

## Article

# Fisheries Co-Management in the “Age of the Commons”: Social Capital, Conflict, and Social Challenges in the Aegean Sea

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**Abstract:** Fishing activity in Greece remains important for the management of marine resources. Fishery co-management, involving various social groups and stakeholders, is considered necessary for marine ecological conservation. Environmental NGOs have acquired valuable expert and scientific knowledge on marine ecosystems which is essential for natural resource management. However, such knowledge is often in conflict with the interests of fishers, who often have tacit/lay knowledge which is rarely considered. The aim of this paper is twofold: first, to critically discuss the perceptions of different stakeholders regarding the protection of marine commons, and second, to unveil the potential conflicts in the management of the MPA on Gyaros Island. Gyaros is a cultural heritage monument, home to a colony of Mediterranean monk seals, and a traditional fishing area for adjacent island communities. Methodologically, the paper synthesises the empirical findings of a five-year (2013–2018) research project. Survey material collected over two separate periods (2014 and 2017) from the local population and professional and recreational fishers is combined with rich qualitative material from various stakeholders and participatory research to inform the research objectives. The successful management of MPAs requires that all users contribute to, agree to, and respect the terms of the MPA.

**Keywords:** fishery co-management; marine protected areas; social capital; Northern Cyclades; Gyaros; Greece



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## 1. Introduction

Fishing communities have faced several challenges in recent decades. These include fisheries management involving various actors who are engaged in fishing activity, new technologies, globalisation, and market competition. Moreover, there are increasing concerns on the part of local communities, civil society, and national authorities regarding the environmental impact of overfishing and the apparent depletion of fishing stocks. Fisheries co-management is currently considered a vital instrument for marine ecological conservation. Since the 1990s, the discussion on fishery co-management has expanded and attempts have been made to put in place local/regional co-management systems in many countries across Europe [1]. The relatively new notion of ecosystem-based fisheries management (EBFM) seeks to bring together the biological and sociocultural conditions to create a holistic framework for addressing conservation [2–5]. In this approach, the ecosystem is understood as a complex multidimensional concept that encompasses both a biotic assemblage and its associated physical environment in a specific place [6] (p. 2). The ecosystem approach is commonly recognised as a potentially powerful baseline for fisheries management. The design and implementation of a fisheries management strategy varies, depending on how the ecosystem is determined. In this respect, the ecosystem approach to fisheries management entails a multitude of conservation, management, and protection measures. In addition, it includes (or excludes) a few users of the marine environment. However, the lack of a single, universally accepted definition of “ecosystem” has allowed

the ecosystem approach to be used to justify politically controversial fisheries conservation measures, resulting in confusion as well as resistance to its application [4] (p. 19).

Contemporary ecosystem-based management schemes increasingly recognise the incorporation of people and, in particular, the role played by (professional) fishers and/or fishing communities [4,5]. In such a context, people cannot be seen as only exploiting the fishery resources, but also—depending on the aims of stakeholders—as guardians of the fish stocks. The relevant literature therefore emphasises that the active engagement of stakeholders is needed if more effective conservation actions are to be taken [7–10]. In fact, fisheries co-management implies that users of the marine environment will become directly and officially involved in the decision-making process, together with the management and protection of marine space. The role a communities can play in the successful implementation of a marine protected area scheme thus remains crucial; they have become the “missing link” between fisheries management and environmental protection [11–13].

In Greece, fisheries have retained a special role in the socioeconomics of coastal and island areas, whilst fishing activity remains significant for the management of marine resources. Greece is the main producer of Mediterranean fish and maintains a stable share of the EU-27 production, which remains in excess of 40% [14,15]. The Greek fishing fleet is characterised by many fishing vessels (14,123 fishing vessels on 31 December 2018), although the Greek fishing fleet—particularly small-scale—has been significantly reduced since 2003 in the context of the Common Fisheries Policy [16]. Greece accounts for one-fifth (18.3%) of the EU-28 fishing vessels but is in the seventh position in terms of fishing tonnage (with an average of 4.9 GT compared with 19.2 GT at the EU level) [17]. Most Greek fishing vessels are involved in small-scale fisheries (96.54%) [16], have a limited average length (less than 7 m on average), and land small catches [17,18]. Small-scale fisheries in Greece are family-based and male-dominated. Most fishers are male (89.7%) [16], with a small number of female professional fishers. Many women involved in fisheries are doing supporting activities. In Greece, female involvement in fisheries is generally limited to the regional and rural labour markets, and the position of women in Greek fisheries is similar to women’s position in rural areas [19]. The sociodemographic characteristics of small-scale professional fishers may pose a challenge to the viability of the industry [18,20] and should be taken into consideration when designing marine protection measures. Indeed, two-thirds of small-scale professional fishers are between 40 and 64 years old, while 12% are over 65 years of age. Moreover, 6.2% have tertiary education, while the vast majority have primary or secondary education [16].

In Greece, only limited socioeconomic research has been conducted into fishing activities in coastal and island areas. This research has focused on the role of women in small-scale fisheries [19,21], the characteristics of small-scale fisheries [18,22], the prospects for fisheries in Greece [20], and their links to fishing tourism [23]. Despite the limited socioeconomic research, there is growing interest on the part of various stakeholders in the interactions between fishing activity and the environment, as well as in the impact of fishing practices on sensitive maritime areas and on biodiversity. There are two MPAs in Greece in the form of protected areas with clear, established restrictions (Zakynthos and the Northern Sporades), while other national parks include a marine section (Schinia-Marathona park and Mesologgi-Etoliko lagoons, the Acheloos and Evinos estuaries, and Echinades islands) [20]. More recently, in July 2019, the Hellenic Ministry of Environment and Energy issued a Ministerial Decision that established a series of protection measures across Gyaros island in the Northern Cyclades, based on proposed measures discussed from 2016 on by the “Gyaros Co-management Committee”, a special committee designated to establish a MPA in the area.

The aim of this paper is twofold: first, to critically discuss the perceptions of different stakeholders regarding the protection of marine commons, and second, to unveil the potential conflicts in the management of the MPA on Gyaros Island. Our analysis is based on rich qualitative material (interviews and participatory research conducted in 2013–2018) and survey data collected over two separate periods (2014 and 2017). The

research addressed various local and non-local stakeholders (local population, professional and recreational fishers, various professional groups) who live in two island communities adjacent to Gyaros on the islands of Syros and Andros. The establishment of a MPA around Gyaros is extremely interesting because of its high ecological value. The island is part of the Natura 2000 European Network and is home to a colony of the Mediterranean monk seal (*Monachus monachus*), an endangered species. It is also important to mention that Gyaros, which is currently uninhabited, has been given the status of a monument of cultural heritage, related to its use as a place of exile for political dissidents during the post-WWII period. Traditionally, the marine area around Gyaros has been a fishing spot for the island communities in the area and from further afield in the Aegean. In addition, the MPA procedure was initiated during the economic recession in Greece, a period when the dilemma between triggering economic development, on the one hand, and protecting the environment, maintaining the “commons”, and helping small-scale fisheries to survive, on the other, was particularly stark. In the period of the economic recession, the socioeconomic resilience of coastal and rural areas has been a particularly important issue for the country [24].

The remainder of the article is structured as follows: Section 2 contains a brief reflection on the theory of the commons, examines the meaning of social capital in relation to local and outsider knowledge, and discusses social capital as embedded in the co-management of environmental goods. Section 3 provides a concise methodological description, followed by a discussion of the establishment of an MPA on Gyaros Island and a brief account of the main socioeconomic developments in the adjacent island communities, i.e., Syros and Andros. Section 4 focuses on the characteristics of fishing activity and fisher groups in the two study areas, the analysis of fisheries–environment relations during the crisis, and stakeholders’ perceptions and expectations of Gyaros and the MPA. Section 5 assesses the main findings of the paper and highlights the need for a balance between local and non-local interests in relation to the management of the Gyaros MPA.

