

New marine commons along the Chilean coast – the management areas (MAs) of Peñuelas and Chigualoco

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Abstract: To halt degradation of benthic resources in Chile, management areas (MAs) were set up under the Territorial Use Rights in Fisheries (TURFs) framework in the late 1990s. Integrated into the global market, MAs have since expanded along the Chilean coast, involving thousands of small-scale artisanal fishers. This paper analyses how economic criteria relates to social and ecological performance of Chilean MAs, by applying TURFs, commons and co-management theory to two cases: MAs Peñuelas and Chigualoco. To collect and analyse data Participatory Rural Appraisal tools, interviews and official statistics and reports were used. Our results show that MAs' economic benefits are connected to fluctuations on the global market. Adapting to changing world market prices then becomes paramount. TURFs' main goal is ecological conservation, but achieving this seems to depend on meeting fishers' livelihoods; failure to do so likely results in failure to meet conservation objectives. A serious weakness of the Chilean TURFs system is that it does not pay enough attention to fishers' livelihoods or to the global market context. Furthermore, there is a strong relationship between good economic benefits and social sustainability. But irrespective of economic performance, fisher organizations have been empowered and gained increased resource control with the TURFs system. At policy level, a differentiated and more flexible system could be more suitable for existing heterogeneous MAs and their particular economic, social and ecological challenges. For improved economic sustainability and resource conservation, a system with multiple-species managing MAs could be promoted as well. Finally, to enhance theory of commons, co-management and TURFs, we argue for greater acknowledgement

of TURFs' social benefits in addition to economic assessments. More attention should also be paid to global market conditions of which MAs are dependent and in which they are embedded: macrostructures that are seldom considered in the analyses.

Keywords: Collective action, commons, economic benefits, empowerment, MAs, management and co-management, organization, PRA, social and ecological sustainability, socio-economic context, TURFs

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I. Introduction

Seventy percent of aquatic and coastal systems worldwide are fully or over-exploited (FAO 2007), making it urgent to find sustainable alternatives that also pay attention to needs of resource users managing coastal resources. Due to the global crisis in fisheries, co-management has been adopted as an alternative institutional approach to support small-scale fisheries (SSFs) and the communities depending on them. Almost 90% of fisheries worldwide are categorized as SSFs. A vast majority of these are in developing countries (FAO 2005).

Global fish production during the last six decades shows a clear trend of fish production being transferred from developed to 'developing' countries. High value products are exported to international markets while low value species are imported (Hersoug et al. 2004). In addition, poor countries also lease their fishing rights to international companies (Lövin 2007).

The integration of Chilean artisanal fisheries into the global market, facilitated by a neo-liberal economic policy under Pinochet (1973–1989), is part of the general tendency towards increasing globalization of food systems. In terms of food provision, artisanal fisheries supply almost all landings of edible fish (Gallardo 2008). The commoditization of the high value shellfish *loco* (*Concholepas concholepas*), specifically, the economically most important gastropod for the global market created a 'resource crisis'. This led authorities, fishers and scientists to adopt under the co-management framework called Territorial Use Rights in Fisheries (TURFs) after more than a decade of failed regulatory measures to halt degradation of benthic resources during the 1980s.

TURFs, known popularly in Chile as management areas (MAs)¹, give exclusive non-transferable access rights to specific benthic resources within an allocated seabed to applying fisher organizations. MAs are renewed every four years subject to compliance with a series of regulations and demands (Meltzoff et al. 2002; Orenzans et al. 2005; González et al. 2006; San Martín et al. 2010). Since their implementation in the late 1990s, management areas (MA) have expanded along the Chilean coast, involving thousands of small-scale artisanal fishers.

In Chile, the TURF system primarily emphasizes ecological conservation, which is a characteristic it has in common with resource management elsewhere (Goldman 1998), often neglecting the livelihoods of resource users for the sake of conservation. The objectives of MAs are to:

- contribute to conservation of benthic resources;
- contribute to sustainability of artisan economic activity;
- maintain or increase biological productivity of benthic resources;
- increase knowledge of the functioning of benthic ecosystem, generating useful information for management, and
- promote a participative management (Subpesca 2005).

Scientific studies on benthic resources prior to the implementation of MAs were dominated by 'natural science' disciplines, especially marine biology. With the introduction of MAs, studies started to encompass social science research, although still mostly performed by marine biologists. While early studies of TURFs tended to be dominated by positive views, recently there have been more critical reflections on MAs and their implementation. Both kinds of studies will be drawn on throughout this paper.

An economic assessment of the *loco* fishery in MAs (2002–2005) performed by the national fisheries subsecretary, *Subsecretaría de Pesca* (Subpesca) state that the benefits of MAs are: increased organizational management, increased partnership, greater presence of resources, better planning and an improved extraction system (Montoya 2007). The TURF system has resulted in fisher organisations being empowered in several ways through better and arguably more effective relations with government authorities and the legislative system as well as the commercial sector (see further below). However, the same report admits (Montoya 2007) that only a few MAs are productive and that incomes in MAs vary widely. *Loco* prices have fluctuated over the life of the MAs. Many fishers had high expectations when the *loco* prices were high. These hopes, which were largely based on high export prices, have since been dashed (see Figure 1).

San Martín et al. (2010), state that the recent decrease in *loco* price has strongly affected the net income of less productive MAs, thus jeopardizing their economy. Today almost no MA – especially those with *locos* as the target species – is meeting

¹ Officially *Áreas de Manejo y Explotación de Recursos Bentónicos* (AMERBs) or Management and Exploitation Areas for Benthic Resources (MEABRs) (*Reglamento* N. 355, Subpesca 1995).

fishers' expectations in the region IV², where the case-study work for this paper was undertaken (Zuñiga et al. 2008). MAs extracting *locos* have lower incomes than MAs exploiting other species. This finding is rather paradoxical, given the importance attached to *locos* when implementing TURFs (Zuñiga et al. 2008).

Poor economic benefits are likely to affect TURFs social and ecological sustainability. Economic benefits depend on various factors, with price being important amongst them. Therefore the fluctuating price of *locos* becomes an important variable in understanding the performance of individual MAs and the TURFs scheme more generally. If an MA provides little economic benefit to appropriators, can it still deliver other benefits and what are then the implications for institutional robustness?

The aim of this paper is to analyse how economic criteria relates to the broader institutional and ecological performance in Chilean TURFs. The Chilean MAs constitutes an example of a commons institution (Gallardo 2008). According to Christy (1992:4), "There is no clear-cut distinction between common property and TURFs". We use TURFs' institutional designer Christy (1992), Ostrom's (1999, 2000) CPR theory and co-management theorist Berkes et al. (2001) to undertake this analysis, which involves the examination of two MA case studies. Christy (1992:2) in his classic work state that TURFs should be 1) "sufficient in size ... so that use outside of the territory does not significantly diminish the value of use within". Ostrom (1999) and Berkes et al. (2001) are of the view that 2) transformation and monitoring and enforcement costs incurred by appropriators in institutional governance and management of commons should not exceed benefits from participating in and complying with community-based management, on which we also draw.

2. Cases and methodology

We have chosen as cases the MAs Peñuelas and Chigualoco, both located in region IV in Chile. These are different in many regards (see Table 1).

