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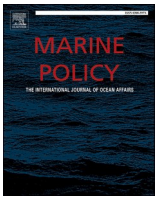

A governance analysis of Cabo de Palos-Islas Hormigas and Cabo de Gata-Níjar Marine Protected Areas, Spain

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ABSTRACT

This paper examines the governance of Cabo de Palos-Islas Hormigas (CPHMPA) and Cabo de Gata-Níjar (CGNMPA) Marine Protected Areas, Spain. The governance approach adopted in CPHMPA is shared authority between regional and state governments, whereas in CGNMPA it is state-led. In each MPA, limited coordination between national and regional government, and weak management at both levels, has made achievement of strategic conservation objectives significantly more challenging. Inconsistencies in legislation applied to internal and territorial waters have left both MPAs vulnerable to local economic development priorities. The reliance on economic and legal incentives has increased employment opportunities within the communities studied, but has also incurred environmental and social costs. Overall, the authors conclude that the current governance approaches are insufficient to effectively address all the challenges faced. In order to achieve more effective and equitable outcomes for both MPAs, greater coordination between national and regional government is required, along with interventions to introduce more participative and knowledge incentives to generate a greater sense of stewardship among all stakeholders.

1. Introduction

This paper utilises the Marine Protected Area Governance (MPAG) analysis framework [1] to examine and compare the governance structures underpinning two Marine Protected Areas (MPAs) in Spain: Cabo de Palos-Islas Hormigas (CPHMPA) and Cabo de Gata-Níjar (CGNMPA) (Fig. 1, Table 1). The aim is to examine the incentives applied within the two MPAs to identify good practice that could be transferable and to provide recommendations to strengthen the current governance structures. It is one of several papers on recent MPAG case study analyses, all of which are discussed separately within this special issue [2] [AMEND [2] Jones 2017 this Issue in Reference List]. The paper draws on in-depth interviews with key informants, marine resource users, community members and regional and national administrators conducted between October 2012 and March 2015 as part of a Marie Curie funded initial training project. Following initial interviews, a modified DELPHI technique [3] was employed to validate findings. Individual reports were created and sent to interviewees and several community meetings were held to validate the data.

2. Case study contexts

2.1. National context

Spain is a highly decentralised unitary state. Although Spain is a high income country (Table 2), Murcia's income is below the national average and the local economy is more strongly reliant on fisheries than other parts of Spain [4]. Cabo de Palos, is a small fishing village with a permanent population of 1770 (this number increases substantially in the summer months).

2.2. Cabo de Palos-Islas Hormigas Marine Protected Area (CPHMPA)

CPHMPA is located in the autonomous community of the Region of Murcia and covers 19.3 km^2 (Fig. 1). It was designated by the National Ministry of Agriculture, Food and Environment and the Council of Agriculture and Water of the Region of Murcia in 1995 (BOE no. 161 of July 7 and Decree 15/1995 of 31 March) (BORM no. 92 of April 21, 1995) to protect fish stocks, following advice from scientists of the Spanish Oceanography Institute and the University of Murcia. Table 3

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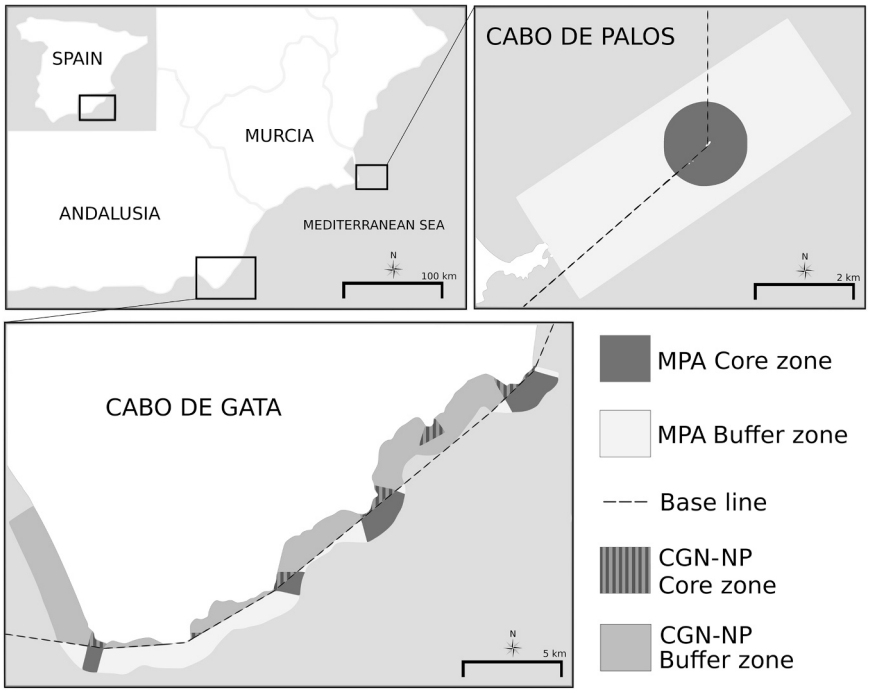

Fig. 1. Location and zoning maps of the case study marine protected areas: 1) CPHMPA, 2) CGNMPA and Cabo de Gata-Níjar Natural Park (CGN-NP).

Table 1
The two MPA case studies.

	Cabo de Palos-Islas Hormigas (CPH), Spain	Cabo de Gata-Nijar, (CGN) Marine Protected Area (MPA)/National Park NP), Spain
Area	19.3 Km^2	120 Km^2 (MPA 46.5 Km^2, NP 73.5 Km^2)
Year of designation	1995	1995

Table 2
Main development metrics and ranks where appropriate for Spain.

GDP per capita	GDP Growth Rate	State Capacity	Human Development Index (HDI)	Population below poverty line
US$30,100 (2013)	−1.3% (2013)	0.83	0.869	21.1%

Table 3
Objectives and related management actions for CPHMPA.

Conservation	Operational
Protection, regeneration and development of fishing resources for the maintenance of sustainable fisheries	Enabling artisanal fishermen in the area to preserve their traditional way of life Support other low-impact activities (scuba-diving, environmental education, etc.) that contribute to economic development in the surrounding community

outlines the objectives of CPHMPA.

CPHMPA lies within a transition zone where there is an abrupt change of the coastline – from sandy and exposed to the east, north of the MPA, to rocky and exposed to the south. The profile of the continental shelf changes from wide and gently sloped northwards to narrow and steep southwards, creating a unique geomorphology. Key habitat types include rocky reefs and extensive *Posidonia oceanica* seagrass beds, photophilic macroalgae in shallower areas and sciaphilic coralligenous assemblages in deeper areas. Furthermore, the MPA provides protection to several commercially important species: groupers (*Epinephelus* spp.), common dentex (*Dentex dentex)*, zebra seabream (*Diplodus cervinus*), scorpionfish (*Scorpaena* spp.), brown meagre (*Sciaena umbra*), barracuda (*Sphyraena* sp.), etc.