## 2. Theoretical Discussion

### 2.1. Reflections on the Theory of the Commons

In “The Tragedy of the Commons” (1968), Hardin [25] argues that the environmental commons are destined to be degraded and overexploited if they remain unprotected and their users remain without property rights to them. According to his understanding, access to the “commons” without specified property rights would lead to free riding, whereby each user will try to get the most out of the commons, without making efforts to conserve them. In Hardin’s view, the commons should be enclosed and then either privatised or given to the state [26] (p. 19). Due to the inferred inevitability of their users’ behaviour and actions, the commons are automatically identified with degradation and tragedy.

It was Ostrom [27] who addressed the commons not simply as an issue of property, but also as a management issue. She pointed out the need to explore the historical evidence relating to the management of the commons both by local populations and by institutions that were developed in conjunction with the maintenance and organisation of the commons. She was interested in both success stories and failures in the management of the commons not only in Europe, but also in Africa, Asia, and the Americas. She analysed numerous case studies from around the world and came up with eight conditions she considered essential for successful and sustainable commons: first, the spatial boundaries and who can and who cannot use the commons must be clearly specified; second, the rules must correspond to local conditions; third, the users of the commons must agree to the rules imposed; fourth, effective monitoring must be in place; fifth, graduated sanctions need to be in place; sixth, conflict resolution mechanisms should be simple and easy to apply; seventh, the right to organise at the local level without interference from higher-level government should be only minimally recognised; finally, in the case of larger commons, multiple-level nested enterprises need to exist with the local commons at their base [27] (pp. 90–102). Based on this thinking, failure on the part of the users of the commons to elaborate common rules

and ensure that they are applicable would lead to the destruction of the commons. Users should therefore consent to the drawing up of effective rules and comply with them. This consensual set of rules can be based primarily on sociocultural traditions and cannot be imposed on the grounds of economic rationality [26] (pp. 50–51).

The power of Ostrom's approach, which is based on analysis of empirical examples and case studies, is that communities create and enforce rules against free riding and hence ensure the long-term sustainability of the commons [28] (p. 58). However, this does not imply that the community is the most appropriate institution to address the issues of the commons under all circumstances. Self-government is important for ensuring that commons are sustainable, but it is clearly argued that multiple institutions are necessary to govern the commons. In effect, Ostrom [29] (p. 70) recognises that governmental, private, and community-based mechanisms can all work in the case of some commons, which is why there are mixed systems of private, public, and shared property rights in many cases [30]. This is the essence of what Ostrom calls "polycentricity", which is understood as the coexistence of multiple decision-centres whose prerogatives may overlap, and which may be organised on different scales and follow different sets of rules [28].

In this context, the sustainable governance of the commons is made possible by cooperative behaviour not just among individuals and groups, but also among social actors and institutions. Ostrom uses several related concepts, including social capital, civil society, and associational life, complemented by more generic concepts such as community and culture. It is important to take human agency into account when considering the commons, which is analysed as individual and/or group behaviour based on specific social attributes and economic interests. There is, therefore, a need to examine the specific mechanisms that underlie the management of the commons, while cooperation remains an important precondition for their governance.

Social capital is important, both for bringing about positive outcomes in the commons and for illustrating people's ability to be well connected to groups and networks. Social capital refers to those aspects of social structure and organisation that can act as resources for individuals, and which also allow them to achieve their aims and interests. In fact, social capital is a "lubricating mechanism", because it lowers the costs of working together and facilitates cooperation. Four basic features of social capital are identified: (1) relations of trust; (2) reciprocity and exchanges; (3) common rules, norms, and sanctions; and (4) connectedness in networks and groups [12] (p. 633).

## 2.2. *The Meaning of Social Capital: Valorising the Knowledge of Locals and Outsiders*

For Ostrom, social capital is of enormous importance for understanding the mechanisms and redesigning the management of the commons. Her institutional analysis and developmental framework integrate all the relevant explanatory factors and variables into categories and then locate these categories within a structure of rational relationships [10]. In fact, the creation of trust is an important feature for the governance of the commons. For this polycentric system of commons management to lead to a sustainable outcome, it requires trust in actors' actions and trust in the knowledge they convey. On many issues, there is conflict over the knowledge shared by the different actors, so in a framework of this sort, dependability, fairness, and goodwill should be established among the actors involved. Once trust is established, the risks of networking—free-rider problems or "loose ties", for example—can be compensated for by community-level coordination [31].

It has also been argued that trust is more built-in in small settings due to the smaller number of people interacting and the improved learning capacity that comes with it, the presence of social organisation mechanisms, and the presence of collective identity, which allows for the diffusion of shared roles [32]. The commons literature is primarily preoccupied with self-governance and the study of the factors that affect the success of communities that govern the commons, while the responsibility for the management of the local commons is delivered into the hands of a board of state actors, international donors, NGOs, community developers, and other local stakeholders. At this level, the

community developers have amassed experiences in the governance of the commons and have therefore deployed expertise in social capital building, capacity development, empowerment, participation, and supporting community institutions [10].

However, it should be stressed how valuable the local and lay knowledge of certain community individuals and local social actors can be for managing the commons. For example, the indigenous knowledge of the locals illustrates the ecological complexity of managing the commons, the fuzzy, non-dyadic logic that actually negates the presumptions of conventional scientific and managerial knowledge, and the holistic view of the ecosystem which is pivotal to approaching the commons [33]. However, indigenous knowledge is more than a simple additive to the sets of knowledge required for managing the commons. In most cases, indigenous knowledge does not fit nicely into exegetical schemas and development planning tools. The normal timescale for indigenous knowledge to become operative is lengthy, since it may take several years for someone to become acquainted with the observations, insights, and practices that may inform management plans [34] (p. 15).

The role of indigenous knowledge has been hailed as important, but when it comes to integrating it into scientific and managerial knowledge, many issues arise such as how this can be done (methodology) and why (theory). The major challenge is to find the best ways to bridge Western scientific knowledge and indigenous knowledge without losing the diversity of knowledge traditions and further empowering dominant forms of knowledge [33] (p. 11). The most appropriate way is to find paths to increase communication between the individuals and social actors who are the bearers of the various types of knowledge. One way of achieving this is to create a situation—or an institution—which enables both “outsiders” and “insiders” to contribute as required. This will allow the “outsiders” to inform the local population and social actors on what scientific technology has to offer, while also allowing them to define the problems and/or constraints of the commons. At the same time, the “insiders” will be empowered to share their local knowledge insights and practices with the public administration, external agencies, scientific advisers, NGOs, and regional development agencies, while also clearly expressing their concerns, conflicts, and limitations in relation to the defined problem [34] (pp. 17–18).

It may well be that the bearers of local/indigenous knowledge frame the problem differently, in accordance with their cultural and socioeconomic context; they may also express their concern about losing their livelihoods in a changed common setting. In order to overcome communication “bottlenecks” that impede the flow of information and ideas, certain local actors (e.g., local NGOs or development agencies) can act as knowledge intermediaries and are charged with both facilitating the operation of outsider social actors and communicating to the local population and social actors the necessity of assisting in the process of managing their commons better. This process may, however, lead to two interconnected problems: firstly, the education and beliefs of the locals may undermine their local and indigenous knowledge, and secondly, the imbalance of power between the outsider and insider social actors may lead to indigenous knowledge being framed as something secondary and sidelined in favour of large-scale management issues [34].

These two problems are considered part and parcel of the complexity of any collaborative scheme and cannot be disregarded when dealing with real-life management plans for the commons [32]. Moreover, despite the willingness of outsider social actors to collaborate with local actors, it is not easy to engage the latter through participation: on the one hand, this is because local actors will not collaborate if the incentives to do so cease to be effective; on the other, this is because outsider social actors both need and fear the participation of local actors. This is to say that, while they need local agreement and support for their goals, they also fear that such broader involvement will be less controllable and will conform less with their set of rules [12] (p. 636).