Our field study was performed during four weeks in November 2008 and complemented by an additional week in December 2010. During the second visit we also presented our main findings in the form of coloured flipcharts given to the fishers. To assess fishers' perspectives, we mainly used Participatory Rural Appraisal (PRA) tools (Table 2). This data was triangulated with observations and open and semi-structured interviews with key informants to assess the perspectives of other actors, such as fishing authorities, fishers' leadership representatives and two regional scientists and consultants that in this case have both roles. We followed-up with e-mails and telephone interviews to clarify and complement gaps or to deepen our understandings (Table 3). (See Figure 2 for location of the study.)

PRA tools were considered appropriate given the lack of formal education among fishers. Also, since PRA is a collective approach, it is particularly suited

² Chile is administratively divided in fifteen regions (see Figure 2).

Table 1: Basics on MA Chigualoco and MA Peñuelas

	Chigualoco	Peñuelas
MA since year	2002	1997
MA hectares	600	288
Setting	Rural	Urban
Living distance	Fishers live 30 km from the cove	Fishers live behind the cove
No of members	45	207
No of boats	22	40
Main target specie	<i>Loco</i> (<i>Concholepas concholepas</i>) and <i>lapas</i> (<i>Fissurella</i> spp.)	<i>Macha</i> (<i>Mesodesma donacium</i>) and <i>taca</i> (<i>Mulinia</i> sp.), but <i>taca</i> has not been extracted yet
Target specie extraction	A few days a year	All year round, 3 days a week
Production destination	Export, but domestic in 2010	Domestic, but previously export
Main source of fishing income	Seaweeds (various)	MA target species: <i>macha</i>
Economic returns from MA	Low	Fair
Average monthly income/ fisher (MA and other fishing activities)	365,988 <i>pesos</i> (US\$653) of which 28,686 <i>pesos</i> (US\$48) from MA target species	539,884 <i>pesos</i> (US\$893) of which 289,884 <i>pesos</i> (US\$480) from MA target species
Average monthly income for fishers in IV region (June 2007–May 2008) 331, 545 <i>pesos</i> (INE 2010) (US\$ 634)		

to obtain qualitative data in studying collectives (Gallardo et al. in press). The number of fishers participating in the PRA exercises varied between MAs and was in general lower than what we expected. The real degree of participation can thus be discussed. *In situ*, as researchers we accepted sampling units that were practical, i.e. our sampling approach could be regarded as a convenience non-probability sampling approach (Frankfort-Nachmias and Nachmias 1996:184).

In Chigualoco, part of the directive and some ten fishers participated in PRA exercises, while in Peñuelas a group of ten fishers, and the secretary in charge of economy (interviews are not counted here). However, the PRA exercises were observed, commented and validated by a larger number of fishers in both MAs when the flip-charts were ready and presented to the fishers at the end of the sessions. Furthermore, as we also analysed official statistics and reports, these were compared to fishers' data, as was the information obtained from our interviews.

3. The TURFs arrival

With the *loco* export from the mid 1970s, landings increased to unprecedented numbers in a few years, from four to five thousand tonnes in 1975 to 24, only to drop abruptly in the late 1980s to 18 (Orensanz et al. 2005). This reduction represents a relationship between the export boom and the following resources

Table 2: Main PRA tools and methods used in field

Peñuelas	Chigualoco	Purpose: to get/understand fishers'
Brainstorming and problem prioritization	Brainstorming and problem prioritisation	Own agendas/concerns to be analysed in regard to their MA.
Caleta Map (It includes resources distribution of both the MA and the ALA)	Caleta Map	Perceptions of the context in which the fishers are embedded, including distribution of significant places and of the city or village structure.
Venn Diagram	Venn Diagram	Reflections on the degree of importance, performance and closeness of the institutions and actors with which the fishers interact for the development of the MA.
Organization Diagram	Organization Diagram	Organizational structure, its committees, and their roles.
Problem Tree and Solution	Problem Tree and Solution (2)	Perceptions of major problems associated with the MA, also identifying its causes and effects, and whom it affects.
<i>Seasonal Calendar</i> –(Done through observation and primary sources)	Seasonal Calendar	Assessments of resource availability, labour distribution and economic evaluation of production, income and costs both within and outside the MA.
Systems Flow Analysis		Perceptions on the MAs extraction and marketing process, i.e. all the sequences from extraction to market.
Source: Based on Pretty et al. 1995.		

crisis. After a period of trial and error³ to control the crisis on the government's side, a new Fishing Law [*Ley General de Pesca y Acuicultura* (LGPA) 1991] was passed for the introduction of TURFs. Previous to TURFs there was a national ban on *locos* (1989–1992) that badly affected fishers who were dependant on the resource (Stotz 1997; Meltzoff et al. 2002; Orenzans et al. 2005; González et al. 2006). The result of the fishing ban was 'illegal' fishing, which worsened resource degradation, although the first claims of degradation were never demonstrated (Orensanz et al. 2005). During the export boom, middlemen transported fishers and their boats along the coast, searching for the best fishing grounds, often buying *locos* harvested with illegal methods.

MAs were established *de novo* through TURFs legislation (San Martin et al. 2010). There were no previous traditions. MAs were also established once traditional practices had already been distorted by the introduction of the above-mentioned regulations (Gallardo et al. in press) and a market driven chase of the *loco* during the boom.

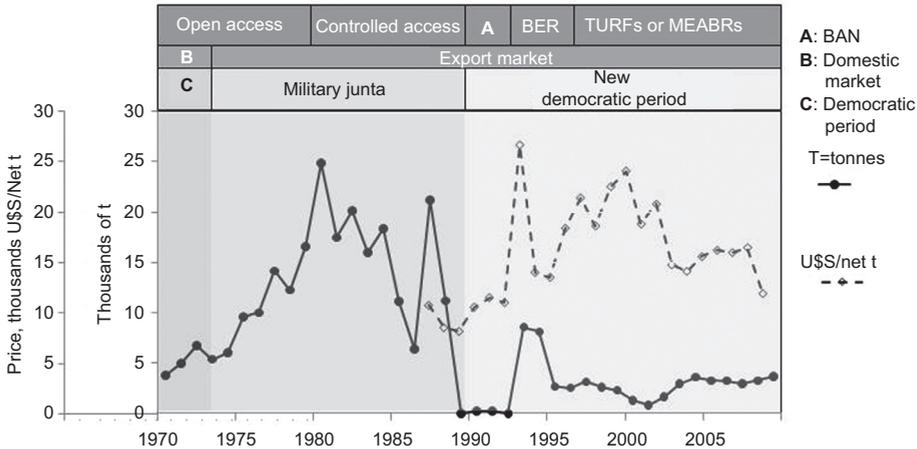
³ I.e. seasonal closures (reproductive seasons or seasonal closing (1981–1984)), global or total national quota (1985–1989), and as the tendency could not be reverted, ending with complete bans (from 1989 on, up to the present day) (Gallardo 2008).