2.3. Cabo de Gata-Níjar Marine Protected Area (CGNMPA)

CGNMPA covers a total area of 46.5 km^2 (in territorial waters) and is located in the autonomous community of Andalusia (Fig. 1). CGNMPA was created in 1995 in response to the fulfilment of the objectives pursued by Council Regulation (EC) 1626/94 of 27 June 1994 laying down certain technical measures for the conservation of fishery resources in the Mediterranean. CGNMPA was created to extend the existing Natural Park (CGN-NP) (declared in 1987, which includes 386.4 km^2 land and 73.59 km^2 internal waters). The total combined

Table 4
Objectives for CGNMPA.

Conservation
Protect the territorial waters adjacent to the pre-existing CGN-NP; Contribute to the regeneration and development of fishing resources Offer particular protection to seagrass beds

marine area that is protected covers 120 km^2, forming a complex protected area and the largest stretch of protected coastline in Spain. The objectives are outlined in Table 4.

Key habitat types include rocky reefs and very extensive *Posidonia oceanica* seagrass beds, macro algae and coralligenous assemblages. Representatives of all species included in the National Catalogue of Threatened Species are found within CGNMPA, e.g, orange coral (*Astroides calycularis*), the giant limpet (*Patella ferruginea*), mollusc vermetid platforms (*Dendropoma petraeum),* slipper lobster (*Scyllarides latus*), pen shells (*Pinna nobilis*) and groupers (*Epinephelus* spp.). The MPA provides refuge to the same list of commercially important species as indicated for CPHMPA.

Andalusia is the second largest autonomous community (i.e. a first level political and administrative division) in Spain. Both Murcia and Andalusia are amongst the poorest regions in Spain and both suffered negative economic growth as a result of the (2008) economic crisis [4]. Natural Park status has buffered the area from significant development. Nevertheless, approximately 7500 permanent residents are spread across several small villages and fishing communities within the park. These numbers are significantly boosted by tourists in the summer months, who bring additional income but also anthropogenic challenges.

CPHMPA and CGNMPA belong to the Natura2000 Network under the European Habitats Directive (92/43/EEC), have been declared SPAMI's (Specially Protected Areas of Mediterranean Importance under the Barcelona Convention), are included in the MedPan network,[1] and CGNMPA has also been declared a UNESCO biosphere reserve. CPHMPA and CGNMPA are divided into core and buffer zones (Fig. 1). The core zones (14% and 20% of total area respectively) are highly protected no-entry areas (IUCN cat. I equivalent) - only authorised research is permitted. Extractive and non-extractive use of marine resources is controlled within the buffer zones (IUCN cat. VI). Small-scale artisanal fishing is permitted in buffer zones, and controlled through a census to limit access, gear type, seasonal gear and species restrictions, and vessel size. Recreational fishing is permitted in CGNMPA, with restrictions on gear type, seasonal species restrictions and catch limits of 4 kg per permit per day [5], but there is no quota to limit the number of permits allocated. All recreational fishing is prohibited in CPHMPA. Non-extractive activities, such as eco-tourism, are allowed in the buffer zones of both MPAs. A quota exists in CPHMPA to limit dive numbers, but not in CGNMPA. It should be noted, however, that these restrictions are selectively implemented, due to limited enforcement capacity and resistance from certain sectors, as discussed in Section 4.

3. Drivers/conflicts

The main activities in both MPAs are marine tourism; coastal tourism (including the hospitality sector); recreational fishing; and artisanal fishing.

3.1. Tourism

Rapid growth in the tourism industry has been a major driver of economic development within each region since the 1970s. However, unsustainable tourism development and practices such as poor diving techniques, uncontrolled anchoring and overuse of popular sites are increasingly impacting the marine environment. CPHMPA lies within a highly developed and touristic area: Mar Menor, and La Manga. Tourism is generally concentrated in the summer months. During peak season, high numbers of tourists put significant pressure on local infrastructure [6]. The rapid increase in dive tourism activities has been a major and, to date, inadequately addressed challenge in the management of CPHMPA, particularly since the small size of CPHMPA makes accommodating mixed resource use difficult. Promotion and uncontrolled growth of the dive industry has resulted in social disruption, and conflicts developing amongst fishers, dive operators, researchers and the administration. Since the establishment of the MPA in 1995, the dive industry has increased from zero to nine dive operators (2015 est.), with additional external operators and dive clubs regularly using the MPA. Regulations regarding dive immersions in nationally managed territorial waters (see Section 4) limited immersions to 25 a day, and the process to gain additional access requires extra paperwork and time, acting as a deterrent to dive operators.

In regionally managed internal waters the limit was, until recently, 75 immersions a day. Dive operators declared this limit was not economically viable and failed to comply whilst the authorities took little action to enforce the regulations. As a result, dive immersions have doubled in the last six years, surpassing 26,000 with more than 500 immersions on peak days in 2013, leading to concentrations of dive boats on the four available mooring buoys. Fishermen have been displaced from key fishing grounds and increasingly feel marginalised from an area that was afforded protection specifically to promote and sustain the artisanal fishing industry. The situation has created strong feelings of inequity between the two main user groups regarding the legitimacy and strength of restrictions applied to each sector. A similar situation occurred in Medes Island MPA, Spain, where increasing tourist numbers left fishers, who had been supporters and fundamental to the development of the MPA, feeling betrayed because their cultural values were not recognised [7]. Diver impact research conducted by the University of Murcia, reveals erosion of fragile benthic species such as bryozoans in CPHMPA [8]. Combined with increased conflict between user groups, these findings encouraged a renegotiation of diving regulations for CPHMPA in June 2014 (Order of the regional ministry of Agriculture and Water of June 4, BORM no. 133 of June 12, 2014). Immersions have now been limited to 180 per day with 300 permitted on peak weekends and dive operators must also follow good dive practice and respect fishing activity. Compliance rates and economic and social effects of these rule changes are yet to be seen. However, after the first summer there was acceptance of the regulations by dive operators who acknowledge the need to promote sustainable tourism.

