# Chapter 25
# Marine Ecological Democracy: Participatory Marine Planning in Indigenous Marine Areas in Chile

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**Significance Statement** Globally, marine ecosystems and indigenous cultures continue to collapse, prompting a need for a paradigm shift in conservation and marine planning. While top-down processes of marine and cultural conservation have widely been shown to be unsuccessful, this chapter shows how to carry out participatory methods for marine conservation planning, through eliciting traditional ecological knowledge and mapping with fisheries communities. Drawing on work in Manquemapu and Caulin Indigenous Marine Areas located in Chile, it considers how different communities identify ecological threats from overfishing and aquaculture, and how researchers can advance the integration of their evidence through participatory GIS. The chapter explores how different valuations of nature are expressed, specifically in Mapuche -Huichille first nation culture and conservation science; and how they can work together.

**Keywords** Participatory mapping · Conservation · Marine ecology · Democracy · Indigenous communities

## 1 Introduction

Globally, fishers from indigenous communities have different world views to conservation scientists, particularly in their approach to ecosystems, however there are overlapping valuations of nature (Muraca, 2011). In this context of these overlapping valuations of nature, some authors argue that these different knowledge systems of ecological observation, can be integrated, whilst ensuring that the co-evolution of their respective approaches are fully respected (Tengö et al., 2014).

While many indigenous approaches to ecosystems based on cosmo-visions (a combination of philosophical approach and belief system), are under threat, they can provide alternative paradigms to conservation of ecosystems (Gould et al., 2019). These indigenous 'cosmovisions', approach conservation based on a

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belief in the importance of humans being part of the ecosystem. In Mapuche-Huichille culture, the concept Itrofil Mogen, not only celebrates biodiversity, but celebrates local nature and humans within it as sacred, connected to all the elements of the local territory (Ñanculef-Huaiquinao, 2016).

This work defines Traditional Ecological Knowledge TEK, as those observations generated by those interacting continually with local ecosystems, such as farmers, hunters, and fishers, who can be aware of important environmental details missed by scientists and power over ecological decision making (Anbleyth-Evans, 2018). It is a system of knowledge defined by its cultural transmission down the generations, such as in indigenous communities. Other forms of ecological knowledge such as those of fishers, farmers and others working in ecosystems, may not have this culture dimension (Berkes, 2017). Thus, TEK involvement can improve ecological monitoring, build trust, fill knowledge gaps that scientists cannot reach, and improve understanding of potential environmental impacts from human effects on ecosystems such as port development, aquaculture industry or commercial fishing and its implications for the wider coastal community (Wilson et al., 2006; Garcia-Quijano, 2007; Johannes et al., 2000). This comes together to support the development of marine ecological democracy. This means a system where decisions and planning can be made where the ecosystems are valued most, and impacts most strongly felt, and where local monitoring continues through TEK (Anbleyth-Evans et al., 2020).

Nevertheless, understanding the differences between these value systems is useful in developing collaboration. For instance, indigenous connection to local place and cultural practices is different to scientists who normally seek generalisability and abstraction from place, to increase the significance of their research (Anbleyth-Evans, 2018). This relates to the importance of the values generated by community relations entwined with local nature, which are not always well understood. This premise is firstly based on conserving the relationship between biological, linguistic, and cultural diversity, or bio-cultural diversity (Davidson-Hunt et al., 2012). This can be protected by recognising indigenous rights to marine indigenous territories, and for indigenous people to enact their own conservation (Rozzi et al., 2006).

This chapter examines two contrasting case studies in Indigenous Marine Areas (IMAs) in Chile. It does this through semi-structured interviews, and, through participatory mapping through workshops. It aims to demonstrate how to carry out participatory methods to support conservation planning, to show that indigenous and scientific value systems can be complimentary, what was successful, and how different systems of knowing can collaborate in the future.

## 2 Methods

### *2.1 Case Studies*

The two coastal indigenous coastal villages are mapped below in Fig. 25.1. Manquemapu, in Los Lagos region shows an example of a mixed traditional/modern


**Fig. 25.1** Two case study sites: Manquemapu on the west coast of Los Lagos region and Caulin on the north coast of Chiloe island

conservation system which links to the traditional Mapuche normative/ethical framework of Az-Mapu. Az-Mapu provides guidance over governance, laws, and ethics regarding harvesting from nature such as fishing. While this has been successful so far there are still some challenges including integrating the artisanal fishing community into the process, and future aquaculture developments.

