechanism for local contexts and conditions, as they might be fit for some contexts but not others.

Table 11. *Summary of sustainable financing options.*

SCALE OF SUSTAINABLE FINANCING	TYPE OF MECHANISM	DESCRIPTION OF SUSTAINABLE FINANCE MECHANISM
Site-based sustainable financing mechanisms	Visitor fees or user fees	Fees charged to visitors of specific sites or areas.
	Business contributions	Regular funding provided by surf related businesses, either directly from the business or from their customers.
	Site-specific fundraising or crowdfunding	Fundraising by a group to support the funding needs of a specific site that is meaningful to that group. This can include adopt-a-site models or crowdfunding campaigns (as described in Section 2.6, Best Practice #31).
	Community fundraising	Community-based fundraising through things like community events where proceeds are allocated to conservation.
Larger-scale sustainable financing mechanisms	Government appropriations	Government agencies allocate an annual budget to support the operations of protected areas.
	Payments for ecosystem services	Fees charged to users of specific resources or areas as payment for ecosystem services.
	Large-scale conservation financing schemes	Large-scale funding usually unlocked through high-level negotiations and donor / government engagement (e.g., debt-for-nature swaps or Project Finance for Permanence).
	Global, national, or local funds	A significant amount of funding is raised, managed, and distributed to support projects over a long period of time (e.g., trust funds or spend down funds).
	Technology-oriented finance schemes	These include carbon credits (either on the voluntary market or verified market) and biodiversity credits traded as Non-Fungible Tokens (NFTs). Another option is to create Decentralized Autonomous Organizations (DAOs).

Site-based Sustainable Financing Mechanisms:

1. **Visitor or User Fees:** Visitor Fees are one of the most common sources of sustainable financing for protected areas. These can include fees charged to visit individual protected areas (such as national park entry fees) as well as fees to

enter entire jurisdictions (such as the visitor fee that is charged by Palau). A major shortcoming of visitor fees is that some of the most remote surf locations that have the highest degree of ecosystem integrity, and therefore some of the greatest conservation potential, also don't have many visitors. One way that park systems have addressed this issue is by directing fee revenue from all sites in their network to a central fund that then redistributes funding to sites based on budgetary needs rather than on level of visitation. Visitor fees are not yet well developed as a source of sustainable financing for surf ecosystem conservation areas, but they have enormous potential.

2. **Local, National, or International Business Contributions:** A common source of conservation financing for surf ecosystem conservation is funding provided by surf-related businesses. This can include hotels, vacation rentals, restaurants, surf schools, surf travel agencies, and various other types of businesses. Some businesses choose to donate directly from their business revenue, while others either charge their guests or provide their guests with the opportunity to donate. Approaches that are commonly used to collect donations from customers are the opt-in and opt-out models. These models provide customers with information about the conservation initiative and a line item on their bill, either with an option to contribute to conservation (opt-in) or an automatic charge that guests can elect not to pay if they prefer not to (opt-out). There are a number of important considerations when selecting which approach to use. In some cases, the opt-out approach will generate more funding than opt-in, especially in lower-cost destinations. The opt-in model, however, can generate significantly more funding —especially in high-cost destinations or accommodations— because it does not pre-determine a donation amount; thus, higher income customers may contribute larger donations when not constrained by an automatic charge or suggested amount.

3. **Site-Specific Fundraising (including Adopt a Site Programs and Crowdfunding):** Groups of individuals, organizations and businesses may find it compelling to fundraise on a consistent basis to support surf ecosystem conservation in one or more specific sites that are meaningful to them or to gain public recognition. This can include an adopt-a-site model for fundraising efforts and/or crowdfunding campaigns (as described in more detail in Section 2.6, Best Practice #31). This approach has been used to protect individual endangered and threatened species as well as natural locations. It has also been used for surf ecosystem conservation, including in Peru under the Hazla por tu Ola (Do It For Your Wave) Campaign to legally protect surf breaks across the country. There are also active proposals to trial it for locations such as the Mamanuca Islands in Fiji. There is significant potential to expand this approach across numerous surf breaks and surf ecosystems globally.