In CGN-NP, tourism development and tourist activities are limited by legislation to preserve the park and its surroundings. There are private businesses that provide various touristic services such as diving, kayaking, trekking and hiking. The administration also provides several facilities for tourists, including a visitor's centre, botanic gardens, nature classroom, information points and an observatory for bird watching. Despite a substantial increase in the population during peak season, activities and development in CGN-NP remain restricted. The dive industry in CGN is spread throughout a much larger area with eight businesses operating in several small communities. The number of dive operators and dives are not limited. However, diver impact is 'diluted' due to the extent of the coastal area suitable to diving and conflict between the dive and fishery industry is negligible. Furthermore, dive operators collaborated with LIFE-Posidonia and the administration to install 15 diving vessel buoys, to reduce anchor damage.

3.2. Fishing

All forms of fishing are prohibited within the no-take/no-use zones of both MPAs and trawling, purse seining and surface long-line have been

[1] MedPAN is a network of MPA managers in the Mediterranean (www.medpan.org).

effectively removed from all areas within each. In CPHMPA small-scale artisanal fishing is limited within the buffer zone to authorised boats from Cabo de Palos village (2014 census included 10 vessels, although only 5 regularly fish in the MPA). In CGNMPA a census was taken to determine the number of artisanal fishers that should be permitted to fish in the territorial waters of the MPA. The census identified boats at each port and on beaches and subsequently allocated permits to 36 boats (of which only 10–12 fish regularly). However, the census is controversial since in failing to consult the two associated cofradías[2] (Almería and Carboneras) and local fishers, a number of legitimate vessels that were at sea at the time are excluded from the census. This was reported to have exacerbated negative attitudes towards the administration. In contrast, no census or restriction exists for CGN-NP (internal waters), hence any vessel can fish, and the autonomous community of Andalusia has exclusive responsibilities over maritime fishing in internal waters. These different regulatory regimes applied in the internal and territorial waters in CGN creates great complexity and controversy, with inconsistencies regarding calendars and permitted uses, causing difficulties for daily planning and management, and confusion among both users and authorities.

The main fishing gears used in each MPA are trammel nets which are alternated with bottom long-lines depending on currents and season. In CGNMPA, alternative traditional methods such as 'moruna' (fixed fishing nets for big demersal fishes) and pots for octopus are used in internal waters and beyond the MPA's boundaries. Fishermen dispute the restriction of these methods given they are traditional techniques considered more selective than permitted gillnets. Similarly, restrictive rules applied to gear permitted in CPHMPA have resulted in many of the authorised fishers opting to fish outside the MPA with alternative gear. Both MPAs require fish to be landed at specified ports and sold through an auction. The extensive size of CGNMPA, lack of fishing port facilities and incompatible fishing hours limits fishers' ability to unload fish in designated ports, and has left fishers feeling abandoned by the fisheries sector. Since 2013, 11 vessels included in the PESCARTES[3] association are permitted to unload their catch at four points within the Natural Park, and then transport the catch to one of the specified ports for auction.

The number of artisanal fishing vessels has dwindled in the two MPAs. Decline in the fishing industry stems from: lack of generational renewal, lack of institutional support and feelings of marginalisation. The younger generation are being attracted by alternative jobs and despite the long cultural tradition within fishing families, the older generation see no future or support for the fishing sector and prefer their children to seek alternatives. Such trends raise concerns for the future of artisanal fishers, particularly when these MPAs were created specifically to support this sector.

Within the limits of CPHMPA all forms of recreational fishing are prohibited, and were also initially prohibited in CGNMPA. However, the ban was lifted in 2011 following results of a study, funded by a recreational fishers association (APRA[4]), that suggested recreational fishing would have a negligible effect. Quotas do not exist to restrict the number of recreational fishing licences and the number of authorised vessels registered in 2013 exceeded 350, far outweighing commercial fishers [5]. Although regulations do apply regarding catch limits, fishing seasons and gear type, recreational fishing, is seen by many as inconsistent with the objectives of the MPA. Within regionally managed internal waters, seasonal restrictions for recreational fishing do not exist, further complicating enforcement. Lack of any other scientific studies, fisheries records, and the power and financial support behind the recreational fishing sector, exacerbates commercial fishers' feelings of abandonment and negative social standing.

Illegal fishers, mainly incoming nocturnal scuba diving and apnoea spear fishers, are a serious issue in both MPAs. In CGNMPA, illegal fishers are known to exploit the kayak tourism industry as a means of gaining access to core zones within the MPA. Although there is currently little data on the impact of illegal fishing in these MPAs, data available suggests that such activities could have a devastating effect on resources, the commercial fishing communities and the dive industry [10]. Not only do such illegal activities deplete stocks for both fishers and divers, they also impact market prices [11]. As in other MPAs [11], the economic crisis in 2008 and associated budget cuts, have resulted in decreased vigilance within both MPAs exacerbating the problem. The crisis has driven recreational fishers to supplement their income or support themselves through illegal activity, increasing conflicts between user groups.

4. Governance

4.1. Governance of CPHMPA

A highly decentralised country, Spain is organised into 17 autonomous communities and two autonomous cities, each with its own government exercising substantial powers, including over regional aspects of environmental management. For example, coastal autonomous communities have exclusive responsibility over maritime fishing within internal waters (the national government retains responsibility for territorial waters beyond the baseline). As the CPHMPA covers internal and territorial water jurisdictions, a collaboration agreement was signed by the national Ministry of Agriculture, Food and the Environment and the regional Council of Agriculture and Water of the Region of Murcia in 2006 to facilitate the sharing of activities and coordination of management. A committee to monitor the agreement includes representatives from national and regional governments (General Secretariat of Fisheries and Director of Fisheries of the region of Murcia), Coast Guard, Spanish Oceanography Institute (IEO) and University of Murcia. The autonomous community of Murcia also has a separate, more informal committee to coordinate activities at the regional level [12]. It includes representatives from different regional government departments, the fisheries and dive sectors and scientific bodies (University of Murcia and IEO). There is potential for community/user participation within this informal coordinating committee, but its focus is on internal waters and regional regulations, particularly the rules relating to diving quotas. It does not address the lack of coordination and collaboration between the national and regional governments, with both entities giving priority and focus to what is under their jurisdiction.

Both national and regional government representatives report that this system of divided management responsibilities offers a successful example of co-management [12]. Despite decentralisation, the governance approach applied in CPHMPA provides no real opportunity for the participation of regional actors when decisions are made that affect territorial waters. The governance approach adopted in CPHMPA falls short of true co-management and is more aptly termed co-decision making by competent administrations [12]. Daily management and enforcement of the MPA is the responsibility of a state-owned public

[2] *Cofradías* are local non-profit corporations with public rights, which represent the interests of the whole fishing sector by acting "as consultative and cooperative bodies for the administration, undertaking economic, administrative and commercial management tasks and with the ability to cooperate in matters of regulating access to the resources and informing over infractions occurring in their territory"[7,9].