The second case study in Caulin Chiloe, shows the challenges of developing community management of seaweed aquaculture and fisheries, achievable by integrating TEK by artisanal indigenous fisher into the process. These cases show there is an opportunity to build new relational values for participatory conservation planning in the future and connect people across ecosystems and landscapes.

Figures 25.2 and 25.3 provide an overview of the coastal areas of Manquemapu and Caulin Chiloe respectively.

## *2.2 Semi-structured Interviews*

The first step within the participatory mapping approach was the development of semi-structured interviews for the case study areas. Semi-structured interviews are useful firstly to understand the local context, allow for free-flowing dialogue where

**Fig. 25.2** Coastal area of Manquemapu case study. (Source: Author)

**Fig. 25.3** Coastal area of Caulin case study, north end of small island. (Source: Author)

**Table 25.1** Interview themes, descriptions and questions

| Theme | Description | Semi structured interview questions |
|---|---|---|
| Ecological conservation planning of local community impacts | Examining historic habitat overexploitation | Are there areas, such as natural shellfish banks or seaweed forests that have been overexploited in the past, and need to be protected? |
| Marine management/planning of external impacts on local ecosystems | Ongoing threats from aquaculture, industrial fishing and other developments | How do you propose to limit industrial aquaculture, industrial fishing, litter, and port development impacts? |
| Ecological endangered species conservation planning | Threats to endangered species | Are there marine mammals, birds and similar species in the area that need to be protected? If so how? |
| Ecological cultural dimensions | Influence of culture | How does Mapuche culture and its rules influence interaction and exploitation of nature e.g. Itrofil Mogen |

the participants might need to explain something previously not considered, such as the bio-cultural context and different value systems.

20 semi-structured interviews with community activists, leaders those working in different governmental institutions, NGOs and aquaculture related businesses were carried out (Longhurst, 2003). Interview data was ordered through an inductive approach to thematic analysis supported by the software NVivo 10 (Clarke & Braun, 2013). The interviews were structured into themes (Table 25.1) with the aim to address: Perceived impacts on the local environment, how traditional management systems can adapt and manage these threats, loss of species, the value system, access to decision making and participation, and how stakeholders felt the current IMA system could resolve these issues in the future.

## *2.3 Participatory Mapping and Focus Group*

Participatory mapping started with sketching on printed maps, ecological shapes, and other important and environmental and socio-economic features of the case study area. The sketching activity was performed through focus groups with up to 10 people. It is important to define what are the ecological elements to be mapped, such as what is most important to protect, such as habitats and sessile species such as shellfish seaweed forests, and their threats, including aquaculture contamination and overfishing. Maps were printed out in A1 or A2, so people could draw on them with colours representing different species, habitats, and other features. Results were digitalized using QGIS open-source software.

Participatory sketch maps are the most accessible to share LEK as they transcend language, cultural and power barriers (Anbleyth-Evans & Lacy, 2019). They do not require technical skills for the participants, and the challenges can be more easily

visualised. Focus groups are meetings with multiple people from the community come together to carry out an exercise such as mapping, where semi structured interviews are normally one on one. They are participatory as they aim to identify the key marine ecological challenges with the community.

Counter-mapping refers to attempts to map against dominant power structures, to further seemingly progressive goals (Peluso, 1995). Those involved in the generation of Public Participation in Geographical Information Systems have worked to decentralise power of from the hands of the cartographic elite to support marginalised knowledges (Sieber, 2006). In this study, it was used in the context of imposed industrial aquaculture.

## 3 Results

### *3.1 Case Study 1: Manquemapu*

Manquemapu is part of the Mapu Lahual territory, a heavily forested Mapuche-Huilliche area. Manquemapu is at least 81% ethnically Mapuche-Huilliche, and part of the former Füta Willi Mapu confederation, a political organisation of communities. A rural road connects the series of deep valleys that lead to the bay of the IMA, meaning there is a growing push for development, and the hills are scarred with new housing projects.

One of the primary challenges in the area has been the activities of artisanal fisher divers overexploiting benthic species, which were identified as needing conservation strategies in the mapping. One of the challenges is collaborating with non Mapuche-Huichille, Spanish-Chilean artisanal fishers. Artisanal fishers interviewed indicated that:

They would like to get more involved in the management committee, but there is no specific initiation ritual to become Mapuche-Huichille. However, to improve participation of all sectors it would make sense to find a way to allow them to feel part of the culture, so that all fishing activities could be understood.