4. **Community Fundraising:** In many communities around the world, local people take it upon themselves to raise funds to operate surf ecosystem conservation projects. The type of fundraising ranges widely from community events like

cookouts or festivals to community members donating a portion of proceeds from fishing or farming to conservation. In villages in Indonesia for example, community members will dedicate a specific time in which all money earned from fishing is donated to community-projects, including surf ecosystem conservation.

Larger-Scale Sustainable Financing Mechanisms:

1. **Consistent Government Appropriations:** Numerous government agencies provide funding to operate protected areas that are within their protected area system–including national and state parks, nature reserves, wilderness areas, and marine and terrestrial protected areas in numerous different categories. In cases where surf ecosystem conservation areas overlap with government protected areas, a consistent annual budget from the government is typically an important source of financing to secure. However, it is extremely common that protected area funding from the government is insufficient to cover all major costs associated with protected area implementation. Thus, it is important to develop other sources of sustainable financing to supplement government appropriations. Additionally, in some countries, such as Indonesia, the government provides an annual operations budget for different jurisdictional levels such as municipalities and communities, which can be tapped as a source to fund conservation work.

2. **Fees/Payment for Ecosystem Services:** Fees charged to users of specific resources or areas are a common source of sustainable financing for overall government services and conservation. The Payment for Ecosystems Services (PES) approach has been well developed, especially in the freshwater sector—whereby businesses and municipalities pay a water fee that in turn helps to maintain watersheds and/or reservoirs to ensure the continued supply of water. Additionally, licenses for fishing and export taxes as well as licenses for marine recreation operators are another common way for governments to capture revenue from a sector that depends on an ecosystem service. This approach has not yet been applied in any significant way in the surf ecosystem conservation sector but should be explored.

3. **Large-Scale Conservation Financing Schemes (including Debt-for-Nature Swaps and Project Finance for Permanence): L**arge scale conservation finance mechanisms such as debt-for-nature swaps and the more recently developed Project Finance for Permanence (PFP) approach have provided millions to hundreds of millions of dollars for conservation. Debt-for-nature swaps negotiate the forgiveness of a certain amount of national debt for a particular country with a portion of that debt then applied to conservation. Project Finance for Permanence projects mobilize a large number of donors to fund the majority of funding needs (typically in the tens or hundreds of millions of dollars) of a particular long-term conservation effort. To our knowledge, surf ecosystem conservation has not yet been included as a stated goal of these large-scale conservation finance schemes.

Photo by Javier Larrea.

4. **Global, National or Local Funds:** Conservation funds typically require raising significant initial funding which is then managed and distributed according to specific criteria to sustainably finance long-term conservation initiatives—which could include surf ecosystem conservation. One type of conservation fund is a trust fund, in which the principal amount of funds are maintained, while earnings from investing the principal are allocated to finance conservation. This type of fund is intended to last in perpetuity. Another type of conservation fund is a spend-down fund, which has a planned end-date, where spending of the principal is authorized such that funds are spent quicker than interest is earned until the funds are exhausted. The conservation fund approach has significant potential for application to surf ecosystem conservation, where funds could be gathered from numerous sources and then managed carefully and applied to priority initiatives. While it takes considerable effort and time to design and capitalize fund mechanisms, once they are operational, they have several beneficial features,

including: creating a trusted mechanism for a variety of donors to invest in surf ecosystem conservation, generating a consistent source of financing to help fill gaps in other philanthropic or sustainable funding sources, or providing a way to fund sites that may not have many other opportunities to generate sustainable financing (such as in remote areas that have little visitation).