[3] PESCARTES is a non-governmental non-profit organization professional fishermen's association of CGN-NP created by fishermen from Cabo de Gata, San José, La Isleta, and Carboneras.

[4] APRA – Asociación de Pesca Responsable Al-Andalus (Association of Responsible Fishing Al-Andalus) is a non-governmental non-profit organization, which defends the Spanish sector of recreational sea fishing from a boat in Andalusia.

body, Tragsa,[5] assisted by environmental agents and administration officers, and the Guardia Civil's Naval Service.[6] The lack of a specific on-site management authority and MPA manager decreases users' accessibility to the governing bodies and continues to exclude key actors from the governance process. Furthermore, this governance approach leaves opportunity for regional level politics and economic-development interests, such as coastal development, shipping, land-use planning and fisheries management, to influence the overall effectiveness and management outcomes of the CPHMPA.

4.2. Governance of CGNMPA

In contrast, CGNMPA lies in territorial waters and is under national jurisdiction (Ministry of Agriculture, Food and the Environment). The MPA forms an extension of the CGN-NP (which already includes around 74 km^2 of internal waters), under regional jurisdiction of the Junta of Andalusia (Council of Environment and Rural Development and Environmental Spatial Planning), forming two separate entities and no agreements have been signed between the national and regional administrations to facilitate coordination and collaboration for their management. The failure to address inconsistencies in regulations applied in internal and territorial waters is causing social discord with many resource-users and enforcement bodies failing to understand and comply with the rules. This lack of coordination is also contributing towards a negative perception of the management bodies and the MPA. Theoretically there is a joint management committee, yet the committee has not met for the last six years. The CGN-NP has a participatory body (board of governors for internal waters), which includes scientists and dive operators, but does not include the fisheries sector. Daily management and enforcement of the MPA is, as in the case of CPHMPA, the responsibility of Tragsa and the Guardia Civil's Naval Service. CGN-NP management body has a patrol vessel for internal waters, but reports suggest it is rarely used. The same issues as described for CPHMPA apply given the lack of coordination between internal and territorial jurisdictions, the lack of an on-site management institution and the distinct lack of participation within the governance framework.

5. Effectiveness

5.1. Enforcement of regulations

Enforcement of, and compliance with, commercial fishing regulations has been relatively effective, particularly in CPHMPA. In CGNMPA, the inconsistency in regulations between internal and territorial waters has unintentionally reduced both compliance and enforcement capacity. For other activities such as coastal development, illegal fishing practices and tourism, predominantly dive and kayak industries, enforcement has been weak and ineffective. This has led to outcomes that are incompatible with conservation goals. Following the MPAG effectiveness scale (see [1] (ranging from 0: no impacts addressed to 5: all impacts addressed)) the effectiveness scale of CPHMPA is assessed as 3 (some impacts from local activities completely addressed, some only partly addressed) and 2 in CGNMPA (some impacts partly addressed but some not yet addressed). Effective enforcement of MPA regulations is still a major challenge and requires stronger commitment and political will from all levels of government. Failure to enforce dive regulations in CPHMPA has created conflict between users. The continued failure to address illegal fishing is resulting in dramatic population declines in economically valuable species [10]. Support from national government and better coordination between national and regional government will be essential to ensure that enforcement officers understand the regulations and can fully exercise their legal authority, an issue that is especially pertinent in the management of CGNMPA. The enforcement teams could learn lessons from other MPAs which have implemented clear enforcement protocols based on a refined legal mandate and clear conservation objectives [13].

5.2. Monitoring

Long term monitoring of CPHMPA by the University of Murcia provides a strong baseline for management. Studies have shown an increase in abundance and biomass of numerous commercially important species, including groupers (*Epinephelus* spp. *Mycteroperca rubra*), seabreams (*Diplodus* spp., *Dentex dentex*, *Sparus aurata*), scorpion fish (*Scorpaena* spp.) and brown meagre (*Sciaena umbra*), etc. [14–18]. In addition, monitoring the artisanal fisheries fleet and market data has shown an increase in catch size for most species of commercial interest [19,20]. Overall, research results indicate the ecosystem and associated species have recovered substantially due to protection [21]. More recent findings however reveal that the recovered grouper population has declined dramatically – attributed to uncontrolled illegal fishers [10]. Unsustainable dive numbers and poor dive practices have resulted in a reduction in ecosystem health and species richness [8]. The availability and reliability of such data has allowed for more adaptive management through the re-evaluation of dive regulations. However, effective protection measures are urgently needed to eliminate the threat from illegal fishing in order to maintain and restore the condition of the marine ecosystem.

Scientific monitoring and surveys within CGNMPA is more limited [5]. Every five years the Junta de Andalusia monitors the status of protected species along the entire Andalusia coastline. Seagrass beds are monitored within the LIFE-Posidonia project,[7] results from which are favourable, supporting findings from a previous study [22]. To date only two studies have been conducted to monitor the commercial and recreational fishing fleets: PARCGA[8] conducted by the Oceanographic centre of Malaga and a study of *Xyrichtys novacula* funded privately by APRA [5]. CGNMPA is reportedly favourable for protecting seagrass, limpets and sea cicadas [23], whilst economically valuable species such as grouper and seabream showed some positive response to protection, but have not recovered as expected within the MPA [14,24,25].

6. Incentives

This analysis has identified key incentives[9] currently used and particularly needed to support governance. In this paper, we define incentives as a means to encourage actors to choose to behave in a manner that provides for certain strategic policy outcomes, particularly biodiversity conservation objectives, to be fulfilled [1]. Five kinds of incentives are discussed here and outlined in Tables 5, 6: economic; interpretive; knowledge; legal; and participative.

6.1. Economic incentives

In both MPAs, the use of economic incentives is a key mechanism through which conflict between nature conservation and economic

[5] Tragsa is a state owned public body whose responsibilities are to perform rural development works and services, environmental conservation and emergency relief operations.

[6] Guardia civil: is a military force charged with police duties, today part of the European Gendarmerie.

[7] Life Posidonia: http://www.juntadeandalucia.es/medioambiente/site/portalweb/menuitem.7e1cf46ddf59bb227a9ebe205510e1ca/?vgnextoid=ccbb795270730410VgnVCM2000000624e50aRCRD&vgnextchannel=42907db13a4ef310VgnVCM2000000624e50aRCRD.

[8] PARCGA, IEO, Malaga: Seguimiento de las pesquerías artesanales y recreativas de la Reserva Marina de Cabo de Gata-Níjar, http://www.ma.ieo.es/reservas.html.

[9] For a full list of incentives analysed and definitions see Jones et al. [1].