Table 3: Interviews, phone interviews and e-mail correspondence with key informants

Name	Stakeholder	Date
Pinto, A. (National coordinator of benthic resources) González, A. (Responsibility of MA regime) Riveras, J. (Responsibility of benthic resources and fishing in Northern Chile) Montoya, M. (Responsibility of MA development and normative part) Valenzuela, N. (Journalist Dissemination and Cooperation Department)	Subpesca	2008-11-11 2010-07-27/29
Cerda G. (Regional manager of aquaculture) and J. Chávez (Regional manager of benthic resources). Cerda, G. (see above) and Tirado, M. (Regional manager of benthic resources)	Sernapesca Coquimbo (Region IV)	2008-11-24 2010-12-18
Ortego, M. I. (Researcher Economy Section) Techeira, C. (Researcher MA Section)	IFOP	2006-09-13/2010-08-23 2009-04-28
Aburto, J. (Marine biologist, consultant) Stotz, W. (Professor, marine biologist)	<i>Universidad Católica del Norte, Chile</i>	2008-11-26 2008-11-26
Aviles, O. (FEPEMACH: Federation of Artisan Fishers and Divers of the Choapa Province, Region IV)	Fishers' leaders	2008-11-24
Guzmán, P. (President Peñuelas) Masbernat, J.R. (President Chigualoco) Dubó Dubó, J-F. (Directive member)	Peñuelas and Chigualoco organizations	2008-11-24 2008-11-14/2010-06-29 2010-06-12
Dubó, A. Esteva Dubó, J. Godoy, M. Muñoz, S.	Fishers Chigualoco and Peñuelas	2008-11-24 2010-06-28 2008-11-19 2010-06-04
Sra. Maria (Non-MA member, seaweed collector)	Other (Chigualoco)	2008-11-19

Specific MA regulations were not in place until 1997. Since then, not only has the number of MAs risen (up to 747 in 2009), but also the aggregated seabed area under the TURFs (Sernapesca 2009)⁴. Although MAs are relatively small (most between 250 and 600 ha), MAs are to be found in the 'prime fishing grounds' (San Martin et al. 2010:329). Chilean benthic fisheries are ecologically rich, encompassing more than 50 species of benthic invertebrates and seaweed

⁴ *Servicio Nacional de Pesca* (Sernapesca) is responsible for control, enforcement and landing statistics.



Source: courtesy and permission from Hauck, M. and Gallardo F., G. L (in prep.).

Figure 1: Loco landings, export prices and fisheries regimes (1970–2009).

(González et al. 2006). For their operation fishers have coves (*caletas*), mostly in rural areas. In some of the latter *caletas*, are equivalent to fishing villages, although in other cases, fishers only have some small huts, while living some distance away. Many *caletas* in Coquimbo region (region IV) are embedded within private property, where the landowners allow neither construction nor infrastructure (Gallardo 2008).

4. Social enhancement of TURFs: empowerment and control, from 'individual' to collective action

The TURF system has brought radical changes to a significant part of Chilean artisanal fisheries. It constitutes a move which has meant changes: (1) in access from open access to use rights; (2) in management from a mono-specific approach to one with management plans on specific target species and; (3) in fishers' agency from individualism with high competition to organised and participative collectivism. Or as Montoya added during an interview, the MAs 'have had benefits such as: co-administration, social organization, and environmental sustainability' (Group interview Subpesca 2008–11–11).

Artisanal fishers in Chilean MAs under the TURF system take care of resources as collectives, which means deciding together when to harvest (though within biological reproduction periods established by the fishing authorities) and taking the responsibility to negotiate the price of the harvest. These rights and responsibilities are indicative of collective choice principles that are an integral part of Ostrom's thinking on common institutions. About a third (32.51%) of 895 fishing organizations sell their catch collectively (INE

2010). Economic benefits go to a common fund from where it is distributed as income according to the specific rules of each organization. Instead of competing for resources as fishers previously did in groups of three or four shifting fishing grounds across regions, they now fish permanently in one place. They are not allowed to move along the coast if officially registered in one region. This is not necessarily viewed as something positive (Interview Stotz 2008–11–26). Gelcich et al. (2005:386), state that the TURF system and its new way of harvesting leads to fishers losing their traditional skills, echoing Ostrom's (2002) ideas that conservation intervention might endanger traditional institutions.

To apply for a MA is in itself a challenge for the fishers. In the formal process of MA allotment, each area is negotiated individually. Fishers need to formally organise (if they are not already), recruit members, and choose leadership and then collectively take responsibility for administering and managing the MA. They must formulate and agree on statutes, rules, monitoring and enforcement strategies, fees etc. (Orensanz et al. 2005; González et al. 2006; Gallardo 2008; San Martin et al. 2010), in accordance with TURFs stipulations and all the requirements associated to becoming a 'successful' common institution in accordance with collective action and user attributes identified by CPR theory (Ostrom 1999, 2000). It is thus expected that in managing their MAs, fishers would act cohesively and as such learn to find consensus on harvest, divide income fairly, arrange own social security (accidents, illnesses, etc.) and generally manage common funds responsibly for the benefit of the members. Rules are subjected to change by the majority of members, the assembly.

The TURF system combines top-down government regulations with a system of self-imposed rules at the organisational level, in accordance with the MA groups' idiosyncrasy. While some MAs have adopted centralized management, others have delegated responsibility for functions such as administration, monitoring, enforcement and commercialization. Whatever the variance in how the MAs operate all making of new rules or changes to existing rules need the consent of the assembly.

5. TURFs' economic benefits

As indicated above, few MAs give sufficient economic benefits to their members to make them worth the costs and efforts of managing them. It is unknown how many MAs have been abandoned on economic grounds. A *Instituto de Fomento Pequero* (IFOP 2009; Fishing Development Institute) list indicated that of a total of 1275 MAs, only 20 community organizations have discontinued (E-mail Techeira 2009–04–28).

With a global synthetic indicator based on the hierarchical schedule of Lambert and Bloom, in Zuñiga et al. (2008) scaling from 0 to 1, Zuñiga et al. (2008) have measured the socioeconomic performance of 30 MAs in region IV. These MAs show a rather poor economic result: 0.30, while institutional performance is 0.54,

and social aspects 0.49 (Zuñiga et al. 2008).⁵ The authors conclude that MAs do not represent an economic solution for artisanal fishers, but instead complement traditional fishing and other occupations.

The fact that fishers in the MAs take care of targeted species and harvest them in specific periods when it is economically convenient to do so, means that the system only occupies fishers part time thereby leaving time for other occupations (Gallardo 2008). Very few MAs occupy the fishers' full time. In a typical *caleta* in central Chile, fishers have licences for diverse types of fishing (shellfish divers, seaweed collectors, long-lining finfish). This might imply that some MAs could function well, even if economic benefits were low. Still, it seems that the high expectations of economic benefits especially among fishers are not compatible with the second objectives of TURFs, which, is to contribute to the economic sustainability of artisan fishers.

Zuñiga et al. (2008) state that since sustainability does not imply maximizing economic benefits from the MAs in the short run, the low economic results might indicate progress towards sustainability in the long run. They argue that a reduction of harvests is a standard result following the transition from open access to a system with 'owners' (or tenants, as in the case of the MAs) (Zuñiga et al. 2008). This is also what can be read from the official landing statistics which show that from the introduction of the TURFs export levels of *locos* are more or less at the same level as in the pre-export period (1955–1974) (see Figure 1).