5. **Technology-Oriented Finance Schemes:** In recent years, technology-oriented funding mechanisms have become more popular. To our knowledge, few if any have been developed specifically for surf ecosystem conservation, but several have been developed for conservation in general and could be applied to surf ecosystem conservation. These include carbon credits (either on the voluntary market or verified market) and biodiversity credits traded as Non-Fungible Tokens (NFTs). Another idea is to create Decentralized Autonomous Organizations (DAOs) that are designed to support surf ecosystem conservation. DAOs provide an opportunity to raise capital without the standard underwriting process and are managed by a collective of the people who invest. This has been suggested as a potential mechanism to fund sustainable surf resorts that, in turn, could generate long-term funding for surf ecosystem conservation.

A number of other potential sources of sustainable finance can be utilized or generated, depending on the local context. As surfing areas become increasingly popular, there are growing numbers of individuals, organizations, and businesses that care about surf break protection and are willing to raise funds for surf ecosystem conservation on a consistent basis. An analysis of sustainable financing options will help reveal the possibilities in each unique context.

BEST PRACTICE

BEST PRACTICE #40:

Undertake an assessment of ongoing and potential new sustainable financing options

Early in the development of surf ecosystem conservation projects, it is important to undertake an assessment of current existing sustainable financing mechanisms as well as potential opportunities for new sustainable financing. Given that sustainable financing mechanisms can take years to establish, it is valuable to start this work as early as possible. However, like conservation actions, the planning and implementation of sustainable financing schemes requires trust, which takes time to develop. As a result, it is important to conduct this assessment of sustainable financing options at the right time, once key local stakeholders are already engaged in and supportive of the surf ecosystem conservation initiative. A list of shared objectives should already be co-created through a multi-stakeholder planning process before engaging in conversation about potential sustainable financing options. Conducting an assessment of sustainable financing options too early may cause confusion about the project's motivation and goals.

Playa Hermosa, Costa Rica. Photo by Ryan 'Chachi' Craig.

BEST PRACTICE #41:

Develop an agreed-upon plan for the surf ecosystem conservation initiative and identify the range of budget needs

The amount of sustainable financing that needs to be generated can vary widely depending on the objectives of the initiative. Most surf ecosystem conservation projects will have a minimum core set of needs that, if not met, will put the project in jeopardy. In some cases, trying to operate with funding that is below a critical threshold may actually put people in harm's way—for example, if boats cannot be properly maintained or enforcement agents are insufficiently trained and equipped. A good practice for any conservation initiative is to work with key stakeholders to develop an agreed-upon plan that includes identification of key needed resources such as staff, contractors, equipment and supplies, travel, meetings and workshops, and other elements as needed. Once the plan is complete, it will be possible to identify the core minimum budget needed for implementation, as well as a more robust budget to support a more comprehensive initiative. The team can then carefully consider whether it is appropriate to continue an initiative if the minimum threshold of financing is not met. Many sustainable financing mechanisms, such as trust funds, are designed to meet the critical threshold of financing, while other sources of finance help to supplement the core budget to support a more complete set of conservation actions.

BEST PRACTICE # 42:

Diversify sources of sustainable finance

Many conventional sources of conservation finance are subject to fluctuations in funds generated based on factors that are outside the control of the initiative's leaders. For example, global income from visitor fees was nearly completely wiped out during the COVID pandemic travel bans. Likewise, funds from visitor fees dried up in Indonesia after terrorist bombings in the early 2000s caused a massive decline in tourism. Government budgets can also be volatile, especially during periods of political instability or change. As a result, like in any investment portfolio, it is a best practice to diversify sources of sustainable finance as much as possible to increase the resiliency of project funding to factors outside of the project's control. A good practice is to develop a balance of funding sources that are less subject to global trends with those that are.

San Pedro, Peru. Photo by José Javier Barragán.

Morotai, Indonesia. Photo by Rafaela Maia.

BEST PRACTICE #43:

Consider developing a local fund or linking with national or international funds

With so many ways to generate sustainable financing for surf ecosystem conservation initiatives, it may be appropriate to create a centralized local fund or affiliate with a national or international fund that can serve as a central repository for different kinds of funding. This can help to reduce the administrative and coordination burden that is likely to occur if funds from different sustainable financing schemes are managed separately. Separate management of different funding streams can result in numerous challenges, including difficulty in understanding anticipated funding levels and challenges in coordinating the use and monitoring of funds for projects. Having a central repository for funds from numerous sources can help alleviate many of these challenges. However, it is extremely important that any such fund is set up with appropriate governance, protocols, and safeguards to ensure that the funds are managed and allocated appropriately for surf ecosystem conservation activities.