Table 5
CPHMPA- Incentives applied (Y) including those that are particularly important priorities for strengthening (Y*) and introducing (N*).

	Incentive type	Used	How/Why
Economic	**Reducing the leakage of benefits**	Y*	There are strict controls on who can fish and where fish can be sold which maintains the benefits of the MPA within the local community. However, there is also a tendency for incomers to set up hotels and restaurants which does cause concern over the local community losing out on some benefits from tourism developments to incomers. Incoming illegal spear fishers (SCUBA and snorkelling, particularly at night, including for commercial gain), illegal commercial anglers and illegal commercial fishing vessels are impacting fish populations, leading to reduced catches by local artisanal fishers.
	Promoting profitable and sustainable fishing etc	Y*	Restrictions in place are designed to promote profitable and sustainable fisheries, with only traditional methods of fishing allowed, as well as seasonal and size restrictions to promote sustainability, but enforcement needs strengthening and illegal fishing occurs: fish stocks appear to be in decline, though stock assessments are lacking.
	Promoting green marketing	Y	A short-term government funded programme - PescaSos - aimed to increase the revenue for fishers and the promotion of the value of artisanal fishing practices, with plans to develop eco-labels to highlight sustainably caught produce.
	Promoting diversified and supplementary livelihoods	Y	Tourism provides alternative livelihoods and businesses in the area, though there are related challenges of waste management, environmental degradation, changes to local traditions and the costs of upgrading artisanal vessels to a standard safe for tourists.
	Investing PA Income/funding in facilities for local communities	N*	If the MPA can generate a surplus, it would be beneficial to reinvest in local facilities for given the communities limited economic opportunities.
	Ensuring sufficient state funding	N*	Budget cuts resulted in decreased surveillance and in the last few years illegal fishing has increased substantially, the effects on fish stocks appearing to be significant. The protection that has been viewed as beneficial is being undone very quickly due to the government's lack of resources.
	Provision of NGO, Private Sector and user fee funding	Y*	A dive tax (€3 per diver) was introduced in 2014 but this income is channelled back into wider regional expenditure, thus not serving as extra funding to support the MPA: a proportion of the dive tax income should be specifically invested back to support the MPA.
Interpretative	**Raising awareness**	N*	There is little, if any, information regarding the MPA. As a highly touristic area more effort needs to be made to ensure visitors are aware that they are in an MPA, what the rules are, etc., in order to encourage more responsible behaviour.
	Promoting recognition of benefits	Y	A university plays a key role in monitoring and writing studies on fish surveys conducted. There is increasing involvement with the community in these activities to promote the benefits of sustainable artisanal fishing
	Promoting recognition of regulations and restrictions	N*	The local committee at the regional level coordinates activities and meet to inform actors of regional regulation changes, involving government departments, fisheries, the dive sector and scientific bodies.
Knowledge	**Promoting collective learning**	Y	Long term monitoring conducted by the university of Murcia have helped to change dive regulations and help to justify the economic benefits from the MPA.
	Agreeing approaches for addressing uncertainty	N*	The University of Murcia collects data about the MPA, though there is still a lack of information. The government is driven by evidence based decisions. Both the government and other actors do not understand or appreciate uncertainty and how to manage for it when making decisions. The use of alternative sources of knowledge would be beneficial to address uncertainty, increase the knowledge base and increase the confidence in the data.
	Independent advice and arbitration	N*	As above. The lack of a local manager means there is no one on site that can act as a bridge between the different actors involved. Due to the lack of confidence between different actors, it would be beneficial to introduce and develop platforms for independent advice.
Legal	**Hierarchical obligations**	Y	This MPA is part of the Natura 2000 Network, designated as a SPAMI and also part of the MedPan Network which requires certain obligations and standards to be met.
	Capacity for enforcement	Y*	There is capacity for enforcement through the Civil Guard and TRAGSA, but it needs improvement after a reduction in budget and there are challenges that remain for enforcing dive regulations and addressing illegal fishing. There is a lack of capacity within the regional government to fulfil the required enforcement.
	Penalties for deterrence	Y*	There are penalties for deterrence but they are insufficient and are not a credible deterrent to illegal fishers. There are some fines issued but few are recorded and these tend to be mainly illegal spear fishers.
	Protection from incoming users	Y	There is some protection but insufficient to deter incoming illegal fishers.
	Cross-jurisdictional coordination	Y*	The National Ministry of Agriculture, Food and Environment and the Council of Agriculture for the Region of Murcia are each responsible for their own regulations, and whilst there are some agreements and committees established to facilitate the sharing of activities and promote coordination, these meet infrequently and there is a need to better promote the integration of regional and national regulations.
	Clarity concerning jurisdictional limitations	Y	There is awareness that there are challenges in areas outside of the MPA that cannot be addressed within the legislation of the MPA. There is different legislation for waters outside of the MPA that aims to address these challenges.
	Legal adjudication platforms	Y	There are appeal platforms but adjudication is also needed to address concerns about inequitable enforcement.
	Transparency and fairness	N*	Issues exist between user groups related to legislation and restrictions, leading users to feel that rules are not applied fairly. There were also very few reports of transgressors being fined and caught, leading some to believe that corruption is becoming more prevalent.
Participation	**Rules for Participation**	N*	At present there are few, if any, meetings taking place. Establishing a clear plan for participation and defining clearly what participation will mean in terms of collaborative management and the role of all actors would be beneficial. The government recognise the benefits of participation, but there are barriers that are preventing it being introduced.
	Establishing collaborative platforms	Y*	Although the regional government has a committee – there are no regular meetings and if there are they are restricted to the times when decisions have been made that will directly affect the other actors. User level actors are demanding greater participation yet no opportunities exist that facilitate communication. More meetings are needed, especially to focus on promoting collaboration with users.
	Neutral facilitation	N*	The amount of distrust that exists between the different actors requires neutral facilitators with increased capacity to begin initiating these processes.