At the same time, many of the indigenous group are part of the artisanal fisher's union, Marino Fuentealba, as well as part of the IMA managing committee. There are 117 registered artisanal fishers, out of a population of 180 people, a high percentage of the total community population. This means they are influenced by the commercial culture of artisanal fishing, and the need to keep expanding profit.

Because of the open access nature of the area, and as part of an ecological study and management plan, two zones were developed to understand the population dynamics. They were proposed to limit fishing, being approximately 13,32%, of the IMA. These areas reach a joint area of approximately 89.25 ha (Costa Humboldt, 2017). These are in the north west and south east (Fig. 25.4) and the other proposed management areas such as silent zones for cetaceans.

The community aims to restore natural conditions and protect from overexploitation several species located in the study area (see Fig. 25.4), such as

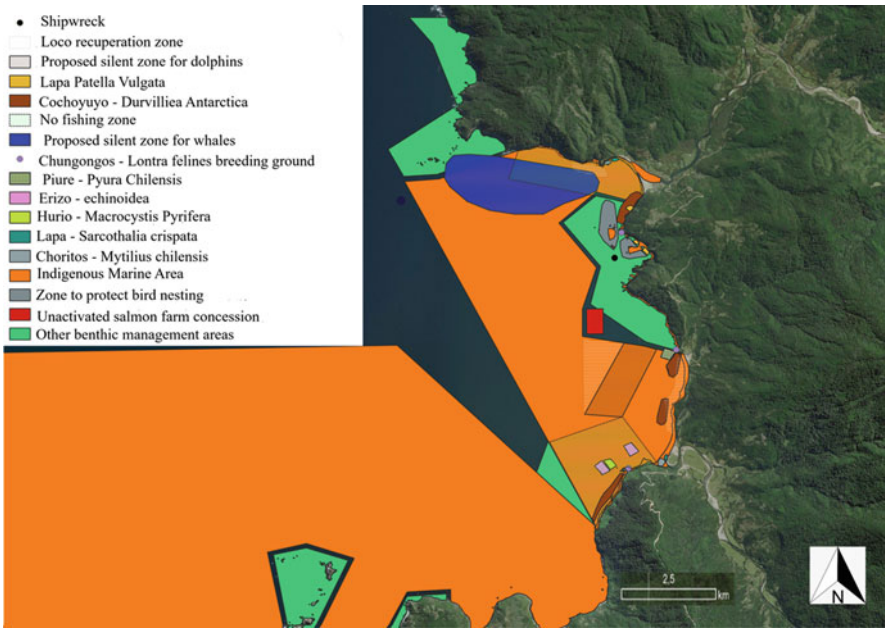


**Fig. 25.4** Results of participatory mapping with Manquemapu community

the shellfish called Loco, or *Conchelapas conchelapas*, Lapa *Fissurella cumingi*, the sea urchin Erizo, *Loxechinus albus* and the seaweeds Cochayuyo *Durvillaea antárctica* and Luga roja *Gigartina skottsbergii*. They aim to develop a monitoring system of where they species and habitats are, and their health, whilst maintaining a level of subsistence fishing. At the same time, they plan to ensure that they expand their knowledge and skills through co-production of monitoring and conservation plans.

The administrative plan gives the objective "3.1 To safeguard and protect the marine space for conservation of marine biodiversity together with maintaining traditional practices balancing development" (Costa Humboldt, 2017). Relating to this, a discussion arose during the participatory mapping on how the community could develop biodiversity conservation. As seen in Fig. 25.4 next to the no fishing area with white and green hashed lines, there is also a traditional cultural site, the rock stack formation (Fig. 25.5), where the ancestors are ritually remembered. The Lonko, the traditional leader, explained that this related to the cultural traditions of the Mapuche Huichilles. This is also a hotspot for bird and sea otter nesting. Furthermore, that the community were against the activation of the salmon farm planned in the rectangle identified in Fig. 25.4 in red. The community want to develop concrete zoning for conservation of these habitats and species as services to the ecosystem. The idea of protecting whales and dolphins was also thought to have merit. Co-production of two silent zone free from acoustic pollution, as well as potential future aquaculture contamination, were drawn out on the map. There is

**Fig. 25.5** Sacred rock stack in Manquemapu. (Source: Author)

concern that the aquaculture concession near to the rock stack cultural site could be activated where the birds nest.