Montoya (2007) examines MA outcomes looking at the supply-demand relationship arguing that the future status of MAs will present economic problems. He argues that as new fisher organisations were entitled TURFs, market supply grew rapidly thereby decreasing prices. Or as Pinto at Subpesca says, "When ... X region and other southern regions, which are richer in terms of marine resources, were incorporated into the MA system, an overcapacity followed. The prices decreased, and *locos* went from the highest peak of around 2500 *pesos* [US\$4.9; 1999] per unit and down – now in southern Chile the price is as low as 300 *pesos* [US\$0.57; 2008] per unit" (Group interview Subpesca 2008–11–11). To this Montoya adds in the same interview, "Peru's and Chile's exports end up at the same market in three countries, so the market is saturated". Following this logic, suggests that the supply and demand relationship plays a role in price decreases in the short run, but if we consider the long run *loco* harvest and export, the establishment of the MAs have meant decreased harvests (and export). However, according to our observations (see Figure 1), this relationship is not so clear. Since 2000 big fluctuations and a tendency towards lower prices has affected the economy of TURFs. The figure also shows that from 2003 onwards export quantity has stabilized.

⁵ Institutional performance consists of an increase of fishers' participation in decision making, proportion of autonomous decision for the administration of the MAs, organization's self management and decreased dependency of extern support for consultancy. Social aspects include increases in job security and social provision, among others. Economic aspects include increases in MA income, income stability and fisher's per capita patrimony.

Loco resource extraction could be profitable even if prices decrease, says Montoya (2007), but not under the TURF system that forces fisher organisations to engage in tax payment, annual follow-up studies and especially surveillance against poaching. This is an interesting view coming from an official actor. Pinto (Group interview Subpesca 2008–11–11) agrees: “The first MAs in the country started in northern Chile. They worked ... well in the beginning for three reasons: they did not pay tax, they got their studies (*Estudio de Situación Base* (ESBA; Base Situation Study) subsidised, and they were the only MAs nationally. These were the only places where you could extract *locos*.” The system has expanded as intended, but initial subsidies have ceased. There was also a tax moratorium (Orensanz et al. 2005), but only during the first four years of each MA.

The costs of MA governance and management vary depending on a series of factors, including size, location, distance from urban centres, distance to fishing grounds and resource availability. Significant costs are incurred annually by paying certified consultants to perform ESBA, management plans, and follow-up reports to comply with the requirements of fishing authorities (Subpesca and Sernapesca). In particular the territorial tax, related to the size of the area, has been at the centre of the controversy and fisher organisations have successfully been pushing for lower rates. It is now at 0.18% of a UTM,⁶ while since 2004 it

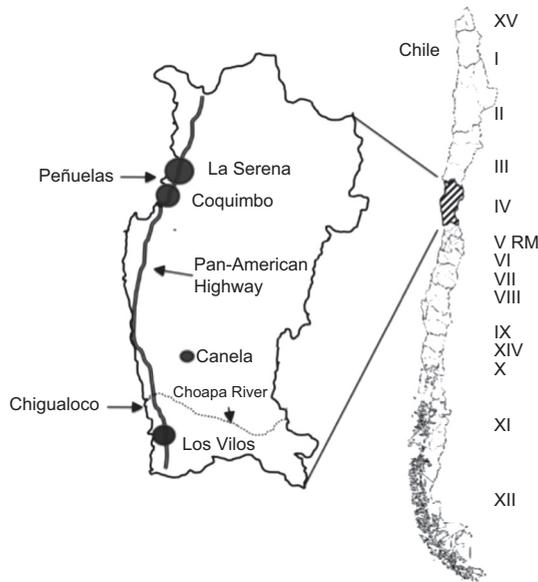


Figure 2: Location of the coquimbo region and the caleta study cases.

⁶ Modifications were promulgated on April 8, 2010 (E-mail comm. Valenzuela 2010-07-27/29). One UTM, Monthly Tax Unit (Unidad Tributaria Mensual) is a currency unit used for payment of taxes, fines, or customs duty.

was 0.25, and previously even higher. Non-compliance with the management plan or tax payments are in theory causes for losing the MA, although the system has been indulgent (Group interview Subpesca 2008–11–11).

6. TURFs and ecological sustainability

Irrespective of whether the poor economic benefits of MAs are a failure of the TURF policy, of ecological conditions, or of market mechanisms, the current situation presents a major challenge to moving towards ecological sustainability. Fishing in open access areas is related to the dilemma of common pool resources (Ostrom 2002), both concerning non-excludability and enforcement. According to several studies and official reports (see above), ecological conservation has been achieved with the introduction of TURFs, and the resource status within MAs is good, while the contrary holds for the so called historical areas (*áreas históricas*) (San Martín et al. 2010), or ALA (*áreas de libre acceso, open access*). References to ecological sustainability though are commonly linked to conservation of endangered, commercial and other species within MAs (Gelcich et al. 2008). However, González et al. (2006) estimate that as much as 50% of the total catch derives from illegal fishing in historical areas. Depletion in these areas is likely to affect productivity in the MAs and thus their long-term sustainability. As MAs are not biologically disconnected from historical areas, action in one area affects the other area regardless of its sea-use status. Incentives for conserving resources within an MA may decrease if the resource is extracted from the open access area with increased supply (Orensanz et al. 2005) and lower market prices the likely result. Again this relates to TURFs' two conditions: that economic benefits should be higher than the costs and efforts of engaging in them; and that the benefits of the territory should be more attractive than those outside of the TURFs.

7. Lurching ways forward? Peñuelas and Chigualoco MAs

7.1. The MA of Peñuelas

Peñuelas guild association chooses directive biannually, but it is the assembly that takes all main decisions concerning the MA. To assess its performance, the association has six units of organisational responsibility, called commissions (MA, Discipline, Account revision, Welfare, Fishing and Administration). While the directive is responsible for all aspects of the association and the MA, the separate functional areas take care of specific aspects of the running of the business.

Peñuelas guild association has an extended internal welfare system. The solidarity commission (as an organisational unit) supports the members and their families and this is not only in cases of necessity. The elders as well as widows (5) and fatherless children get about 75% of a man's income for the rest of their lives and the children are cared for until they can subsist on their own (E-mail Dubó Dubó 2010–06–12). The solidarity commission also supports social

activities at the local school as well as women's football and a sports club for children. The members get support to pay medical costs. In cases of operations the support is US\$287 above the income of full fishing quota. In the case of getting sick, the payment due is US\$57 with a doctor's certificate, above the monthly MA income. The penalty for absenteeism without a doctor's certificate is US\$19, on top of losing the daily income. Non-attendance at meetings also attracts a fine of US\$10, and after three absences, a fisher may be excluded from membership. MA Peñuelas has expelled five fishers over the last five years (Phone interview Esteva Dubó 2010–06–28). The guild association also gives systematic economic support to every member three times per year during important days and festivities such as children's school equipment, for Independence Day, and Christmas (Interview Peñuelas' leadership 2008–11–25).