(*continued on next page*)

Table 5 (*continued*)

Incentive type	Used	How/Why
Independent arbitration panels	N*	This is needed to help with collaboration and to improve participation.
Decentralising responsibilities	Y	Most responsibilities for regulating uses in internal waters have been devolved to the regional government.
Building trust and the capacity for cooperation	N*	As above. The level of distrust is very high between the actors, and a lot of effort is required to overcome this.
Building linkages between relevant authorities and user representatives	N*	There is a need to develop strategic linkages between national, regional and user representation actors, particularly from the fisheries sectors, to improve integrated and effective governance.
Building on local customs	Y	This area continues to use traditional fishing practices and local customs, especially artisanal fishing.
Potential to influence higher institutional levels	N*	The non-administrative actors have little influence, if any, but they want to have more say and to be empowered. Furthermore, there were also complaints that EU regulations were not contextually specific for the areas, yet were being applied with a blanket approach. There were calls for these regulations to be made more adaptable/flexible.

development is being addressed. Potential fisheries benefits of MPAs were promoted during the implementation process. Fishers agree with the need to use resources sustainably, and in CPHMPA fishers concur that the MPA has benefited them directly. In CGNMPA, fishers report that they too have seen some benefits of protection. However, the design (six small no-take zones (20% of MPA area- Fig. 1)) and lack of scientific information mean there is no evidence upon which to base sound decisions. The development of tourism has changed and, in general, improved the livelihoods of traditional fishing communities in both case studies. However, whilst locals agree tourism brings benefits, such as new jobs, money from house rents, increased commerce etc., it also introduces problems of waste management, environmental degradation and changes in local traditions. In CGN-NP, green tourism is promoted. A short-term (six month) initiative, PescaSos,[10] aimed at increasing the revenue of fishers and promotion of the value of artisanal fishing practices e.g. through gastronomic workshops, improving the traceability of the market chain and fishing 'pesca-tourism'. However, the short-term nature of this initiative limits its impact, and greater effort is required to develop long-lasting green marketing strategies. The fishing industry could introduce eco-labels and the dive industry in CPHMPA could benefit substantially if operators could agree to develop sustainable tourism as a brand. In CPHMPA, a dive fee was introduced in 2014, the idea being that the funds will ensure that the MPA and community infrastructure are maintained. However, to date, there is no clear plan as to how the money will be used by the regional administration, raising suspicions as to who/what will benefit from this fee.

6.2. Interpretive incentives

Interpretive incentives are cognitive messages or nudges designed to change behaviour. Successful protection and long-term environmental stewardship hinges on the surrounding communities' understanding and appreciation of the value of having a healthy, sustainable environment. Yet both MPAs have made limited use of interpretive incentives. Signage that illustrates the limits of the MPA was implemented in each area, but the signs are not particularly informative, have not been maintained, and in some cases have been removed. Awareness of CPHMPA is low, both within the region and amongst tourists visiting the area. Awareness of CGNMPA is higher, but it is unclear if people are aware of the MPA or the marine part of CGN-NP, though the terrestrial part is very widely recognised. Various organisations and projects (e.g. LIFE-Posidonia, EcoAlmería) working in collaboration with Junta de Andalusia have held educational workshops and run school campaigns raising environmental awareness in CGN-NP, but such programs have suffered in recent budget cuts. In 2014, three short-term government-funded projects[11] related to improving environmental awareness and finding a balance between resource users were carried out within the two MPAs and surrounding coastal regions [26,27]. Funding three concurrent projects in the same region suggests that government is giving increased recognition to interpretive incentives. However, an on-site MPA authority with more permanent education facilities and outreach plans/programs is more likely to have longer-lasting and far-reaching impacts.

6.3. Knowledge incentives

The systematic acquisition and application of reliable ecological and socio-economic information to inform management decisions has been shown to improve management over time and forms the principle of adaptive management [28]. However, the lack of systematic monitoring in CGNMPA [5] poses a real challenge and analysis from sporadic studies are rarely used to inform decision-making, undermining the potential for adaptive management. Likewise, the situation in CGNMPA is exacerbated by the lack of reliable fisheries data. Recreational fishers (APRA) funded scientific research to campaign against fishing restrictions. Commercial fishers themselves demand scientific evidence to justify current restrictions and to ensure the MPA is functioning, yet plans for research projects are not forthcoming. Fishers are aware that the lack of baseline data, and continued failure to monitor fisheries or consult the fisheries sector, is counter to adaptive management and undermines the potential effectiveness of the MPA. The perception is that the application of new regulations attempts but fails to cover up previous management mistakes, rather than addressing issues by ensuring that future decisions are supported by scientific information and local knowledge. The systematic and long-term monitoring conducted in CPHMPA by the University of Murcia offers greater opportunity for adaptive management. Findings have initiated recent changes to dive regulations and are used to justify the economic benefits yielded from protection. The role of the University and scientific information could be strengthened further through the creation of a scientific/technical committee. Participatory research projects could improve the knowledge base and strengthen trust and relationships between the sectors [29]. Improved collaboration between administrators and research bodies would ensure that research outcomes are better aligned with policy requirements, and that funds are allocated appropriately [30].

[10] PescaSos is an initiative of the Association Columbares financed by the European Fisheries Fund and the Biodiversity Foundation, the Ministry of Agriculture, Food and Environment. The aim of the project was to increase the awareness and value of artisanal fishing, promote the development of fishing tourism, educate the local population and tourists and contribute to scientific knowledge. http://www.columbares.org/pescasos/.

[11] PescaSos, Pescares and another project developed by Europarc-Spain. Pescares is a project developed by Alfa Ocean funded by the European Fisheries Fund. The aim of the project was to develop training and awareness of different actors involved in the reserve, with particular focus on the development of good practice guidelines for divers and dive operators. http://www.proyectopescares.com/secciones/el-proyecto/. Europarc: Fundación Fernando González Bernáldez and EUROPARC-España, with the collaboration of Fundación Lonxanet developed a project to investigate the environmental and social benefits of fisheries interest marine reserves. http://www.redeuroparc.org/reservasmarinas.jsp.

Table 6
CGNMPA- Incentives applied (Y) including those that are particularly important priorities for strengthening (Y*) and introducing (N*).