### *2.3. The Meaning of Social Capital: Embedding the Co-Management of Environmental Goods*

Co-management captures many of the issues that have been raised thus far by providing an explanatory framework. Co-management has been depicted as a form of power



sharing, as an institution-building framework, as an arrangement based on social capital and trust, as a long-term process, as a problem-solving framework, and as a form of governance [12,35] (pp. 1693–1694). However, co-management is more than any of these individual aspects. One may add to its component parts the aspects of innovation and of conflict resolution. The most important quality of co-management is its ability to adapt to change, which is possible when three major functions are acknowledged: knowledge partnership, bridging organisations, and social learning capacity. Consequently, an adaptive co-management arrangement whose main function is to increase the effectiveness of participants' actions and which is operated by social networks [36] may enhance the ability to address problems, learn from experience, reflect, and self-organise when necessary [35]. Fishery co-management, which is defined as “the collaborative and participatory process of regulatory decision-making among representatives of user-groups, government agencies and research institutions” [37] (p. 423) is the cornerstone of MPAs. Fisheries co-management entails the users of fisheries becoming directly and formally involved in the decision-making process through the delegation of regulatory functions to fishers' organisations, or to organisations especially designed for management purposes in which resource users retain central collective authority. The main idea is that a more responsible attitude towards the use of resources will be achieved through cooperation, while the scheme also promotes learning and rule-compliance. The system promises a dialectic process in fisheries management in which the conditions of co-management are a result of both top-down and bottom-up approaches [11].

Adaptive co-management relies on the collaboration of various types of stakeholders, operating at different levels, often using networks which extend from local users and municipalities to regional, national, and international actors. It provides flexible community-based systems of resource management customised to specific places and conditions. This flexibility allows for learning as well as responding to and shaping change. Adaptive co-management is seen as a process in which institutional arrangements and ecological knowledge are continuously tested and revised in a dynamic, ongoing, self-organised process of learning by doing [38] (p. 448).

Despite the existence of various co-management arrangements, it is increasingly recognised that co-management does not always deliver what it promises [39–41]. There are various reasons for this, which relate to the number of rules in use, external socioeconomic factors, and institutional issues [42]. In addition, coastal fishers acknowledge ineffective participation [43]. All stakeholder participation is vital in designing and implementing a co-management system [41,44]. Just as importantly, the legitimacy of the stakeholders and the degree to which they trust one another are considered as indicators for assessing MPA effectiveness [41]. The challenge, thus, lies in giving voice and power to the more marginalised groups, while acknowledging the economic, cultural, and social setting in which fisheries are embedded.

### 3. Materials and Methods

#### 3.1. Methodology

The objective of our research was to explore the changing socioeconomic conditions on the islands of Syros and Andros and to capture the stakeholders' perspectives on implementing an ecosystem-based management system in the wider area of Gyros Island. The research design was mixed-method, combining quantitative and qualitative data collection techniques, and was implemented between 2013 and 2018. Specifically, we investigated the socioeconomic profile of the two island areas along with the views, attitudes, and opinions of the local societies on local developmental challenges, with a particular focus on fisheries. In addition, we analysed the characteristics of fisheries on the two islands, and we portrayed the roles played by various stakeholders during the setting up of the Gyros Co-management Committee. In what follows, our paper synthesises material from two different periods (2014 and 2017); the material consists of surveys conducted with the local population and with fishers (both professional and recreational), rich qualitative material

from interviews and focus groups with various stakeholders (local administrative authorities, professional associations, Ministry representatives, port authorities, recreational fishers, professional fishers), and participatory research (for a more detailed analysis of the methodological design of the research, see [45]).

Survey data were collected based on a geographically stratified probability sampling of residents who responded to a structured questionnaire. Due to the lack of a sampling frame, the research team utilised the available lists of residents taken from the municipalities in the two research areas. This information was stratified geographically to include households from all municipal units in the two areas and to maximise the dispersion of the sample across space.

As for the two groups of fishers, a different sampling method was followed. Using information from local authorities on the total number of licences for professional fishers, as well as information from professional associations and cross-checks during fieldwork on active fishers, the research team was able to locate professional fishers in both areas. To reach the number of recreational fishers in both areas, the snowball method was used, which is best suited for populations with different characteristics that cannot be captured without a sampling frame. It should be noted that according to Law L. 4256/2014 “Tourist Vessels and Other Provisions” in Article 14, the obligation to issue a recreational fishing licence is abolished. Based on the above, the snowball method was used to find professional and recreational fishermen on Syros and Andros. The basic process in this method is the formation of a chain of acquaintances (chain referral method), where the next links in the chain refer to the previous links up to the first link, i.e., the person from whom the network was formed [46]. The fact that the empirical research was conducted a second time with the same sub-populations (professional and recreational fishers) helped to identify the sample more quickly.

Overall, during both periods, 446 questionnaires (201 in 2014 and 245 in 2017) were completed by means of face-to-face interviews (see Table 1). Moreover, 45 qualitative interviews and 4 focus groups were conducted. In what follows, we analyse the emergent challenges reflected in the differing views and attitudes of stakeholders and the local community during the setting up of the MPA. These challenges are discussed in the light of three underlying themes: (a) power asymmetries with regard to who is entitled to be among the main users of marine resources; (b) cooperation and competition among the various users; and (c) the environmental protection versus economic survival in a recession dilemma.

**Table 1.** Basic socioeconomic characteristics of survey respondents, 2014 and 2017.

Main Characteristics	Variables	2014	2017
Respondents (N)	Professional fishers	45	51
	Recreational fishers	53	76
	Local population	103	118
	Total	201	245
Age group (%)	Less than 40 years	24.90%	19.60%
	41–50 years	25.40%	24.90%
	51–60 years	23.90%	22.90%
	Over 60 years	25.90%	32.70%
Educational level (%)	Primary education	22.40%	23.70%
	Secondary education	56.20%	50.20%
	Tertiary education	21.40%	26.10%
Active/non-active population (%)	Employed	73.00%	68.00%
	Unemployed	3.00%	4.00%
	Pensioner (non-active)	21.00%	25.00%
	Housewife (non-active)	3.00%	2.00%
	Student (non-active)	0.00%	1.00%

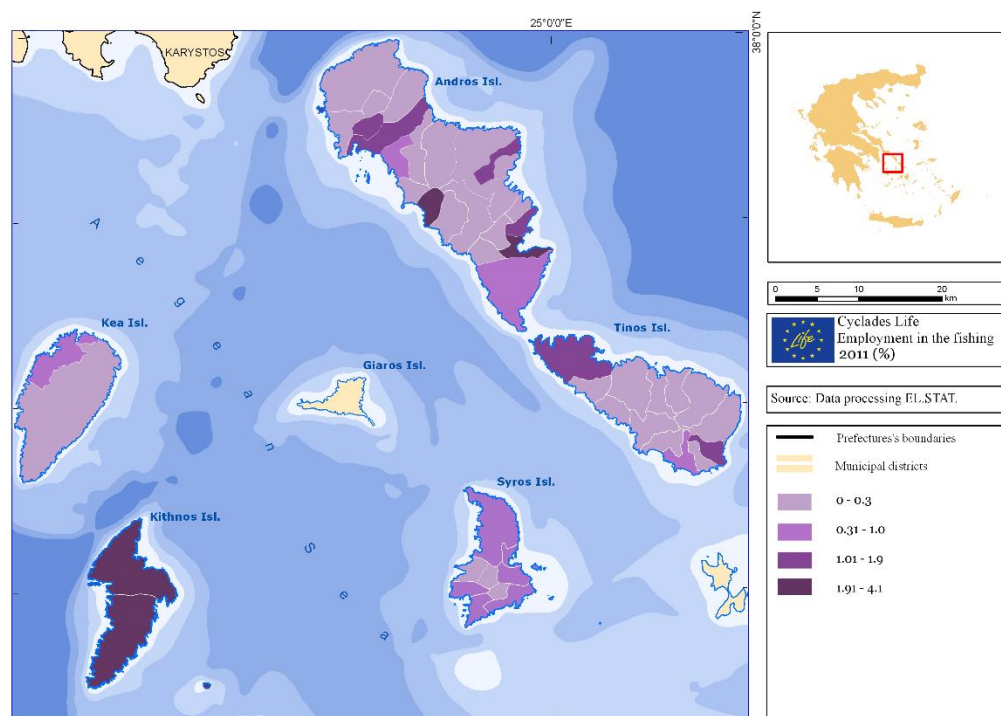
Table 1. Cont.

