



Study on the Economic Benefits of MPAs

Final Report

Written by ICF Consulting Services Limited, in association with IEEP and PML

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1 Introduction

The European Commission contracted ICF, IEEP, PML and partners to undertake a review of the economic benefits of marine protected areas (MPAs) and other spatial protection measures (SPMs)¹ (henceforth collectively referred to as MPAs unless specifically referring to SPMs). The study sought to compile an extensive evidence base on the benefits of MPAs to blue economy sectors, and to identify the role and best practices of measures taken to ensure that benefits are realised, maximised and compatible with MPA conservation objectives.

This is the study's final report. It provides a synthesis of evidence, from three research tasks undertaken during 2017. Three separate stand-alone technical reports present the detailed findings of the three research tasks. In addition, an abridged version of this final report is available.

1.1 Context

1.1.1 The Blue Economy

Economic activity in Europe's seas supports some 5.4 million jobs and a gross value added of just under €500 billion per year (European Commission, 2012). This 'blue economy' includes sectors such as fisheries, aquaculture, tourism, shipping, marine mining and biotechnology, ocean renewable energy, aquatic products, and offshore oil and gas, among others.

The European Commission's Blue Growth Strategy suggests that the blue economy offers 'new and innovative ways' of supporting international competitiveness, resource efficiency, job creation, and economic growth. The Strategy emphasises economic growth, but also recognises the need to minimise environmental impacts and to protect the marine environment and the ecosystem services that it provides.

1.1.2 The marine environment and marine protected areas

Marine ecosystems and biodiversity are declining across the EU (European Commission, 2015a). Loss of biodiversity directly impacts the carrying capacity and resilience of marine ecosystems. This jeopardises the ability of marine ecosystems to support healthy flora and fauna and to provide the variety of ecosystem services that support coastal livelihoods, whether through fishing, aquaculture, tourism, or other activities. The consequences for continued socioeconomic progress are therefore direct and serious.

Various EU commitments (internal and international e.g. on the Natura 2000 network) envision a major role for MPAs as a method for reducing anthropogenic impacts, maintaining and improving biodiversity and building ecosystem resilience. Other SPMs, such as temporary or permanent fisheries closures and restricted access areas around marine infrastructure, may also provide conservation benefits. The creation of MPAs and SPMs is a tool available to Member States to support the achievement of good environmental status in their marine waters under the Marine Strategy Framework Directive (Directive 2008/56/EC).

The Aichi Biodiversity Target 11 under the Convention on Biological Diversity (CBD) requires 10% of marine and coastal areas, and especially those areas of particular importance for biodiversity and ecosystem services, to be conserved through effective MPAs or "other effective area-based conservation measures". In 2016, MPAs covered 10.8%² (624,971 km²) of the EU's total marine surface area, up from 5.9% in 2012 (Agnesi et al, 2017). In addition, 6.5 million km² of EU Overseas marine territory is under protection (IUCN, 2017). Nevertheless, more MPAs and other area-based conservation measures (which might include some types of SPMs) are expected, and many recently designated MPAs do not yet have management rules established.

¹ See Section 1.3.2 for definitions.

² Of which 7% is from Natura 2000 sites

1.1.3 The blue economy and MPAs

Expansion of blue economy sectors and the drive towards greater protection of the marine environment will both drive increased demand for marine space. In the EU, this should be managed in particular through the Maritime Spatial Planning Directive (2014/89), the overarching spatial framework for the coherent management of all maritime economic activities and MPAs in EU waters. Maritime spatial plans have to be established as soon as possible, and at the latest by 31 March 2021.

A concern sometimes raised about MPAs, and to a lesser extent SPMs, is that they may constrain economic activity, adding costs to businesses and restricting opportunities for growth and jobs – even for industries that may benefit from improved marine biodiversity and environmental conditions. This is despite the majority of European MPAs allowing many economic activities to continue to operate, subject to certain conditions, within their boundaries (for example see guidance documents on managing economic activities in Natura 2000 site³).

While the initial economic costs of MPAs and SPMs may outweigh the economic benefits, viewed over the long-term, MPAs and SPMs may make an important contribution to the growth of a greener blue economy – one that places the conservation of marine resources and the development of innovative and clean industry at its heart. To plan and manage for this and to maximise the flow of potential benefits (to the environment, the blue economy and society more generally) the linkages between maritime sectors and these potential benefits need to be better understood, including how the design and management of MPAs and SPMs can help facilitate their realisation. Failure to do so may impede efforts to conserve and improve the marine environment and instead contribute to the continued degradation of marine ecosystems, placing at risk blue economy objectives, economic growth, and the wider benefits obtained through marine ecosystem services.

1.2 Study objectives

The main objective of this study was to evaluate how MPAs and SPMs provide economic benefits to blue economy sectors, to inform future debate and decisions on marine management at EU level and identify further research needs. It specifically considered all blue economy sectors, not just those such as tourism that are commonly thought to benefit. It thereby seeks to build on existing evidence by broadening the potential scope of economic benefits considered, and filling evidence gaps identified, by previous syntheses and analyses (e.g. Russi et al, 2016; Mangos and Claudot, 2013).