7.2. Socio-geographical location

The Peñuelas *caleta* lies along the coast of La Serena City in Coquimbo Bay (471 km from the Capital). La Serena is a popular upper- and middle-class summer resort of 200,000 inhabitants (INE 2002). The parcel of water making up the MA runs parallel to the coastline. On land (not part of the MA) the beach and the *Avenida del Mar* (Sea Avenue) extends. Former agricultural land, adjacent to the beach, is now being used for housing primarily to support tourism to the area by wealthy urbanites.

The *caleta* itself is at the southern part of the bay, towards Coquimbo city, where the port is situated (see Figure 3). The seabed is dominated by sand, i.e. the physical protection conditions normally associated with a *caleta* (such as from winds, tidal surges and waves) are absent, although the bay in itself constitutes a natural protection. *Machas*, the main target species, are extracted on 8 metres depth (UCN 2000–2001) in the northern part of the MA at *Punta Teatinos*, which can be reached by boat. Although the fishing activities in Peñuelas are more than 100 years old, harvesting *machas* started around 1975, when salesmen brought divers from central Chile to the *caleta*. Several of them stayed and brought their families (Phone interview Muñoz 2010–06–04).

Peñuelas' impressive and costly *caleta* building, constructed and financed by the *Dirección de Obras Portuarias* (DOP; Board of Harbour Works), is located on the beach, where boats are also parked. These boats are privately owned by some of the fishers. The *caleta* lacks a pier and crane for fishers to lift and lower their boats. Fishers therefore always have to push the boats into the sea (and then push them back up again), causing health problems such as injured knees, hernia, and back injuries. Several fishers (6–7) have recently been in surgery for injuries of this type. Fishers themselves know that they do not have adequate financial resources and lack the knowledge on how to deal with the authorities. They are also of the view authorities are not interested in listening to their problems. The lack of a pier makes the Peñuelas MA dependent on the Coquimbo Port. When fishers catch a lot of fish, they have to anchor as well as load and sell the fish there.

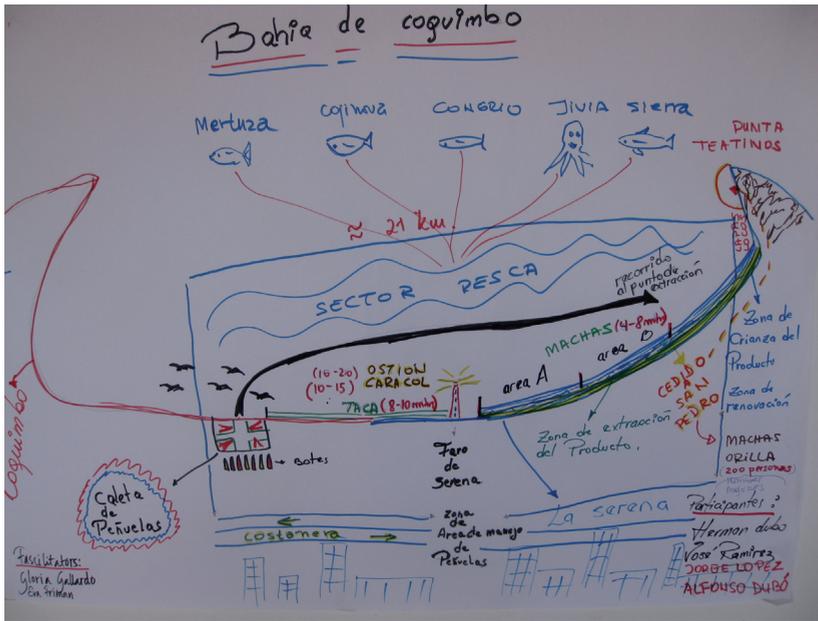


Figure 3: Caleta Map Peñuelas.

Fishers want to construct a pier to resolve this issue. An even simpler solution would be an electric dragger (*huinche*), to at least draw the boats out of the sea. One such dragger cost around 20 million pesos (US\$38,314), and the fishers would need several *huinches* to pull that many boats, as they all depart and return at the same time for *machas*.

The urban environment and the beach setting are favourable to the fishers in terms of a constant demand for their product especially by tourists during summer. Another side of their urban setting, though, is contamination of the bay. Peñuelas is, according to the fishers, categorized as a B-*caleta*. This means that they are only allowed to export boiled products. Sernapesca representatives (Interview Cerda and Chávez 2008–11–24) advised us that although Peñuelas was categorized as a B-*caleta* earlier, there is no categorization at present (2008).⁷ During our first visit, the association had just been assigned funds to build a cleaning factory to be able to export again. Being an urban *caleta*, Peñuelas also has electricity, piped water and a sewage system. As the beach is a common good, fishers have no access problems. Another urban advantage (also due to housing programs of the past) is that the vast majority of fishers live conveniently behind the *caleta* on the other side of Sea Avenue. As a result the

⁷ Based on sanitary aspects, there are three categories: A-*caletas* export their species raw; B-*caletas* export boiled products; and C-*caletas* are too contaminated for their catch to be eatable.

fishers' families can assist the fishers when necessary. It is common that fishers build other small houses on their private yard, though it is not allowed (Interview Dubó 2008–11–24). Fishers can earn 15,000–25,000 *pesos* (US\$29–48) a day from renting their beach front house during the tourist season (2–3 months per year). Several fishers have constructed small restaurants in their front houses for the same purpose (Interview Dubó 2008–11–24).

7.3. Production, commercialisation and division of labour

In 1994 IFOP recommended a maximum harvest of 175 kilos of *macha* per boat for Peñuelas, but fishers themselves decided on a limit of 320 kilos per boat, which soon led to a decrease in *macha* (UCN 2000). The 'death touch' and *macha* crisis came in 1997/98 due to a heavy and sustained rain period in 1997, causing the river to deposit a lot of sediment, trees and stones in the sea, which resulted in the *macha* banks collapsing. Due to the crisis many fishers migrated to southern Chile for *machas*, and took their boats with them; a process facilitated by middlemen. Presently, Peñuelas MA divers collect *machas* all year round, but only 3 days a week. This is the maximum limit that they themselves have set to allow the resource to recuperate. "We are the ones responsible for the resource", ex-President Guzmán states (Interview Guzmán 2008–11–24).

At first sight Peñuelas' *caleta* denotes wellbeing and order. This is an impression that grows stronger when observing the highly efficient organization of labour during a fishing day. When buyers call the office to place an order of *machas*, extraction for sale and transport to restaurants begins. The work starts at 8am and the day's quota is distributed according to a system where quotas in relation to labour have been calculated in a table. If all fishers are needed, all go. If demand is low, just some go. The *alcalde de mar*, formally assigned by the navy, ensures that fishers have their licenses updated. If licences are not valid, they cannot depart. This officer also authorises departure after being informed about weather conditions. Another person prescribes the amount allocated to each boat and a third distributes plastic net bags where *machas* are to be stored. Fishers themselves decide with their own crew if they will go out or ask another boat to take their part, or a crew of two boats combine in one. The next day they change roles, saving both work efforts and fuel. In summer when demand is high, there are sometimes orders of up to 10,000 kilos per day.