BEST PRACTICE #44:

Establish a financial safety net for ongoing site operations

In line with the best practice of diversifying sources of sustainable finance, it is important to set aside funds that can help to cover core operating costs of surf ecosystem conservation projects if other sources of sustainable finance fluctuate. There are several options for how to approach this. One simple way is to allocate a small percentage of all grants or our sources of finance to deposit in a separate account for emergency use only. Other options include more robust funds that are managed by a separate fund manager and can only be accessed based on specific criteria established in the fund's by-laws. Funds can be structured in a variety of ways, including spend down funds (where principle funding can be used according to the fund's by-laws) and perpetual endowments (where only a percentage of the trust's principle is spent annually, typically in line with an anticipated or actual rate of return on the endowments investments). When designing a fund of this nature, it is important to secure the guidance of a fund manager that is experienced in charitable funds so that the fund can be designed to best fit the needs of the surf ecosystem conservation initiatives it serves.

BEST PRACTICE #45:

Support development of community-based economic ventures

Development of community-based economic ventures linked to surfing and conservation is discussed thoroughly in Section 2.7. Supporting the development of these types of enterprises is important to generate community benefits from surf ecosystem conservation that, in turn, motivates their support for long term surf ecosystem conservation. These enterprises can also be an important source of sustainable financing. Community enterprises can direct some of their revenue to support surf ecosystem conservation in the long-term and can give their guests either opt-in or opt-out opportunities to contribute to surf ecosystem conservation.

LMMA workshop in Morotai, Indonesia.

CASE STUDIES

CASE STUDY #29:

Government appropriations and conservation fees in Morotai, Indonesia

With the full leadership and facilitation of the Indonesia Locally Managed Marine Area Foundation (ILMMA), 25 communities on Morotai Island, in Indonesia's North Maluku Province have successfully established community-based surf conservation areas. As discussed in Case Study #13, ILMMA independently led a process using the Open Standards for Conservation to guide communities in setting conservation objectives and formalizing legally binding regulations. These regulations were approved at both the village and sub-district levels. Each village also created a practical action plan and budget tailored to their surf conservation area.

Thanks to ILMMA's support, 10 of these communities have secured funding from their annual village development budgets, which now cover core operating costs—such as community meetings, patrols, and the development of education and outreach materials to promote compliance with conservation regulations. Additionally, five communities collaborated to establish a visitor fee system, primarily targeting domestic tourists from Morotai's capital (Daruba) and the provincial capital (Ternate). Proceeds from this fee are used to support teams of youth (ages 16-25) who monitor for violations and conduct regular cleanups of local beaches, reefs, and mangrove areas. Additional uses of these funds include habitat restoration and public education.

Building on this success, ILMMA is now expanding this model to additional surf conservation communities on the island and working to introduce new conservation finance mechanisms to diversify long-term funding. The next phase of work includes the development of community-based surf and conservation enterprises, such as guided tourism packages and village based accommodation for visiting surfers. With community-led surf conservation areas now functioning, ILMMA is actively promoting sustainable surf tourism to responsibly grow visitation and generate lasting ecological and economic benefits for Morotai's coastal communities.

CASE STUDY #30:

The Indonesia Locally Managed Marine Area Foundation Safety Net

The Indonesia Locally Managed Marine Area Foundation (ILMMA) is one of Indonesia's most successful non-governmental organizations, dedicated to supporting local communities to protect marine and coastal ecosystems and their livelihoods. ILMMA has been supporting local communities in eastern Indonesia to protect their ecosystems and livelihoods through the establishment of Locally Managed Marine Areas (LMMAs) since its founding in 2006. To date, ILMMA has supported 300 communities to establish LMMAs. Additionally, since 2019, ILMMA has been partnering with Conservation International, Konservasi Indonesia, Save The Waves, and other partners to support the establishment of surf conservation areas on Morotai Island, in North Maluku, and Biak and Supiori Islands, in Papua.