The sub-objectives were to identify evidence and critically analyse studies that:

- Have undertaken a full cost-benefit analysis (CBA) for MPAs and SPMs.
- Examine how MPAs and SPMs are, or can be, sustainably used.
- Assess overlaps, conflicts or mutual reinforcement between blue economy sectors which are linked to MPAs and SPMs.
- Address conflict resolution, engagement with stakeholders and governance.
- Collate and synthesise research and known case studies about 'de facto' refuges.

1.3 Study scope

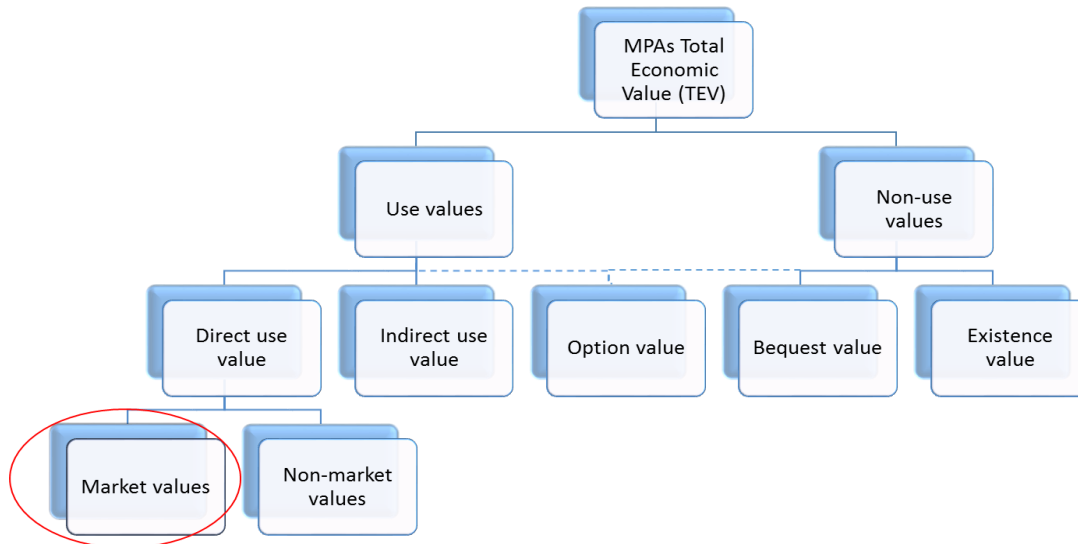
1.3.1 Economic benefits

The focus of this study was on economic benefits that occur through the real economy (i.e. benefits with a market value) indicated by changes in, for example, economic output, revenue, profits and employment in blue economy sectors. Broader local

³ Available at: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

economy and community benefits associated with such economic benefits are relevant, but were of secondary importance. Other types of benefit supported by MPAs, such as non-market use values⁴, indirect use values⁵ and non-use values⁶ were not the main focus and are only briefly referred to (see Figure 1).

Figure 1. The scope of total economic value covered by the study



Ecosystem services are recognised as a broader narrative and context to the study, but are included only where they result in benefits in the real economy as market values. Further, ecosystem services are recognised as just one of the routes through which MPAs may provide real economy market benefits.

In this way the study seeks to provide greater insights into market values, and complement other evidence reviews that have focussed on a broad range of economic values and ecosystem services (e.g. Russi et al, 2016; OECD, 2017); as well as earlier research that focussed more on terrestrial protected areas than MPAs (e.g. ten Brink et al, 2010). It also complements broader studies and initiatives on delivering effective MPAs, MPA networks and conservation objectives (e.g. those promoted by the European Commission⁷, Regional Sea Conventions and organisations such as MedPAN).

The study is primarily focussed on gross benefits. Less attention is given to the extent to which these may translate into net benefits once costs are taken into account. This is partly due to the lack of existing CBAs for MPAs. In this sense, overall, the report is seeking to explore the types of economic benefits that can occur and how they occur; rather than to judge whether MPAs are providing net economic benefits. However, the limited evidence base on MPA CBAs was considered and the study case studies gave consideration to the net effects.

1.3.2 Types of protected areas

While the study title emphasises a focus on MPAs, the scope was broader than the standard definition, including also spatial protection measures that are not principally designated for conservation purposes, but from which conservation and environmental