Once divers are given their quotas and bags, they put on their wetsuits, while others prepare and drag the boats into the sea. Non-MA members of four to five carry the heavy (50–70 kilo) boat engines from the storage room to the boats. Another non-MA group of eight people, so-called 'pumas', help carry the *machas* when the boats return. Elderly members guard the *caleta* during the day, through a rotation of two members/day. A paid guard watches the *caleta* during night. Once the boats deliver their cargo, fishers help each other to drag the boats up the beach. The big buyers are waiting and they pay at the office, where a fisher receives payment and

accounts for sales with the secretary that also pays the fishers later the same day. The buyers distribute the resource to consumers (local supermarkets, the general public, restaurants and the national market). There were at least eight of these big buyers in 2007–2008 (UCN 2009). There are also individual buyers waiting for the *macha*, who pay at a small cashier's. The workday is over by about 2 pm.

Peñuelas' fishers are not alone extracting *machas* in their MA. Fishers from the Coquimbo guild association work together with them through an agreement of 'delivery service'. To the shallow part towards the beach, access is given to another fisher organisation, the San Pedro guild association. To add to the complexity also a third fisher organisation actively participates in sectors A and B of MA Peñuelas, taking part of the *macha* quota (UCN 2009). Doubtless it is Peñuelas that is in power of this collaboration, but the agreement with the three other organizations: Coquimbo, San Pedro and STI Macheros, is based on pre-MA cooperation and supports good will amongst fishers. The current abundance of *machas* in the MA, and thus a good income, probably guarantees the agreement. There seems to be no fear of a dwindling *macha* catch – fishers themselves say there are plenty (UCN 2009). While not due to a reduction in stock, the recovery of the *macha* banks in southern Chile, has meant that demand and therefore landings in Peñuelas have decreased; fishers are vulnerable to domestic fluctuations. And today's *macha* abundance does not guarantee future availability. This species is difficult to manage as seed recruitments tend to disappear for periods (Interview marine biologist Aburto Nov. 2008).

7.4. Economic benefits within and outside of MA

The average net annual income from *machas* for a fisher in Peñuelas from 2002 to 2008 was 3,478,615 *pesos* (US\$5764) (see Table 4). This equals a monthly income of 289,884 *pesos* (US\$480), which can be compared to the minimum Chilean salary for 2008 of 165,000 *pesos* (US\$295).

Fishers also have other incomes. When fishers do not extract *machas*, some fish in the ALA or 'open access' in small groups of three to four fishers, who report landings monthly to Sernapesca, and some fish from within (but not for) the MA. The income is traditionally shared equally between the participating fishers, with one extra share for the boat owner. Incomes vary according to weather, species and fish availability. The average monthly income per fisher from non-MA fishing activities adds up to 250,000 *pesos* (US\$413), which again can be compared to the minimum Chilean salary above.

7.5. The MA of Chigualoco

To operate the MA, the Chigualoco union has four commissions (MA, Disciplinary, Welfare and Sports), each consisting of about five members each. The president of the directive and the *alcalde del mar* are the main formal and informal leaders in the MA. The organisation has a union house in Los Vilos – a cause of pride among the fishers.

Table 4: *Peñuelas macha quotas, extraction and incomes, according to official statistics from Sernapesca – medium values, 2002–2008*

Year	Quota, kg	Extraction, kg	Total value <i>pesos</i>	Price/kg <i>pesos</i>	Total value US\$*
2002	1,562,000	1,520,000	1070,000,000	725	1,553,201
2003	12,000,000	1,113,000	779,100,000	700	1,126,844
2004	5,050,000	429,000	364,000,000	775	597,211
2006	2,500,000	974,000	779,200,000	800	1,469,440
2007/08	2,500,000	898,764	821,648,900	914	1,572,835
In total		4,934,764	3813,948,900	3914	6,319,531
<i>Medium values for 2002–2008 below</i>					
Extraction		986,953			
Annual gross income			762,789,780		1,263,906
Price per unit				783	
Costs (P medium 5.6%)			42,716,228		70,779
Annual net income			720,073,552		1,193,127
Annual net income/member			3,478,615		5764
Monthly net income/member			289,884		480

*Conversion to US\$ with the medium rate for each year (Banco Central de Chile 2011). Source: Our elaboration based on Sernapesca, 2008. The 2007/2008 figures are based on information gathered at the first field trip. Base: 207 members (Interview Tirado and Cerda 2010-12-18). No info for the year 2005.

Fishers are heavily indebted to *Banco del Estado* with two loans, granted to the fishers individually backed by the union. One loan is worth 22 million *pesos* (US\$40,000), taken in 1993 (half a million *pesos* (US\$900) per member), and another that the fishers took later because they were unable to pay the first loan back. The fishers took the first loan in advance and were to repay it from the proceeds of a *loco* harvest, but they were cheated by an export company which bought *locos* with a bad check (the union has sued the company).

When the union got its entitlements it comprised 80 members, who paid nothing to become member. New members however have to pay. Since its formation, 38 members have been expelled for not participating in accordance with member rights and responsibilities. In June 2010, The MA of Chigualoco had 45 members. The current union regulations do not state that it is not allowed for a member to have another full-time job. What the rules however do state is that if a member is absent for three meetings in a row, he gets suspended for a time. Partial engagement is an issue of concern that the union is discussing.

7.6. Socio-geographical location

Chigualoco's *caleta*, situated 250 km north of the Capital, is rural. The *caleta* area is divided between two large properties with a beach in the middle (see Figure 4). To the north is the Santa Ana property and to the south the Matte Larraín property. It is the owners of the latter that gave the fishers the *commodatum* (temporary free loan or easement) of the *caleta* (Interview Sra. Maria 2008–11–19). There are a few poor



Figure 4: Caleta Map Chigualoco.

fisher families who live in the caleta area with the consent of owner of Santa Ana, though just beyond the commodatum.⁸ Among them lives William, a young person who works assisting fishers in the *caleta*. To the North, within properties owned by the Santa Ana family, there are at least 16 summer residences. A part of the beach owned by the Matte Larraín family was given in concession to a private person who has built a modest summer camping facility close to the *caleta*. Since the camping

⁸ According to her, also this part still belongs to the Santa Ana property, although it rather seems to be part of the caleta and easement given by Matte Larraín.

facility was established in 2004, low-end tourists who spend vacations on the beach now have to pay for it. This leaves less money for them to buy fish from the *caleta* with the result of diminished incomes for the fishers. A few years back, the union undertook a repopulation of sea urchin seeds (100,000) in the southern part of the beach. According to the fishers, the seeds died when the company that administers the Pan-American Highway broadened the road and threw leftover soil into the sea. Therefore, the Chigualoco union has since commenced legal action against this company for compensation due to financial loss incurred in the project.

The open and steep nature character of the northern part of the area makes the MA dangerous. At the southern end of the beach, the land extends in a chain of low hills into the ocean, protecting the beach. DOP has built and financed a *molo*, which is a long arm of about 20 meters of stones and cement to protect the *caleta* from the open sea. This allows a safer passage for fishing boats departing or landing. For this purpose Chigualoco has what Peñuelas lack. This is an electric dragger with a winch, which they use to draw the boats out of the sea. DOP also built a boat ramp sloped towards the sea, making the job less physically demanding. For DOP to be able to build any infrastructure the fishers must have a *commodatum* and for this purpose Matte Larraín donated 5000 square metres to the *caleta*. The fishers seem to have established positive relationship with the Matte Larraín family, although not all landowners are so generous with providing access land to the beach. The situation is different with the owners towards the North, the Santa Ana, who do not allow Chigualoco fishers to access the sea through their property. The fishers have to pass through less accessible places, edging along the sea through the hills and cliffs and return from fishing trips overloaded with algae – a dangerous endeavour indeed.