Main Characteristics	Variables	2014	2017
Employment sector (%) (active population)	Agricultural sector	28.00%	21.00%
	Secondary sector	16.00%	9.00%
	Service sector	56.00%	70.00%
Informed about the existence of protected area in the vicinity (%)	Yes	68.20%	79.60%
	No	29.40%	13.90%
	Don't know	2.50%	6.50%
Informed about prohibition of fishing around Gyaros (%)	Yes	55.20%	66.10%
	No	21.40%	9.40%
	Don't know	23.40%	24.50%

Source: Fieldwork data.

### 3.2. Establishing an MPA on Gyaros Island

Gyaros is a small, semi-arid, deserted island in the Northern Cyclades, an island group in the Aegean Sea. It has a surface area of 17.76 km<sup>2</sup> and a coastline 37.05 km long. It is located at the centre of an almost circular expanse of sea—formed by the islands of Kea, Evia, Andros, Tinos, Syros, and Kythnos—with a diameter of around 50 km (Scheme 1). The closest island is Syros, which lies nine nautical miles away. This small island was inhabited by groups of people (farmers and fishers) until the end of World War Two. In the post-war period (1947–1974), it was used as a place of exile for political dissidents (hosting some 7000 prisoners in certain periods). In 1947, the prison of Gyaros was built; this was designated a protected cultural monument by Ministerial Decision in 2001. This historical era has left its mark on the island's terrain, in the form of buildings and the abandoned landscape [47]. It was used as a naval target range between 1974 and 2001. Since 2001, it has been open to the public, but the human presence has remained limited due to the existence of unexploded ordinance. Sheep and goats roam free on the island along with its—mostly avian—native fauna. In 2002, the island was declared a historic site of significant value which deserved state protection. Later, the eastern part of the island was declared a historical site. In 2011, Gyaros and the surrounding marine area were declared European Natura 2000 Network sites.



Scheme 1. Gyaros and surrounding islands (% employment in fishing). Source: [45].



Its coastal waters are fished, despite Ministerial Decision 5278/39B/22–01–1979, which bans all fishing activities around the island—without, however, defining explicit boundaries. Since 2014, there has been an explicit ban on fishing activity within a radius of three nautical miles around the island. The marine area around the island is of great ecological importance, as it hosts several species and habitats of particular ecological importance for the conservation of biodiversity in the Mediterranean. The whole site is of the utmost importance for the survival of the critically endangered Mediterranean monk seal. Due to its history and biodiversity, it is acknowledged by the Greek state as being of historic, cultural, and ecological value. At present, Gyaros belongs administratively to Ano Syros, a Municipal Unit on Syros Island. It is currently uninhabited, and there are no roads or other infrastructure on the island, apart from a few abandoned houses and prison settlements on its east coast.

In 2010, several environmental NGOs (WWF Greece, Mom, Tethys Research Institute) joined forces to develop an initiative for the long-term conservation of Gyaros. By 2013, the Cyclades LIFE project was funded and seeking to establish an ecosystem management plan, designed by Gyaros Co-management Committee (GCC) (see [www.cycladeslife.gr](http://www.cycladeslife.gr), accessed 20 August 2022), around the Natura site of Gyaros. The expressed aim of this committee was to help its members take joint decisions about measures to be implemented around the island of Gyaros, simultaneously taking into account the need to protect both the natural and marine environment and the activities that take place in that environment; the committee would then jointly develop those measures. The expected outcome was the establishment of an MPA on Gyaros through the participation on equal terms of all the stakeholders involved [48].

### 3.3. The Socioeconomics of Areas Adjacent to the Protected Area: Syros and Andros

Although the research sites, Syros and Andros, belong to the same group of islands (the Cyclades—whose name is derived from the Greek word for “circle”), they vary significantly in terms of their population dynamics and socioeconomic characteristics. In terms of population, Syros (with 21,475 inhabitants) is one of the most densely populated areas in the Cyclades, while Andros (with 9128 inhabitants) is ranked among the group’s most sparsely populated areas. Both study areas have gained significant human capital due to population inflows in recent decades, both internal and international migration flows. Generally speaking, internal migrants have higher educational attainment than the indigenous population and contribute to the strengthening of the local society and economy [49]. Moreover, there is a significant seasonal variation in the population of the two islands: in fact, the population of Andros is estimated to quadruple during the summer, which increases the pressure on the use of the island’s resources.

Besides tourism, agriculture, and fisheries, considered as core economic activities in both areas, Syros’ Neorion was one of the oldest naval shipyards in Greece, while Andros has a long shipping history. The contribution of fisheries to the local economies of the study areas is low in comparison to other sectors. However, the historical and cultural context in which fishing activities are situated is important. Both professional and amateur fishers are crucial for the management of the coastal areas and marine resources of both islands, while fisheries have economic links to other sectors of the local economy, such as tourism. Moreover, due to the economic recession, more people have become involved in amateur fishing in recent years. In fact, as we shall see in the analysis, employment in fisheries provided a labour buffer and safety net during the economic downturn, a period in which other economic activities shrank [50]. This has often led to antagonism and disputes between professional fishers and recreational fishers in the area.

Essentially, fishing is carried out by 76 fishing vessels registered on Syros plus another 60 on Andros; the vessels on both islands are mostly small-scale. In terms of manpower, the islands have 83 and 65 fishers, respectively, with professional permits; nearly all of them are inshore fishers. Based on the data from the recreational fishing licences that have been issued, there are 845 recreational fishers on Syros and 275 on Andros. This means

that recreational fishers represent about 4% of the population of Syros and 3% of Andros. However, there are estimates which raise the number of recreational fishers to 2000 on Syros and 300 on Andros. Most of them have small fishing vessels equipped with tools and electronic devices which facilitate their fishing activities.

Based on the sample data from the recent survey conducted in 2017, we sought to research three population groups: professional fishers (20.8%), recreational fishers (31.2%), and the local population (48.2%) (professional fishers and recreational fishers are over-represented in the population sample due to the need to focus on their attitudes and perceptions on various issues). The sample of the population from the two areas was halved (119 respondents on Syros, 126 on Andros) to produce the following breakdown: (a) on Syros, professional fishers constitute 21%, recreational fishers 29%, and the local population 50% of the sample; (b) on Andros, professionals make up 20%, recreational fishers 33%, and the local population 47%. Therefore, about half of the respondents per area are related to fishing activity either professionally or recreationally.

## 4. Results

### 4.1. Fishing Activity and Fisher Groups in the Two Study Areas

The analysis of the sociodemographic characteristics of the respondents in both study areas has shown that the professional and recreational fishers of Syros are older than their counterparts on Andros, while all the respondents on Syros are significantly older than those on Andros. Moreover, while the educational profile of all the professional fishers is rather low, professional fishers on Andros reveal a somewhat higher educational profile than their counterparts on Syros. This is reflected in their views and attitudes regarding environmental protection. Equally importantly, the educational profile of recreational fishers is higher than professional fishers in both areas.