ILMMA has historically operated on a modest annual budget of between US $300,000 and US $500,000 and has been supported by a variety of donors—including foundations and bi-lateral government donors. To help ensure that their work can continue without interruption between grants, ILMMA created a "Safety Net" program to put aside funds that can be used when external grant funding is limited. The primary mechanisms to raise these funds include: staff members taking on a few weeks of consultancies each year with proceeds going to the safety net; renting of their organization's meeting rooms and guest house to businesses, partners, and visitors; and including Safety Net contributions in the indirect costs charged to grants. At times, the Safety Net has been as large as US $100,000 to US $150,000, and this approach was used to fund the construction of the ILMMA campus of meeting rooms and a guest house. Through its 19 years of operations, ILMMA has never had to pause its support to local communities because the Safety Net has always provided core funds regardless of gaps in external funding.

Photo by Javier Larrea.

Join the movement

We invite you to join the movement, to collaborate with us in implementing and iterating on these best practices, and to share your additional case studies and best practices in surf ecosystem conservation to be part of the next iteration of this guidance. Let's continue to learn and grow together as we all strive to protect the world's surf ecosystems.

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Glossary

Blue economy:

"The sustainable use of ocean resources for economic growth, improved livelihoods, and job creation while preserving the health of ocean ecosystems" (World Bank, 2021b). Core components of the blue economy include established ocean industries such as fisheries, tourism, and maritime transport, as well as new and emerging activities such as offshore renewable energy, aquaculture, seabed extractive industries, marine biotechnology, and bioprospecting (World Bank & United Nations Department of Economic and Social Affairs, 2017). While the blue economy encompasses a wide range of ocean-based and coastal industries, this guidebook focuses specifically on surfing and surf-related activities as an entry point for both sustainable economic development and conservation.

Locally Managed Marine Area (LMMA):

A locally managed marine area (LMMA) is an area of nearshore waters and coastal resources that is largely or wholly managed at a local level by the coastal communities, land-owning groups, partner organizations, and/or collaborative government representatives who reside or are based in the immediate area. LMMAs are generally thought to be a complementary and sometimes more culturally appropriate approach to marine protection and management in the Pacific Islands than the strict use of centrally-managed marine areas – that is, areas that are largely or wholly controlled by a central government body or outside organization, sometimes from afar (Govan et al., 2008).

Marine Protected Area (MPA):

A Marine Protected Area (MPA) is a geographically defined area within the ocean, or even estuaries or coastal waters, that is recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature and associated ecosystem services and cultural values. MPAs can be designated through a variety of legal mechanisms and implemented in a variety of formats.

National Surfing Reserve (NSR):

A National Surfing Reserve (NSR) is a designation used most widely in Australia. The designation is given to a specific surfing area that holds significant environmental, heritage, sporting, and cultural value. These reserves are recognized for their high-quality waves, long-standing usage by surfing communities, and the importance of the local environment to surfing. Unfortunately, the designation of a surf break on the NSR list in Australia is largely symbolic; in order for an NSR to have any legal protections, it must be accompanied by state or national legislation to protect that NSR. See www.surfingreserves.org/ for more information.

Natural protected area:

According to the International Union for the Conservation of Nature (IUCN): A protected area is "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values". Protected areas are essential for conserving marine and coastal biodiversity and delivering vital ecosystem services.

Other Effective Area-Based Conservation Measure (OECM):

Other Effective Area-Based Conservation Measures (OECMs) are defined as geographically defined areas distinct from traditional Protected Areas (PAs), which are governed and managed in ways that achieve positive and sustained long-term outcomes for in-situ biodiversity conservation, including associated ecosystem functions and services, and, where applicable, cultural, spiritual, socio-economic, and other locally relevant values.