The majority of Chigualoco MA members live in Los Vilos, a small town around 30 km south of the *caleta*, in lower middle-class *poblaciones*. Fishers living at the *caleta* are poorer than those living in town. William who lives and works at the *caleta* earned around 120,000 *pesos* (US\$230) per month in 2008. Compared with 159,000 *pesos* or US\$304, which is the minimum salary. The *caleta* residents assist fishers, as well as compete for resources, as case of collecting seaweed shows. Due to a lack of education, Chigualoco fishers struggle with illiteracy problems. Fishers start work at a young age and only 50% of them complete primary school, while only about 10% finish secondary school. The president, who was not originally a fisher, came to Los Vilos as political dissident because of forced settlement during Pinochet's rule and married a fisher's daughter. He has studied at the university and has political experience, which benefits the union as a whole, but his actions are sometimes viewed with scepticism by other fishers.

7.7. Production, commercialisation and division of labour

Loco is fished during a few days around December-January. *Lapas* is the other target species, fished throughout the year. During most of the year, when *locos* are

not extracted, the fishers fish or catch crabs within the 5 nautical miles provided for artisanal fishers, gather or harvest seaweed, or do other work outside of fishing. Out of the 45 members, about 30 work actively within the MA and in the ALA. Six boats and 15 fishers go out to sea and dive to harvest seaweed and about 15 stay on the beach to gather the seaweed washed ashore. In 2010, the Chigualoco fishers sold their seaweed for export to three middlemen.

For several reasons there is, according to the fishers, a problem of commercialisation in Chigualoco. This include: a lack of resources and infrastructure to process fish; a lack of contacts for export (companies have monopoly concerning export); and middlemen have too much power in relation to fishers. The middlemen have direct contact with export companies, which allow them to control export channels. From the fishers' perspective, the middlemen pay the fishers a low price while still demanding high quality and it is largely their prerogative where they buy catch or not.

Loco extraction is no longer economically viable for Chigualoco MA, not least because of the interest due to bank loans referred to above. However, since the late 1990s there has been a boom in the demand for seaweed. While the main target species of the MA, the *loco*, no longer brings viable fishing incomes, fisher members still hold on to their MA and with it the exclusive rights to extract other resources from it.

7.8. Economic benefits within and outside MA

During our first visit in 2008, Chigualoco was still selling *locos* for export. The number of fishers working with *locos*, *lapas* and seaweed was 30 out of 45 MA members. Ten boats were used for *loco* extraction. For several years, the companies that buy *locos* discuss the deals with the MA. In 2010 however, the income from selling *locos* for export was as low as about 200 *pesos* per unit. This is compared with 1700–1800 *pesos* (US\$2.49) per unit in 2002/2003.⁹ This is because the Chigualoco MA now sells *locos* domestically at about 500 *pesos* (US\$0.96) per unit (Interview R. Masbernat 2010-06-29). The biggest harvest of *locos* in Chigualoco was during 2004, when 85,623 units were landed. The highest price per unit as well as the highest income for Chigualoco was in 2002 when 83,510,000 *pesos* (US\$121,381) was earned (see Table 5). In 2009/2010 the allowable quota was 25,000 units, but the harvest only reached 10,000 units due to poor quality of the *locos*. Fishers are of the opinion that the *locos* are not fat enough due to El Niño: "...studies must be made on the water; I have no idea why, because now it's bad... and the same is happening in all the other *caletas*" (Interview with anonymous fisher belonging to the Chigualoco MA, 2008–11–16).

⁹ Official statistics, though, state that they were paid the highest price per unit (1 250 *pesos*) in 2002 (Semapesca 2008).

Table 5: *Chigualoco loco and lapa quotas, extraction and incomes, according to official statistics from Sernapesca – medium values*

LOCO Year	Quota Kg	Extraction Kg	Total value <i>pesos</i>	Price/unit <i>pesos</i>	Total value US\$
1999	56,700	51,456	48,883,000	950	96,079
2000	53,500	53,375	53,375,000	1000	98,936
2001	55,000	55,000	66,000,000	1200	103,948
2002	67,200	67,200	83,510,000	1225	121,381
2003	71,628	71,291	35,645,000	500	51,556
2004	86,673	85,623	58,223,000	680	95,526
2005	78,283	74,113	48,173,000	650	86,060
2006	24,500	7917	5,146,000	650	9704
2007	56,147	32,351	21,028,000	650	40,253
2009/10	25,000	10,000	5,000,000	500	8935
In total, <i>loco</i>	507,431	441,126	424,983,000	8005	712,378
In total, <i>lapa</i>			116,657,428		195,547
Medium values below					
Extraction <i>loco</i>		44,113			
Price per unit <i>loco</i>				801	
Gross income <i>loco</i>			42,498,300		71,238
Gross income <i>lapa</i>			11,665,743		19,555
Gross income <i>loco and lapa</i>			54,164,043		90,793
Costs (medium C 91%) ¹⁰			38,673,453		64,826
Net income			15,490,590		25,966
Annual net income/member			344,235		577
Monthly net income/member			28,686		48

*Conversion to US\$ with the medium rate for each year (Banco Central de Chile 2011). Source: Elaboration based on Sernapesca, 2008. The 2009/2010 figures based on phone interview with J.R. Masbernat, 2010-06-29. Base: 45 members.

Looking at Chigualoco MA's incomes over a ten-year period there is a clear trend of the decreasing market value of *locos* (see Table 5). Also, MA costs are considerably higher in relation to income than in Peñuelas MA. The monthly net income per member over the ten-year period is a meagre 28,686 *pesos* or US\$48 (!). Thus, the majority of income in the *caleta* comes from seaweed harvesting, supplemented by fishing and catching crabs within the ALA. Seaweed harvested mainly from December to April, when it can be dried on the beach. During 2009/2010, the 15 members working with seaweed harvesting by boat extracted a total of 1,000,000 kilos for which they earned an average price of 85 *pesos* per kilo. The total income from seaweed was thus 85,000,000 *pesos* (US\$151,786), which amounts to a net monthly income per fisher of 337,302 *pesos* (US\$602). This compares with the minimum Chilean salary in 2009 of 165,000 *pesos* (US\$316). This analysis indicates that seaweeds harvesting is actually what sustains the fishers of Chigualoco MA.

¹⁰ Medium costs for these years are 91% of the gross income for *locos*. Costs include costs for tax, interest transport, cell phones, per diem, follow-up studies etc. The high interest is about 50% of total annual costs.

8. Peñuelas and Chigualoco: Economic benefits and sustainability

The results of our case studies suggest that the Chilean MA system does not fulfil our two conditions of concern. There also seems to be a strong relationship between good economic benefits and social sustainability, at least concerning organisation and trust. The two cases show differences: Peñuelas MA is currently doing well economically and socially, while Chigualoco is economically much worse off, which seems to limit the possibilities of organising in a way that builds trusting relationships.