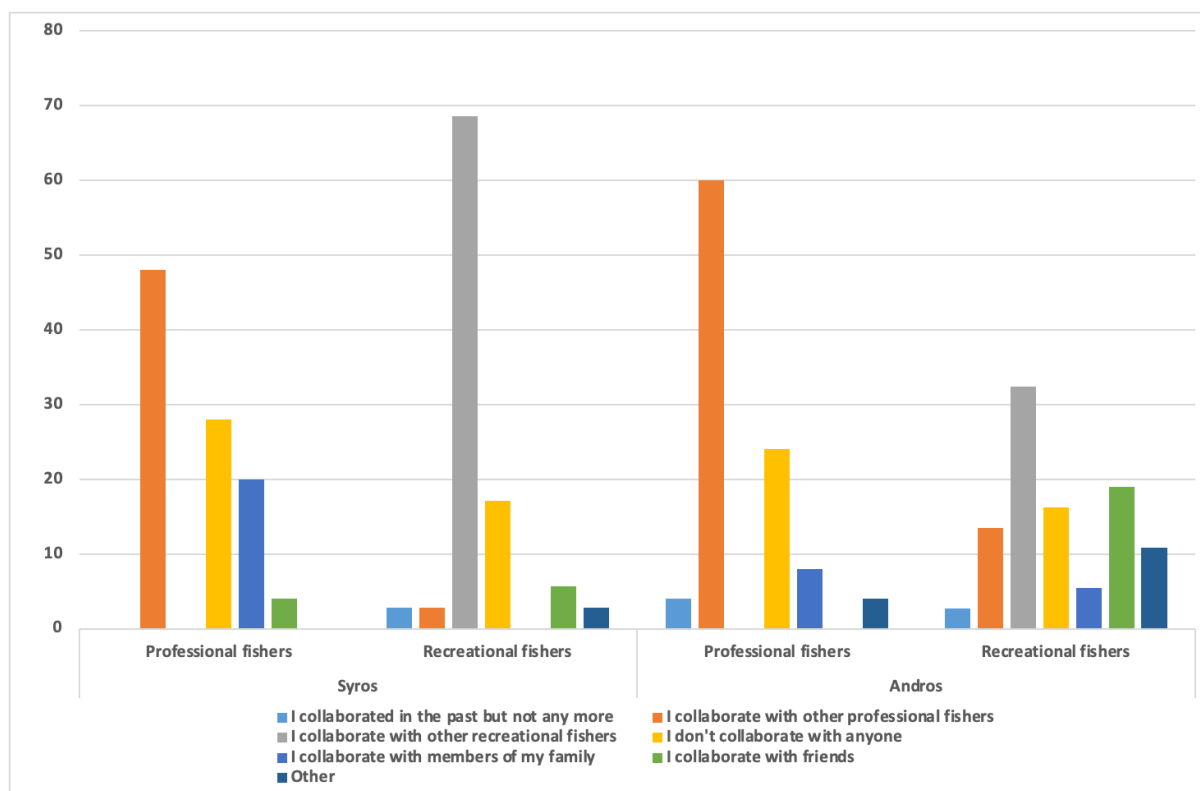
Most of the professional and recreational fishers have small fishing boats, which they tend to own. Many professional fishers have boats which are over seven metres long with medium to high horsepower. In contrast, most recreational fishers own relatively smaller boats, under seven metres in length, but with a relatively high horsepower. The powerful engines are a way of dealing with bad weather conditions and allow the fishers to arrive at the fishing fields faster. Moreover, a large proportion of fishers have shifted their fishing fields in recent years to obtain larger and/or higher quality catches, which will earn them better prices at the fish market. Establishing a protected area around Gyaros Island has impacted the fishers' selection of fishing fields in the last couple of years, creating antagonism between professional and recreational fishers.

Most professional fishers sell the fish they catch themselves, putting them in a position to secure better prices; the seasonality of the demand for fish affects which marketing networks they choose to sell their fish through. During the economic downturn, fishers tried to increase their income by selling their catches themselves, establishing and expanding both their formal and informal/interpersonal networks. This was evident in both areas, although on Andros the comparatively smaller size of the local market and its seasonality create additional avenues. In both areas, there is an inherent contradiction in fishers being unable to respond to market demand in peak seasons but being unable to promote their catch during low-demand seasons. It would thus seem that professional fishers need to be flexible and adaptable to demand-driven seasonality if they are to secure their income by exploiting the different conditions and opportunities in different seasons.

The economic crisis led to a major fall in activity in the other key economic sectors (i.e., construction and tourism), leading a part of the local population to "return to the sea", and in particular to fishing activity, in order to supplement their income. This economic context intensified the competition between professional and recreational fishers. In fact, competition for fisheries was one of the fundamental problems facing professional fishers, along with the high cost of fishing activity and declining catches. As one professional fisher emphatically argues: "*During these times [of economic recession], and with the hardship that is going on, everything is being caught and everything is being sold. It doesn't matter if you're a*

*professional or an amateur. Even unemployed people go out to sea, catch a fish, and sell it to the highest bidder” (Interview No. 14).*

There is high participation among both professional and recreational fishers in their respective fishing associations. Despite their significant participation in various events and mobilisations/petitions organised by their associations, when asked whether they believed their associations were effective at protecting their interests, many professional fishers revealed significant scepticism. Cooperation and trust among peers seem to be more limited among professional fishers than among recreational fishers. Professional fishers tend to cooperate with other professionals (48% on Syros, 60% on Andros) or with other members of their family (20% on Syros, 8% on Andros). Nevertheless, about one in four professional fishers in both areas state that they do not cooperate with anyone (28% on Syros, 24% on Andros). Recreational fishers, on the other hand, usually cooperate with other colleagues (69% on Syros and 32% on Andros) or with friends (6% on Syros and 19% on Andros) and to a lesser extent with professional fishers (3% on Syros and 14% on Andros). Among recreational fishers, there is a significant percentage who say they cooperate with no one (17% on Syros and 16% on Andros), but this percentage is lower than it is for professional fishers (Figure 1).



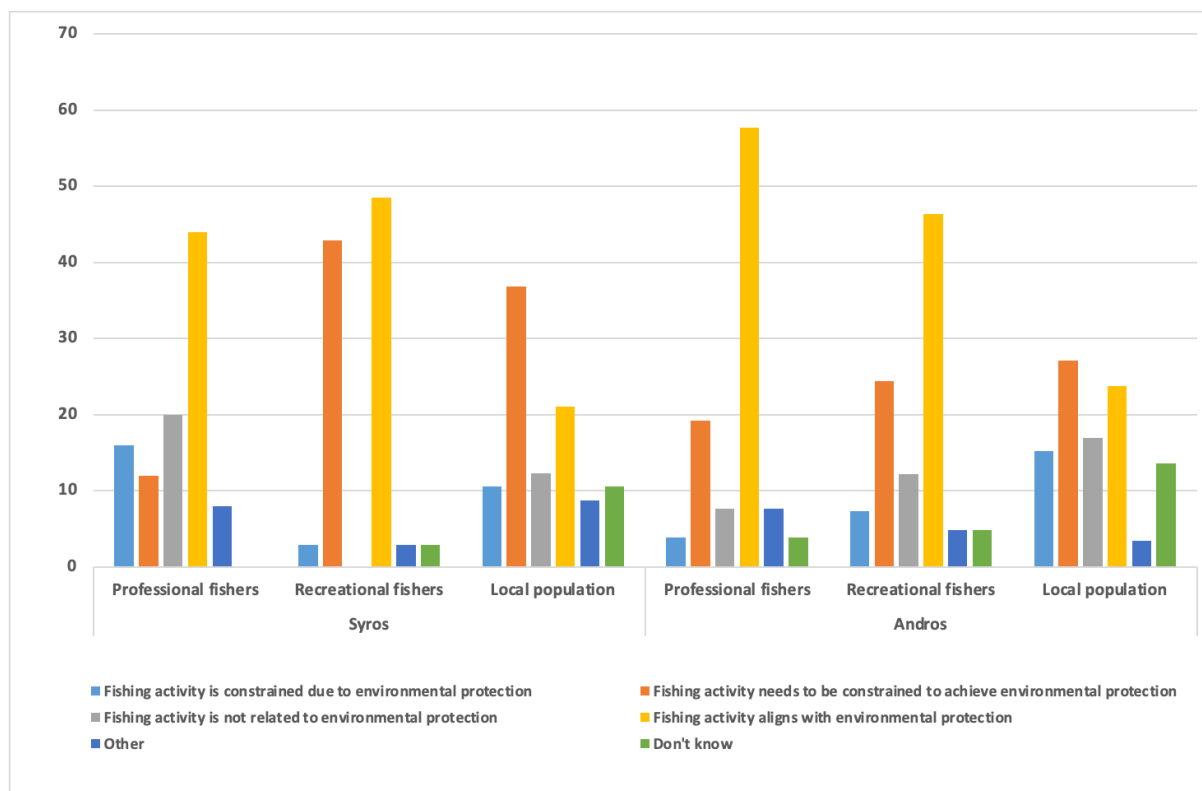
**Figure 1.** Collaboration among professional and recreational fishers and across fisher groups (in percentages).