	Incentive type	Used	How/Why
Economic	**Reducing the leakage of benefits**	N*	The census restricts commercial fishing to local artisanal vessels so this should restrict the leakage of benefits, but incoming illegal spear fishers (SCUBA and snorkelling, particularly at night, including for commercial gain), illegal commercial anglers and illegal commercial fishing vessels are impacting fish populations, leading to reduced catches by local artisanal fishers.
	Promoting profitable and sustainable fishing etc	Y*	Restrictions are in place, designed to promote profitable and sustainable fisheries, with only traditional methods of fishing allowed, as well as seasonal and size restrictions to promote sustainability, but the enforcement needs strengthening as fish stocks appear to be in decline, though stock assessments are lacking.
	Promoting green marketing	Y	A short-term government funded programme called PescaSos aimed to increase fishers' revenue and promote the value of artisanal fishing practices; plans exist to develop eco-labels to highlight sustainably caught produce.
	Promoting diversified and supplementary livelihoods	Y	Tourism has provided some alternative livelihoods and businesses in the area, though there are related challenges of waste management, environmental degradation, changes to local traditions and the costs of upgrading artisanal vessels to a standard safe for tourists.
	Investing PA Income/funding in facilities for local communities	N*	If the MPA can generate a surplus, it would be beneficial to reinvest this into facilities for local communities given their limited economic opportunities.
	Ensuring sufficient state funding	N*	Budget cuts have resulted in decreased surveillance and absence of a local manager. In the last few years illegal fishing has increased substantially and the effects on fish stocks appear to be significant. The protection that has been viewed as beneficial is being undone very quickly due to the government's lack of resources to continue an adequate level of protection.
	Provision of NGO, Private Sector and user fee funding	N*	There is scope to charge a user fee to incoming users, particularly divers (such fees charged at other MPAs in Spain, including CPHMPA) to raise funds to support the MPA and invest in local facilities, though this is dependent on at least some of the fees being channelled back to support the MPA, rather than just for wider regional expenditure.
Interpretative	**Raising awareness**	N*	There are materials and signs around the natural park. However, they are old, damaged and out of date. They are also related to the natural park not the MPA. The awareness of the natural park is quite high- but whether this knowledge extends to the marine environment is unclear and there would seem to be much lower awareness of the MPA.
	Promoting recognition of benefits	Y	Local fishers have reported that they have seen benefits to protection and agree with the need and practice of regulations for sustainable fisheries management.
	Promoting recognition of regulations and restrictions	N*	There is a need to promote recognition of fisheries restrictions in the MPA amongst both fishers and the Civil Guard that enforce the restrictions on them, as well as amongst incoming divers, snorkelers, anglers and other recreational users.
Knowledge	**Promoting collective learning**	N*	Few studies are available in CGNMPA. Fishers lack confidence in the decisions taken and demand more research be conducted. The use of their knowledge would be beneficial to promote collective learning and increase confidence in data.
	Agreeing approaches for addressing uncertainty	N*	There is a need for an agreed approach on how to address uncertainty in decisions related to the MPA to support collective learning.
	Independent advice and arbitration	N*	The lack of a local manager means there is not a person on-site that can act as a bridge between different actors involved and seek independent experts to provide advice and arbitration roles.
Legal	**Hierarchical obligations**	Y	This MPA is part of the Natura 2000, SPAMI and MedPan Networks and is subject to related obligations. It has been declared a UNESCO Biosphere Reserve and as such has to deliver to certain standards.
	Capacity for enforcement	Y*	The Civil Guard and TRAGSA surveillance service provider are responsible for daily management and enforcement. This is in need of improvement, including through patrols from the CGN management body patrol vessel and the provision of related enforcement powers to the CGN wardens.
	Penalties for deterrence	Y*	Penalties are in place but they are not severe enough to be a credible deterrent. There is also confusion over the legislation so they are not used enough.
	Protection from incoming users	Y	There is some protection but it is not sufficient to deter incoming illegal fishers. The local census only allows local boats to fish and not regional ones but there is little deterrence to enforce this restriction, as penalties are insufficient or not used.
	Cross-jurisdictional coordination	N*	Spanish decentralisation means regional and national government operate independently from each other. There is poor coordination within the level of government across sectors, but many issues exist due to lack of coordination between the regional and national government, particularly with regards to a lack of coordination between the Civil Guard/TRAGSA and the CGNNP/MPA authorities.
	Clear and consistent legal definitions	N*	Decentralisation has led to some inconsistencies between national and regional legislation that need to be addressed.
	Clarity concerning jurisdictional limitations	N*	As above.
	Legal adjudication platforms	Y	There are appeal platforms but adjudication is needed to address concerns about inequitable enforcement.
	Transparency and fairness	N*	Issues exist between user groups related to legislation and restrictions, leading users to feel that rules are not applied fairly. There were also very few reports of transgressors being fined and caught, leading many to believe that corruption is prevalent.
Participative	**Rules for Participation**	N*	At present there are very few meetings taking place (joint NP/MPA management committee has not met for six years plus). Establishing a clear plan for participation and defining clearly what participation will mean in terms of power sharing and the role of all sectoral actors would be very beneficial. The government recognises the benefits of participation, but there are barriers preventing it being introduced. In particular, regional rules for who participates in the NP governing board need to be revised to require the participation of fisheries sectors.
	Establishing collaborative platforms	N*	As above. Fisheries actors are demanding greater participation but no opportunities currently exist that facilitate their participation.
	Neutral facilitation	N*	In general, Spain is not familiar with participatory processes. The distrust that exists between the different actors requires neutral facilitators with increased capacity to begin initiating these processes.
	Independent arbitration panels	N*	As above- to deal with distrust.

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Table 6 (*continued*)

Incentive type	Used	How/Why
Decentralising responsibilities	Y*	Some responsibilities have theoretically been decentralised to the joint management committee but this is not functioning: there is a need to improve the decentralisation arrangements to make them effective.
Building trust and the capacity for cooperation	N*	As above. The level of distrust is high between the actors, and a lot of effort is required to overcome this.
Building linkages between relevant authorities and user representatives	N*	There is a need to develop strategic linkages between national, regional and user representation actors, particularly from the fisheries sectors, and between the NP and the MPA authorities, to improve integrated and effective governance.
Building on local customs	Y*	The area is a big NP and MPA and is very under-developed, so maintaining a lot of traditional fishing practices and traditions is relatively easy and also allows cultural activities to continue. However, traditional low impact fisheries should be permitted to ease cultural and related economic impacts and help build trust with the traditional fishing sector.
Potential to influence higher institutional levels	N*	The non-administrative actors have little influence, if any. They want to have more say and empowerment.

6.4. Legal incentives

Legal incentives, which are penalties imposed on non-compliant behaviour, appear to be the main mechanism through which both MPAs were implemented and maintained. This is unsurprising given the top-down nature of both governance approaches and lack of participation. In both case studies, and particularly in the case of CGNMPA, clarification and consistency in defining legal obligations/objectives, jurisdictional boundaries and roles and responsibilities of national and regional government are crucial to overcoming many of the governance issues identified. Much could be learnt from the success achieved in this respect by the Great Barrier Reef Marine Park, where despite the complexity presented by overlapping regional and national jurisdictions, complementary legislation, integrated management and strong partnerships have been developed [31]. Though the presence of legal incentives acts as a deterrent, their application to CPHMPA and CGNMPA has been insufficient to deter illegal fishers and to ensure effective governance. Education i.e. interpretative incentives coupled with participative incentives, have been shown elsewhere to be an effective and long-lasting strategy to encourage compliance and thereby support legal incentives [31,32]. In both case studies, resource users have shown willingness to report transgressors, yet the authorities and administrations have not taken the opportunity to develop legitimate peer enforcement - an effective management tool applied in other MPAs [33,34].