Economic benefits of MAs also have an impact on the sustainability of the ecological system within and around it. If a MA does not function economically, there are likely to be organisational problems and the ecological pressure on it and on the ALA increases. And even if it does function well economically and organisationally, the ecological pressure on the MA also depends on what is happening in the ALA and on the levels of illegal fishing or theft from within the MA. The co-existence of these two types of areas is problematic. It is a dual access system where MAs coexist with *de facto* 'open access' areas (González et al. 2006). Largely driven by livelihood needs, however, fisher members of the MAs commonly practice illegal fishing outside of and in MAs. Since 1998, *locos* can only be extracted within MAs, so non-members also commonly fish illegally within MAs due to higher concentration of the resource. Although MAs are set aside for sustainable extraction of the respective MA's target species, the right to exclude non-members also implies an exclusive right for MA members to (legally or illegally) extract other species within the MA, subject to other resource use restrictions. Access to the *caleta* also gives access to the ALA, which are open to all fishers registered in the region, and subject to resource-specific regulations only, for which the MA organization can charge other fishers if accessing the sea from the *caleta* and/or using the *caleta* facilities. This might be a non-planned outcome of TURFs scheme for Chilean authorities, but it is consistent with the conceptual intent of TURFs, where use rights imply rights of exclusion to determine amount and kind of use, to extract benefits, and to future benefits (Christy 1992).

TURFs' main goal is ecological conservation, but achieving this seems to be dependant upon meeting fishers' livelihood needs and aspirations. So failing to deliver livelihood outcomes is likely to result in failure to meet conservation objectives. This is a serious weakness of the Chilean TURF system. From the perspective of social sustainability, however, and irrespective of economic benefits, both fisher organisations have been empowered and gained increased control of resources with the implementation of their MAs through the TURF system.

The intriguing question is why in spite of lower than expected economic results, fishers keep their MAs, even when they can be costly to maintain. We have found that the fishers appreciate the entitlement itself, including the actual access and claim with its economic and social prospects. These rights go beyond the core species that they have been set up to manage. For instance, the exclusivity right to seaweed extraction within the MAs, the MAs' potential future use (Gallardo et al. in press), as well as, the more general agency and empowerment that collective

action brings. Furthermore, several MAs have also expanded their activities to other economic spheres such as tourism and restaurants (Interview Áviles 2008–11–24; Gallardo 2008). These are examples of additional benefits that can result from the TURF system (see also Gallardo et al. in press).

In regard to their main target species, the *loco*, it seems that the benefits of the MA territory in Chigualoco are not attractive enough compared to those outside of it, leading to ‘illegal’ fishing (also within the MA). Regarding non-target species the contrary holds, as the MA give the fishers exclusive rights to the *caleta* and other resources within the MA. Using boats and diving, the fishers also extract seaweed outside of the MA, apparently not in accordance with regulations. There is a ban on seaweed extraction, although it can be extracted with special permission.¹¹ So even if the economic benefits from *locos* are lower than the costs and efforts of engaging in the MA, they have persevered with it. The unsatisfactory economic benefits in Chigualoco, however, seem to have an adverse effect on the fishers institutionally. In trying to complement their income, formal regulations and internal rules are overruled because of livelihood pressures. Thus *loco* extraction in MA Chigualoco is an uncertain endeavour that also raises questions about ecological sustainability.

‘Illegal’ fishing does not seem to be a big issue in Peñuelas, neither within or outside of the MA, though people other than fishers poach in the beach area especially during summer (Interview Aburto 2008–11–26). The monitoring and enforcement of the area is done exclusively from the beach by the San Pedro members (UCN 2009). In Peñuelas, the economic benefits of the MA are higher than the costs and efforts of engaging in it. This outcomes has been achieved despite the large number of fisher members and agreements with other fisher organizations that simultaneously use the area. Regarding the second TURFs condition, that benefits of the territory should be more attractive than those outside of the MA, the territories are separate and do not interfere with each other in terms of catch. In this sense, the satisfactory economic benefits in Peñuelas seem to influence fishers institutionally, positively benefiting both them and the ecosystem. Harvest is performed exclusively based on direct demand, and they only fish three days a week. Peñuelas MA is innovative in rotating extraction among members, it functions well socially, and has a well developed cooperation with other fisher organisations. Our results for Peñuelas validate Zuñiga’s et al. (2008:74) results, showing that the economic characteristics of MAs affect the other variables, and are related to the ‘success’ of the MA. Zuñiga’s et al. (2008) state that only five MAs did well economically, while the performance of the rest was rather low. Peñuelas is at the top of the best performing MAs, scoring 0.698. Of the synthetic indicators (see above), the economic criteria scores highest with 0.89, followed by the institutional aspects with 0.64, and the social aspects with 0.53.

¹¹ The bans deals with *Lessonia nigrescens*, (*huiro negro*); *Lessonia trabeculata* (*huiro palo*) and *Macrocystis* spp. (*huiro*) (Subpesca Decree 1167, Sept. 23, 2005; Subpesca Decree 1347, Oct. 8 2008 up to Oct. 2010).

9. Concluding remarks

Irrespective of economic performance of their MAs both fisher organizations have been empowered and gained increased control of resources with the implementation of the TURF system. This suggests evaluation of MAs, in addition to economic assessments should pay consideration to the social sustainability aspects, which includes much more than just having a well functioning organisation. There are intangible values, difficult to capture and measure in connection to MAs. Fishers cooperate while struggling to make their living in a context where they cannot influence the economic or the larger ecological context. Both TURF and non-TURF extraction is exported and therefore economic benefits are closely connected to fluctuations in the global market. Adapting to changing world market prices and ecological conditions that affect resource availability or quality then becomes paramount. The Chilean TURF system does not pay enough attention to fishers' livelihoods and of the larger socio-economic context in which they pursue their living. Furthermore, in reality, TURFs serve society at large by contributing to the maintenance of ecosystem services and by acting as stewards of nature for future generations. This is not sufficiently acknowledged or rewarded by society. Perhaps this is what the president of MA Chigualoco captures when he says that MAs serve society more than what society and the state serves them: "We take care of the fishers, and nature, and this is a bonus benefiting society" (Phone interview Masbernat 2010–06–29).

Due to the dynamic context in which they are embedded the role of both MAs seems to be changing. While Peñuelas is aiming to export again, Chigualoco is for the moment selling its production domestically. Chigualoco is adapting their strategy in accordance with resource availability, quality, market prices and the demands of their own economic interests and institutional capacities. Although TURFs do not specifically aim to manage single species, but benthic resources in general, in practice MAs rely on the exploitation of a few species. Policy makers should allow a less bureaucratic and a less expensive system to convert MAs into multiple-species management. Institutionalizing such management would allow better control and hopefully a more ecologically sound MA system. Furthermore a differentiated policy support could be more suitable for the large variety of existing MAs and their particular challenges.

To enhance theory of the commons, co-management and TURFs, on the one hand we argue that there should be greater acknowledgement of social benefits of TURFs. Social benefits include enhanced agency, greater empowerment, and belief in future economic possibilities. On the other, more attention should be paid to the global market conditions of which MAs are dependent and in which they are embedded: macrostructures that are seldom considered in the analyses.

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