While the community has made progress by getting their own enforcement boat to patrol the area to limit overfishing, this would be more complicated if their attempts to stop the private aquaculture rectangle from being activated. Overall, the strategic elements identified show how Manquemapu can evolve to support conservation of biodiversity, an example of a low impact anthrome.

## *3.2 Case Study 2: Caulin in Chiloe*

Caulin is another Mapuche Huichille community in the north of the island of Chiloe. It is currently the largest IMA with its management plan recognised. A comprehensive strategy has been developed with the community to realise a multi-species fisheries management plan, integrating TEK alongside ecological and scientific information. Over 15 indigenous, fisherman and social organizations took part of focus groups, participatory mapping, and field sampling. The fishing management plan includes 8 commercial fisheries and 11 subsistence fisheries with a total of 19 marine species (6 algae and 13 invertebrates), along with the creation of 1,490,000 $m^2$ of no-take zones with clear conservation goals.

Diverse management tools have been developed, including no-take zones, fishing quotas, seasonal closures, size limits, and harvest guidelines. These proved to be necessary for achieving the multi species management. One of the biggest challenges has been to control the runaway Peillo *Gracilaria Chilensis* seaweed, and its aquaculture. A community leader explained that the Peillo seaweed had overgrown the farm areas and been difficult to control as it spread. The management plan supported a strategy to help this.

While native, the extent of the cultivation has overrun other ecosystems. Further to this challenge, the fisheries management plan has involved the development of a no take area, and a shellfish management area. Earlier to this, the first area created specifically for conservation of birds was to protect nesting. However, there hasn't been any strategy realised so far, as they were not thought to be at risk. Threatened bird species according to IUCN lists include Martin Pescador (*Megaceryle torquata*); Yegua (*Fardela Negra*) and Magallenic Penguin (*Sphenisus magellanicus*), however here there is an opportunity for monitoring from the school directly in front.

Additionally, to the species conservation, but integrated is the challenge bio-cultural conservation challenge. Another community leader explained that while the conservation strategy is moving forward, they would like to bring back the Mapuche Huichille culture, and restart the traditional calendar. Part of this is the revival of the use of ritual and space of the Guillatuns, thanking the guardian spirits of nature, identified in Fig. 25.6 above produced through participatory mapping.

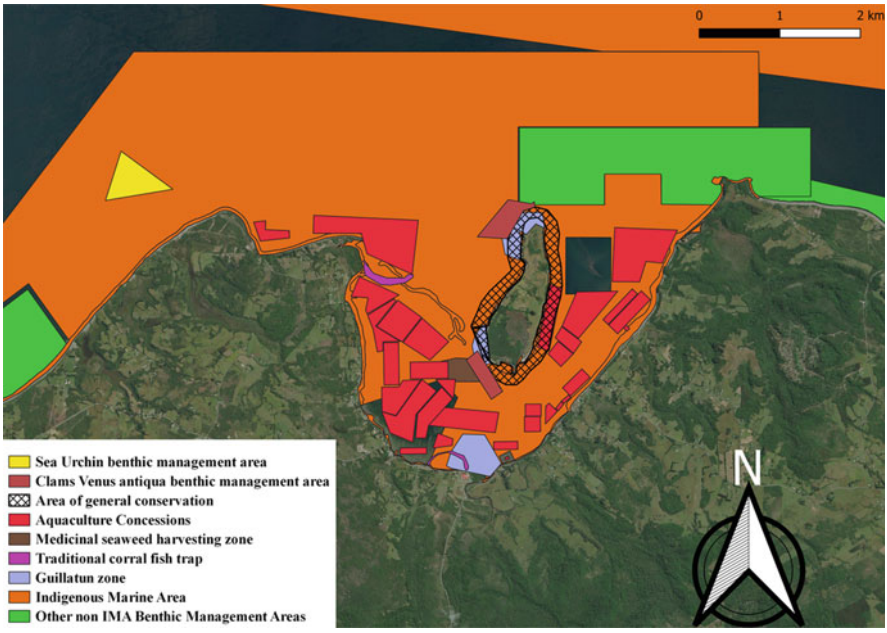


**Fig. 25.6** Results of participatory GIS mapping from workshop with Manquemapu community. The red area is the benthic management of Almejas/clams Venus antiqua. The yellow area refers to sea Urchin benthic management sites. The green area is a general area of conservation

This can support the celebration of the Ngen, the local guardian spirits of the sea and land, such as the island, supporting use of the language, which has mainly been lost as well as using the plants for traditional medicine.