6.5. Participative incentives

On participative incentives, community involvement and participation are widely acknowledged in the literature as providing opportunities for improving natural resource management [35]. However, the state and regional government failed to consider views of wider local people and resource users in the initiation of both MPAs. The region of Murcia is taking steps to introduce more participation into the management of CPHMPA [12]. However, their approach concentrates on government authorities, fishers' representatives and scientists rather than marine resource users, and goes little further than informing users of regulation changes. Given the conflict that has developed between sectors, the consultation exercises have concentrated primarily on attempting to placate opposing actors rather than seeking wider views and agreements through genuine transparent and participative decision-making processes [12]. Public participation is a relatively new concept in Spain. Whilst there are a few examples of public participation in the management of marine resources in other regions i.e. Galicia and Catalonia [11,36], the lack of experience of these processes by both managers and citizens will be a challenge to wider adoption [6].

The research in CPHMPA is consistent with other studies which suggest that the nature of the fishing industry means commercial fishers are often not available to participate in consultation exercises [34,37]. In this case, administrations must actively seek appropriate methods to permit fishers to participate or at least feel satisfied with their level of involvement [32]. In CGNMPA, fishers have united to create PESCARTES,[12] and actively campaign to participate within MPA management processes. However, to date their inclusion in the management of the MPA has been denied. The lack of involvement and consultation, and provision of information and scientific justification for decisions taken has left fishers with a negative attitude towards the current management and MPA design. Furthermore, by failing to engage all relevant actors, important local knowledge about the state of the MPA and resources is underutilised, and crucially the opportunity to build strong relationships between the different actors which could aid conflict resolution is being lost [34]. Improving participation within both MPAs could be facilitated through the creation of working groups with neutral facilitators that include representatives from all relevant sectors, with legitimate rules regarding participation. To address challenges around the availability of particular actors, alternative forms of participation could be explored, such as online streaming of meetings, to make decision-making more accessible, transparent and available.

7. Cross cutting issues

7.1. Leadership

As seen in other examples, in both case studies, weak leadership from the national, regional and local government is evident in the lack of coordination between administrations; the ambiguous legal and policy frameworks (i.e. inconsistency in regulations between internal and territorial waters in CGNMPA); a lack of funding and resources for efficient MPA management; and weak enforcement [38]. As both MPAs are under national jurisdiction, strengthened leadership from the national government is needed, particularly given the potential influence of regional/local vested interests, which may undermine national level conservation efforts. The University of Murcia through helping to establish a long-term vision for the MPA has provided some leadership. However, the role of the university could be strengthened substantially through greater coordination with the administration and other actors in order to better harmonize research and policy needs.

7.2. NGOs

NGOs are playing ever more important roles in governing MPAs by providing funding, knowledge, facilitation and guidance that are

[12] PESCARTES is a non-governmental non-profit organization professional fishermen's association of CGN-NP created by fishermen from Cabo de Gata, San José, La Isleta, and Carboneras.

required for their management. The NGO ANSE[13] played a significant role during the declaration of CPHMPA, and is involved in several projects aimed at studying particular aspects of marine biodiversity in the vicinity of the MPA (seagrasses, sea birds, etc.). The administration recently provided short-term funding to the NGO Asociación Columbares to carry out the PescaSos project discussed in Section 6. Other potential actors, including WWF-Spain (www.wwf.es) and Oceana (http://eu.oceana.org/es), are actively working to gain more and better protection of the marine environment at the state level, but their level of local involvement in CPHMPA and CGNMPA is negligible. The lack of NGOs at a community level in CPHMPA and CGNMPA is a missed opportunity, especially given the current economic climate. As in many other MPAs [6,13], government and foundation funding has decreased over the years, impacting surveillance and offering increased opportunities for illegal activities. Funding from NGO sources could offer an as yet untapped source of complementary economic support for both MPAs. Furthermore, in response to the lack of dedicated on-site MPA management authorities, NGOs could play a vital role, facilitating discussions between resource users and administrators.

7.3. Equity and stewardship

Another area of weakness in the governance of CPHMPA and CGNMPA is the failure to address issues relating to equity. Local artisanal fishing communities are being displaced by recreational activities and deprived of access to the natural resources they rely on for their livelihoods, undermining their sense of stewardship. Nevertheless, institutional support for CPHMPA remains strong amongst fishers as well as other groups. 65% of dive operators, 82% of fishers, 100% of restaurant workers/owners and community members interviewed perceiving CPHMPA as beneficial to the community. In CGNMPA 100% of dive operators, 50% of commercial fishers and 60% of recreational fishers interviewed reported the MPA to be beneficial to the community. Key criticisms focused on the management's lack of coordination, inconsistency in regulations (between territorial and internal waters), weak enforcement and few opportunities for participation. These concerns need to be addressed if users' perceptions of the MPA's benefits are to improve and compliance strengthened.

8. Conclusions

The governance of the CPHMPA and to a lesser extent the CGNMPA is characterised by top-down control and a lack of support from the central government, a lack of genuine participation from local resource users and communities, a lack of coordination and legislative inconsistency between national and regional government and a vulnerability to local politics and influences at the regional government level. Despite a well-established legal framework, in both case studies, lack of coordination and participation is causing real management challenges, particularly in getting local communities/businesses to comply with regulations (e.g. constraining the dive industry in CPHMPA and recreational fishing industry in CGNMPA, and combating illegal fishing in both). The use of legal and economic incentives has generated significant conservation benefits, but is likely to be insufficient to address all challenges and cross-cutting issues faced, especially in the current economic climate. In order to improve the governance towards more effective and equitable MPA outcomes, alternative and creative governance solutions are needed that allow for adaptive management and genuine representation- providing stakeholders with a platform to deliberate and debate options prior to representatives attending decision-making meetings. Lack of data in CGNMPA is a key constraint to good management, but even where good data exists (in CPHMPA), coordination and lack of participation limit its usefulness for effective management. The presence of an on-site MPA authority could bring with it social benefits, helping strengthen coordination not only between the two levels of government but also between government and resource users/key actors (e.g. fishers, researchers). There is also a clear need to increase stewardship and win the support of local and incoming users through education/awareness raising, equitable treatment of user groups and increased (and genuine) participation. Increasing participation will be challenging but there are examples from elsewhere that can be used as models to build on. While the focus of this paper was to provide information specifically related to CPHMPA and CGNMPA, the strategies applied and lessons learned and recommendations made extend far beyond the south of Spain.

[13] ANSE (http://www.asociacionanse.org) is a naturalist association funded in 1973, devoted to the dissemination, study and defence of the environment in SE Spain.

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