However, knowledge about fisheries is passed down from generation to generation and from family to family. In fact, many respondents emphasised the fact that they were “born and raised” in fishing boats, making use of the tacit/lay knowledge learned by and from previous generations: “*I was born in sea. I was at sea since I was little. I just liked it and my best man is a fisher too. I have worked with him for many years. He is much younger than me, but he was ‘born in a boat’. His mother and father, his great-grandfather (they are fishers) he was born for this job*” (Interview No. 32). Yet, despite the problems that are clearly facing the fishing sector, it is abundantly clear that most professional fishers will continue with their

fishing activities. For many in both research areas, apart from providing an income, fishing is a way of life that is intricately bound up with their daily lives.

#### 4.2. Fisheries and Environmental Protection Amidst the Crisis

The three population groups (local residents, professional and recreational fishers) have different views about the relationship between environmental protection and fisheries. In general, professional fishers in both areas show a positive attitude towards the environment, though less positive than the local population. Moreover, as expected, the local population and recreational fishers seemed more ready than professional fishers to accept restrictions on fishing activities designed to protect the environment. Specifically, more than one-third of the local population on Syros believed that fishing activity should be restricted to protect the environment (37%), while on Andros this figure drops to 27%. As expected, fewer (only 12%) professional fishers share this view on Syros, while on Andros about one-fifth of professional fishers did so. However, a significant proportion of the respondents in both areas agreed with the view that fishing activity goes hand in hand with environmental protection (34% on Syros, 38% on Andros). This view is echoed by professional fishers (44% on Syros, 58% on Andros) and recreational fishers (49% on Syros, 46% on Andros) in both areas, while the local population does not seem to share this view. Thus, professional and recreational fishers seem to share the view that fishing accords with environmental protection, while the local population seems to more often support the view that fishing should be restricted. Furthermore, the attitudes of recreational fishers and the local population favour the implementation of structural measures for fisheries, combined with environmental protection and the conservation of natural resources. The view that fisheries should be brought into line with environmental protection seems to have gradually become widespread (Figure 2).



**Figure 2.** Fishing activity and the environment (in percentages).

Due to their higher levels of education and income, recreational fishers in both study areas have a broader perspective, reveal greater sensitivity to environmental issues, and

are more conscious of the need to implement structural measures for fisheries. On the other hand, the local population also supports the institutionalisation of structural measures for fisheries and fishers, while they are convinced that environmental rules should be respected, pollution reduced, and fisheries restricted to protect the environment.

The protection of the Mediterranean monk seal is emerging as the main bone of contention between environmental organisations and fishers. The study of the qualitative material shows a conflict between the different stakeholders, environmental NGOs, and professional and recreational fishers over environmental resources. In the narratives of professional and recreational fishers, the monk seal assumes anthropomorphic features, becoming the clever “beast” that hangs around and “steals” their catch. According to the fishers, the monk seal causes income loss due to lost catches, damaged gear, and time spent repairing gear rather than fishing. In addition, the monk seal is seen as a competitor for natural resources, particularly in periods when catches are low.

In this sense, the survival of fishers is threatened by the increased protection of the monk seal by environmental NGOs and the authorities. The following quotes vividly show the anxiety of fishers for their future survival:

*“The monk seal has destroyed me. We are fighting tooth and nail because you cannot keep buying new [fishing gear] and we are trying to fish with the gear [destroyed by the monk seal]. How am I supposed to survive? ( . . . ) They say to protect the monk seal, to protect the dolphins ( . . . ) those who are dealing with this [conservation measures] have no idea what is going on. ( . . . ) They said that we [fishers] would kill monk seals and things like that. ( . . . ) We cannot do that”. (Interview No. 32)*

*“However, for fishermen with greater fishing capacity than coastal fishermen, seal-fisher catch competition is not perceived as a problem. In this respect, a professional fisher argues. Not for us [the seal is not a problem]. But it crushed the others [the small-scale ones]. The fish gets caught in the net and the seal takes it, ( . . . ) For us it is not a problem”. (Interview No. 35)*

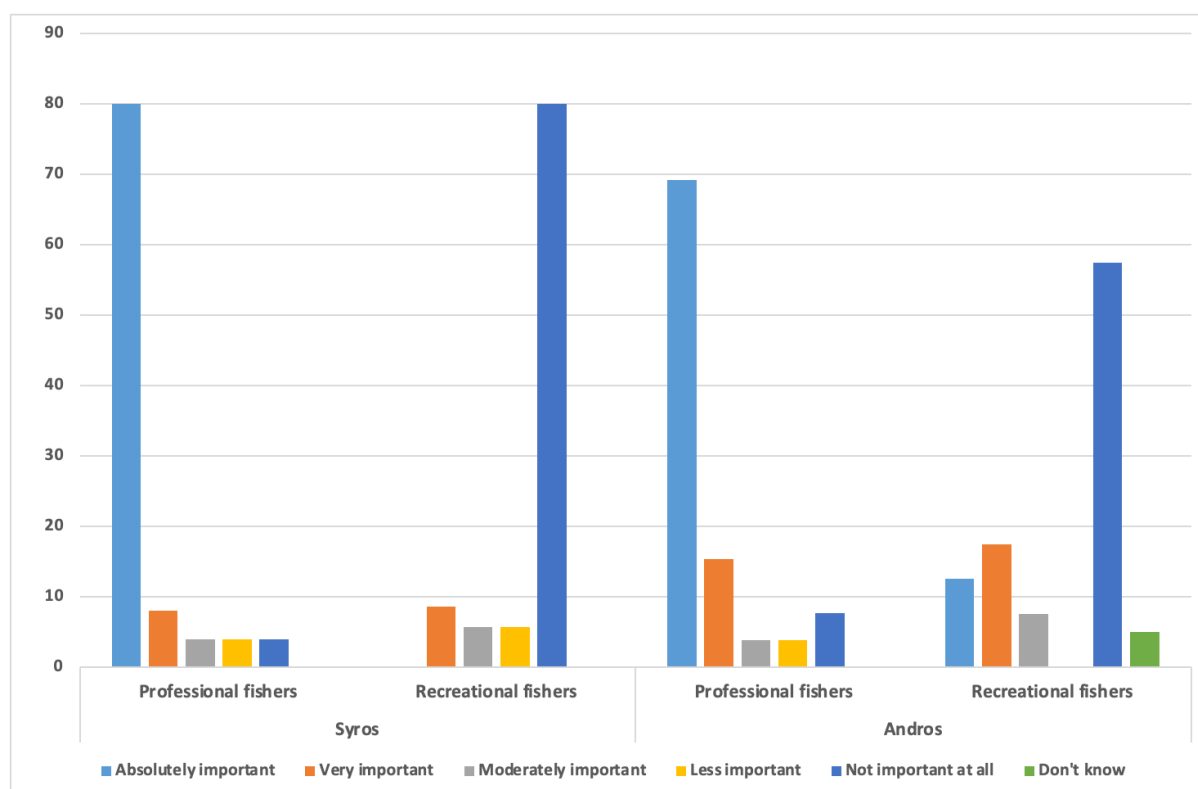
Professional fishers, who consider the Mediterranean seal to be a very important problem, have communicated this problem to other population groups but overstated the problem (Figure 3). This issue requires particular attention and needs to be highlighted and discussed with a view to collecting evidence which can be provided to interested parties, while also helping fishers whose gear is damaged by the Mediterranean monk seal to secure compensation. The dilemma represented by the choice between protecting the monk seal and safeguarding and supporting the livelihood of fishers has often proved contentious at meetings of the Gyaros Co-management Committee [48].