Reconnecting with the Mapuche-Huichille culture can enhance the connections with species and habitats in the future. As the community recuperates these dimensions of language, and local ecological mythological connections to place such as the north end of the small island, where a Ngen guardian spirit is thought to live, bio-cultural conservation can emerge.

## 4 Discussion

The value systems of conservation scientists and indigenous nations are different but can be complimentary. The Mapuche-Huichille values of marine and other ecosystems connects to conservation behaviour, firstly through traditional culture norms, for example by excluding fisheries and other harvesting around the rock stack in Manquemapu (Fig. 25.5), informing TEK. In a complimentary fashion, they have been collaborating with marine scientists to develop fisheries management plans to avoid overexploitation.

The value systems of marine scientists and Mapuche-Huichilles can be shown to be complimentary working towards the same goals of ecological conservation. Their traditional relational values with nature have created systems which are effective, thanks to the geographically remote nature of the areas where the Mapuches-Huichilles communities remain the main population. However, these traditional cultural systems are breaking down, with the push from the Chilean government to develop artisanal fisheries profits over the last 30 years, alongside the pressures of industrial aquaculture to expand into new areas. In other parts of the coast nearby, TEK informs that contamination from salmon aquaculture is substantial enough to suggest that aquaculture farmers operate according to a different value system. The salmon farm value system ensures that all effort is focused upon profit, and therefore without proper enforcement, are ready to profit in private, whilst passing on the impacts onto ecosystems and the communities in common (Anbleyth-Evans et al., 2020). These different value systems of Mapuche-Huichilles, scientists and aquaculture workers are summarised in Table 25.2 below.

Aquaculture workers and commercial fishers with their focus on short term profit, have a different value system, and therefore knowledge system to the other two looking to improve conservation planning. They contrast with Mapuche Huichilles and conservation scientists, in their focus on private profit and single species, that means they do not normally identify their own impacts or see the whole ecosystem during their extraction of nature. The Mapuche Huichille cosmovision also contrasts with conservation scientists who often tend to seek generalisability in their research, over local context.

In the wider political and ecological context this is relevant to what Temper (2019) calls decolonial environmental justice, that is allowing for indigenous

**Table 25.2** Overview of contrasting values and knowledge systems of the Mapuche-Huichilles ethnic group, conservation scientists and Aquaculture/artisanal fishing workers

| Mapuche-Huichille cosmovision/ knowledge values | Conservation scientists epistemic approach/values | Aquaculture/ Artisanal fisher epistemic approach |
|---|---|---|
| Place based/biocultural | Species/ecosystem based, seeking decontextualization/ generalisability | Profit based |
| Observation of species/cultural change | Scientific measurement of threatened species | Measurement of single species health |
| Bio-cultural approach | Ecosystem approach | Focus on exploitation |
| Local to global focus, with more focus on local context or Itrofil Mogen/realising the good life conserving biodiversity | Local to global world citizen with more focus on generalisability | Local profit-based approach with some variation |

autonomy over governance to carry out ecological management for environmental justice. In this way, there is potential for greater application of TEK, and indigenous values to support the rights of stateless nations. For instance, Lofmarck and Lidskog (2017) identify that International policy Panel on Biodiversity and Ecosystem Services avoids contested and conflict-laden issues, including what counts as valid knowledge when working across knowledge systems. This needs deeper exploration with more stateless nations, such as in the context of the project of Nature's Contribution to People coined by IPBES (Diaz et al., 2018).

Developing co-production of research for marine bio-cultural conservation, is a way to bring together the scientific conservation value system and TEK systems. This means using mixed social and natural science approaches to address the challenges of multiple users developing marine coastal spaces. The increasing pressures of aquaculture, alongside historic overfishing, mean it is important to seek collaborations across different groups and worldviews to create a consensus.

## 5 Conclusion

This chapter introduced two IMA case studies where participatory conservation is slowly being realised. These introduce methods to move towards the protection of species and habitats, through initiatives to fish sustainably, with no take zones and limited aquaculture development. We deepened the planning through participatory mapping, co-producing a potential plan for future zones for cetacean and bird conservation, acoustic impact free zones, in Manquemapu, and areas to control fishing effort and bird conservation in Caulin. Further, areas that can be culturally recuperated in terms of their local connections to ecosystems were proposed. By identifying where cultures of conservation and their mechanisms exist, behaviour supporting conservation can be better supported.

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