Surf break:

A surf break is a natural feature where the hydrodynamic character of the ocean (swell, currents and water levels) interacts with seabed morphology and winds to generate waves that can be caught and ridden by surfers. Surf breaks components include: the seafloor, the swell window and the swell corridor (path of groundswell). The presence of a surf break requires specific geophysical conditions to be met; thus, wave quality can be impacted if sedimentation processes, wind corridors, seafloor morphology, or sea level are affected (Adapted from Peryman, 2011).

Surf conservation areas:

A surf conservation area is a broad term utilized to describe a place where surf ecosystem conservation is implemented. Usually, this refers to legal protection and management of a surf break and surrounding ecosystems. It can include Surf Protected Areas, surfing reserves, LMMAs focused on protecting surf ecosystems, or other similar efforts.

Surf ecosystem:

Surf ecosystems are defined by Save The Waves Coalition as the land-to-sea interface that creates the conditions for breaking, rideable waves and the flora and fauna and human communities dependent upon it (Strong-Cvetich et al., 2025). More simply, a surf ecosystem consists of a surf break and its surrounding environment. Therefore, a surf ecosystem is more than a wave: it's the interconnection between the geophysical (bathymetry, watersheds, sediment flow), the biological (biodiversity and productivity of the plants and animals), and the socioeconomic interactions (human wellbeing, economies, and cultures) that make a place unique.

Surf ecosystem conservation:

In this document, we refer broadly to collective, concerted efforts to protect surf breaks and surf ecosystems as "surf ecosystem conservation". Recognizing the value that surf breaks and surf ecosystems provide, communities and organizations around the world are working to protect these critically important places in a variety of ways, with the goal of preserving the integrity of these places and maintaining or improving the benefits they provide (socially, culturally, economically, and ecologically). In this guidance, we refer to a wide variety of approaches under the umbrella of surf ecosystem conservation.

Surf Protected Area Networks (SPANs):

Surf Protected Area Networks (SPANs) are a program of Save The Waves Coalition that combines legal protection of surf ecosystems with sustainable community development. SPANs aim to conserve large areas of surf ecosystems by establishing networks of locally managed protected areas around surf breaks. These networks are particularly effective in areas where high-quality surfing waves overlap with biodiversity hotspots and critical marine ecosystems. The term "Surf Protected Area" is often utilized to refer to an individual protected area within a SPAN. See www.savethewaves.org/span/ for more information.

Surf resource:

The term "surf resource" refers to surf breaks and all their features as a type of natural resource (including the conditions that enable waves to break). Some recent literature and insight from practitioner interviews make the case for using "surf resource" instead of "surf ecosystem" to avoid confusion about the scientific bounds of an ecosystem. However, in this report, we primarily utilize the terms "surf break" and "surf ecosystem" instead, as they align more with commonly used language in surfing communities, legal protection avenues, and conservation or management strategies.

Surfonomics:

Surfonomics is a natural resource economics methodology which aims to assess and quantify the direct, indirect, and non-market values of surf ecosystems to document surfing's financial contributions to local and regional economies, including through generation of tourism revenue, employment, real estate impacts, and ecosystem services. Surfonomics studies aim to equip decision-makers with key information to make better choices to protect their valuable coastal resources and waves. See www.savethewaves.org/surfonomics/ for more information.

World Surfing Reserves (WSRs):

A World Surfing Reserve (WSR) is a designation given by the Save The Waves Coalition to iconic surfing locations around the world, recognizing and aiming to preserve their key environmental, cultural, and economic attributes. WSRs represent a global network of designated surfing reserves that are managed, implemented, and protected by local communities. As of 2025, there are 13 WSR sites in: Australia, Brazil, California, Chile, Costa Rica, Mexico, Peru, Portugal, and the United Kingdom, and El Salvador. Save The Waves works collaboratively with local coalition partners at each site, guiding them through a conservation planning process that results in the creation of a Local Stewardship Council (LSC) and a Reserve Stewardship Plan. The LSC is responsible for the ongoing management of the Reserve once established. See www.savethewaves.org/wsr/ for more information.

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