In the focus group discussions, the need for environmental protection was acknowledged, but more importance is attached to the protection of the monk seal rather than balancing broader environmental protection with safeguarding small-scale fisheries and the protection of endangered species. A professional fisher explains:

*“At the end of the day, every action that happens [in the MPA] is for the monk seal. Ok, we agree, ok, it is nice and pleasant, but at the end of the day this is not a marine protected area, it is a marine park for the monk seal” (Focus Group III)*

Eventually, a middle way was pursued: assuring the fishers that state support will be used to compensate them for the damage they sustain from the monk seal.





**Figure 3.** How important is the presence of monk seals for fishing in the two study areas (in percentages)?

#### 4.3. Perceptions and Views on Gyaros and the MPA

The history of Gyaros is imprinted on the memory of the populations of Syros and Andros. “It’s an island of pain. I mean you can feel it when you are there” (Interview No. 32). Professional and recreational fishers are more likely to have visited Gyaros, probably for fishing, in the past. When asked, all the respondents agree that the island is a “place of historical memory” (Figures 4 and 5). However, apart from this view, perceptions about Gyaros differ between population groups. In general, professional fishers emphasise that the island demarcates a fishing area and a protected area, whereas recreational fishers and the local population argue that Gyaros is an abandoned place that needs to be utilised more effectively. From the angle of professional fishers seeking their share of the island’s “treasures”, Gyaros is “the pot of gold at the end of the rainbow”:

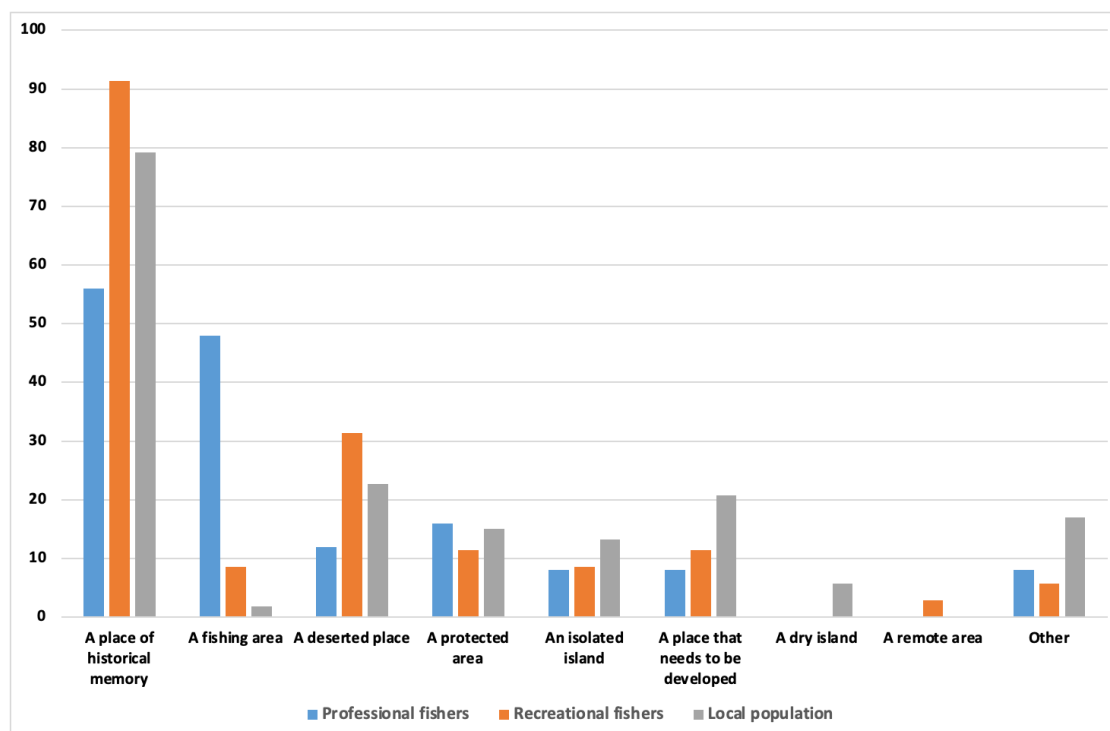
*“I am for protection, not exclusion. ( . . . ). It is one thing to protect and another to do nothing. [Look] what happened to Gyaros. It is an uninhabited island. ( . . . ) But where do we [fishers] end up going? Where shall we go fishing? ( . . . ) Gyaros has always been a place for fishing, nothing else”. (Interview No. 35)*

Gyaros is ultimately portrayed as a common resource that is seen as underused and unused by most of the respondents. At the same time, many “users” are portrayed as willing to exploit it to the fullest, without considering the “consequences”, as there are no residents on the island, only flora and fauna. At the same time, Gyaros is a place associated with isolation and exile, with strong emotions imprinted in the collective memory of the residents.

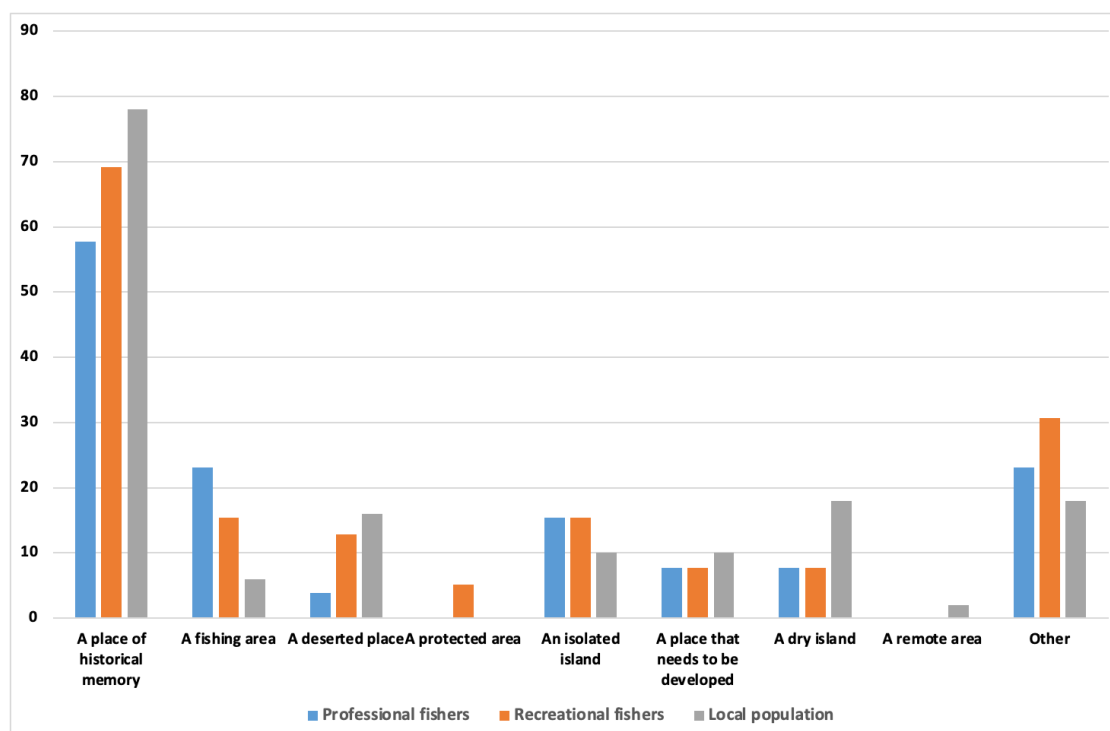
A more pragmatist view about the valorisation of the island is expressed by a local government official who considered the island as a place for eco-friendly investments with recompensating benefits:

*Gyaros is an important monument. I think you should bear in mind that within the framework of this programme for the use of renewable energy sources in Gyaros, the*

*restoration of the monument is also planned, a rewarding project. Surely, this is positive in my view (Interview No. 5)*



**Figure 4.** Perception of Gyaros per group of respondents on Syros (in percentages).



**Figure 5.** Perception of Gyaros per group of respondents on Andros (in percentages).

When asked what provisions should be made for Gyaros in the future, the three population groups have different attitudes within each region. On Syros, the views expressed

by the three population groups align, probably in a stereotypical way—they argue that Gyaros should become an open museum (43% of professional fishers, 77% of recreational fishers, 62% of the local population). In addition, professional fishers argue that fishing on the island should be permitted (48%). While 13% say it should be used for tourism, with the relevant infrastructure constructed, only 9% believe the area should be safeguarded as a protected area. The recreational fishers of Syros consider Gyaros as a place for tourism (23%), and more particularly maritime tourism (23%), while some would like to see it become a protected area (23%). On the other hand, on Andros, the local population believes that Gyaros could be turned into a protected area (32%) or exploited touristically in the context of maritime tourism (28%) or through hotel construction (18%). It is interesting to compare the ways in which views and attitudes towards the establishment of the protected areas have shifted since 2014 on Syros: the percentage of respondents of all three population groups who propose that Gyaros should be established as a protected area has increased. However, due to the economic recession, a good number of residents see Gyaros as an opportunity for economic development. Meanwhile, the residents of Andros do not see any links between the economic development of their island and Gyaros, due to the geographical distance of their daily lives from the island and the difficult access to Gyaros.

## 5. Discussion and Conclusions

This paper has critically examined the social and geographical aspects of marine resource management using the MPA on Gyaros Island as an example. It also confirms the need to combine the social, economic, cultural, environmental, historical, and geographical aspects of the use, perception, and management of marine resources by different stakeholders. The peculiarity of Gyaros is that it remains a marine and cultural landscape characterised by human absence, as the island has been uninhabited for many decades [47]. Therefore, any intervention must strike a balance between the conservation of the natural habitat and human activities. As marine management involves both spatial and socio-economic approaches [51], the success of the MPA on Gyaros seems to depend on the extent to which stakeholders engage and participate in its operation. It has become increasingly evident that social factors are crucial for the success of MPAs [52,53].

Despite the inherent shortcomings in marine conservation planning strategies and the implementation of MPAs, it is of utmost importance to incorporate the available scientific knowledge—i.e., scientific, expert, lay, and local knowledge—to take into account the specificities of the protected area and to ensure that stakeholders are truly involved in the organisation and operation of the MPA. The compilation of baseline information makes it possible to assess the effectiveness and sustainability of co-management strategies. Compiling multiple uses of marine resources and incorporating traditional fisheries into the MPA structure can benefit conservation objectives by fostering stakeholder support [54]. In addition to ensuring the feasibility of the conservation objectives of an MPA, it is crucial to address the vulnerability of fishers' livelihoods. As fishers' vulnerability is a complex reality, it is important to identify the many factors that contribute to their vulnerability. These factors include some tangible ones such as competing uses of marine space, global climate change, and market shifts, but also others that are less tangible such as governance structures, the potential for institutional change, social capital, global market forces, and natural resource management and policy regimes [52].

Placing the perspective of different users and the community at the centre of any co-management system inevitably raises questions of rights, power relations, and justice in relation to who can use marine resources and whose claims the co-management system takes into account. It is not uncommon for decisions and environmental protection measures to be proposed or even imposed from above or by non-local actors, which can undermine the legitimacy of the project. Empowering and involving all stakeholders engaged in marine resource management, as well as local communities, can help ensure that a management scheme is implemented successfully and sustainably. Similarly, building bridges between local economic development and environmental protection, as well as building

relationships of trust and cooperation between local and non-local actors, can strengthen the acceptance of environmental measures. The latter is particularly important for local island communities where various economic activities may initially seem incompatible with the protection of common resources.

The general trend is that fishing activity is gradually declining, although it remains important for the management of marine resources. There are different population groups and stakeholders on both islands who put forward various arguments for the establishment of an MPA on Gyaros. Users and stakeholders include local island communities, environmental NGOs, professional fishers, and recreational fishers. The different stakeholders have different perceptions, views, and attitudes towards fisheries (cf. [55]) and therefore tend to support different measures and/or activities for conserving the marine “commons”. For the local population of Syros, Gyaros is first and foremost an island that is embedded in their social memory as a place of torture and pain and should either be used for tourism or turned into an open-air museum. For environmental NGOs, the island remains a place of biodiversity that needs to be protected through specific policies. Fishers take a contrary view, believing that a MPA on Gyaros would put their income at risk, especially in the harsh economic environment created by the economic recession.

The successful establishment of a MPA requires that all users agree to and respect the terms of the MPA [56]. In 2019, the Hellenic Ministry of Environment issued a Ministerial Decision to establish Gyaros as an MPA in line with the proposals of the Gyaros Co-management Committee. Ensuring sustainability in the long term requires proper management of fish stocks and effective long-term participation of affected communities. The main objective of the Gyaros Co-management Committee, launched in 2016, was to enable its members to jointly develop and decide on the measures to be implemented in relation to the island’s marine environment by simultaneously addressing the conservation of the natural and marine environment and the provision of mild socioeconomic interventions. This committee included representatives from fifteen stakeholders: three ministries, three NGOs, six regional/local authorities, one research centre, and two local fishers’ associations (see also [48]). The NGOs, who are heavily involved in the committee, and the public authorities, who can facilitate the institutional structure and functioning of the MPA, contributed a lot to the dynamics of the committee. The regional and local stakeholders, on the other hand, seemed to have less potential for engaging in the work of the committee. The fishers’ associations played an important role, although they hardly limit their activities around Gyaros island and are sceptical about the effectiveness of the conservation measures.

In March 2020, the National Framework for the Protection of the Marine Environment questioned the sustainability and legitimacy of the co-management system in the area. In just a few days in September 2022, efforts to protect the environment and conserve marine life fell like a tower of cards. A decision by the Ministry of Environment was enough to jeopardise these efforts, as the licence requirement for fishing in the zone around Gyaros Island was lifted: fishing boats from all over the Aegean, from Athens to Kalymnos, rushed into the area in an attempt to catch the maximum amount of fish. This development was seen as a plea for stricter protection of the country’s few marine protected areas so that such a successful experiment can be sustainable (*Kathimerini* newspaper 8 September 2022, <https://www.kathimerini.gr/society/562030546/gyaros-prospatheies-pente-eton-chathikan-se-liges-imeres/>, accessed on 3 October 2022). In this context, the Ministry of Environment reinstated the environmental protection status of Gyaros until July 2024 and banned fishing in the protected zone (*Kathimerini* newspaper 13 September 2022, <https://www.kathimerini.gr/society/562042000/katholiki-apagoreysi-tis-alieias-sti-gyargia-ta-epomena-dyo-chronia/>, accessed on 28 October 2022). The decisions of the Ministry of Environment to lift and reintroduce the licence requirement for fishing in the zone around Gyaros island, in our opinion, require attention and should be followed closely. In any case, further research on the long-term sustainability of the Gyaros MPA is needed.

In our view, however, more attention needs to be paid to striking a balance between local economic development and environmental protection, as well as cooperation and synergies between different stakeholders. This implies providing for equal participation in the involvement of local and non-local stakeholders in the management of protected areas. Resolving conflicts over the use and conservation of the marine environment remains a major challenge for MPAs and their co-management committees.

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