⁴ E.g. the welfare benefits of recreating in MPAs

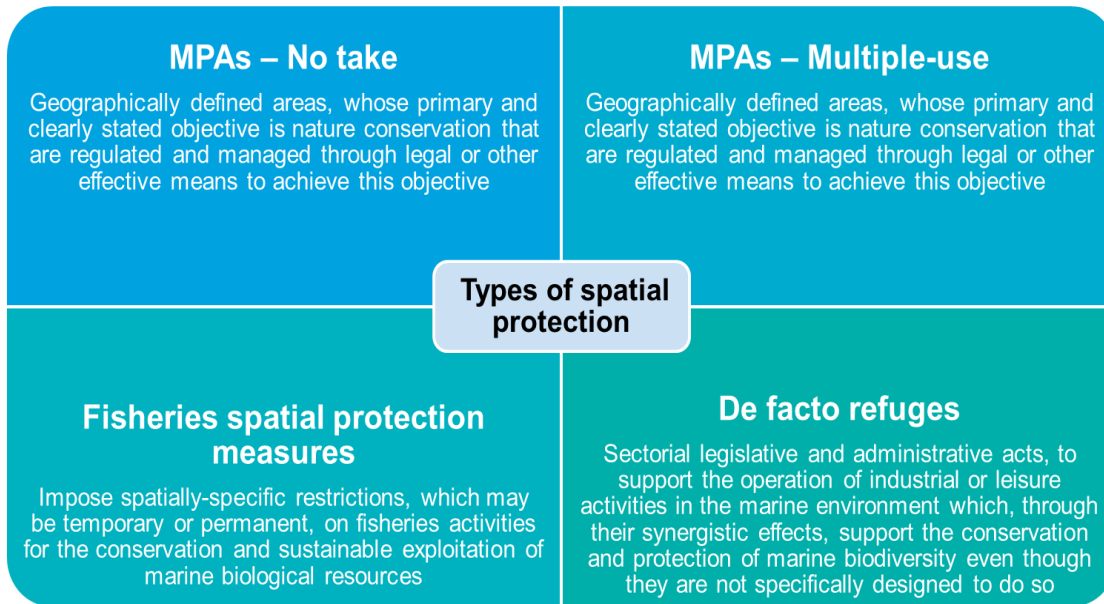
⁵ E.g. the value of carbon sequestration regulating services delivered by seagrass beds

⁶ Values attached to MPA ecosystems, features and habitats even if they do not currently or intend to use them

⁷ See http://ec.europa.eu/environment/nature/natura2000/marine/index_en.htm

protection benefits can emerge. The definitions used in this study⁸ are summarised in Figure 2 (see Technical Annexes A or B for further details).

Figure 2. Types of protected area included within the study scope



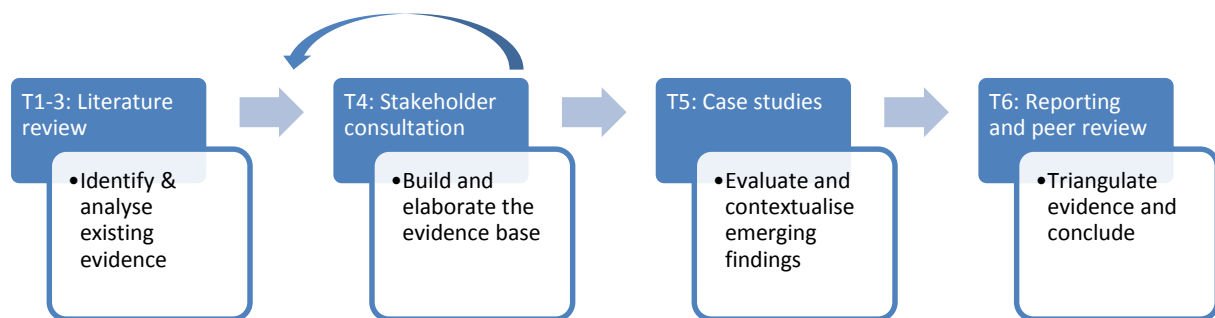
1.3.3 Geography

The study includes evidence relevant to the marine waters of the European Union and, to a lesser extent, its Outermost Regions (ORs) and Overseas Countries and Territories (OCT).

1.4 Methodology

The study consisted of three main research tasks and a final triangulation and reporting task (Figure 3). This mixed-methods approach gathered evidence from a broad range of sources, incrementally building and evaluating the evidence base. This subsection provides a summary of the study’s methodology. Further details can be found in the three Supporting Technical Annexes.

Figure 3. Study methodology



⁸ Adapted from European Commission (2015b)

1.4.1 Tasks 1 to 3 - Literature review

Tasks 1 to 3 established the existing state of knowledge across the study objectives. The review purposely focussed on **high quality, robust, ex-post economic evidence** relevant to the geographical scope of the study. Evidence which only infers economic benefits from environmental evidence was not included (or attached a lower priority). A review protocol was established, including an evidence hierarchy (Table 1).

Table 1. Evidence hierarchy

Evidence type	Quality score and prioritisation
Evidence linking blue economy benefits to MPAs and SPMs in a scientifically rigorous way ("this actually happened")	High quality evidence: main priority
Evidence-based scientific reasoning (ex-ante or ex-post) ("this has been observed, therefore it can be deduced that also...")	Medium quality: acceptable in absence of stronger evidence
Hypothesised studies without direct evidence base ("theoretically, it is expected that...")	Low quality: to be avoided

Literature was identified through keyword searches of scientific journal databases and grey literature (through internet searches), as well as via targeted gathering through study team networks and regional sea experts. Literature that satisfied the review protocol was systematically logged in an Excel spreadsheet - the final database resulted in 115 entries. A separate log of rejected studies contained 507 entries. A critical analysis of the literature was conducted using primarily descriptive narrative. A gap analysis sought to identify topical gaps, gaps in sector coverage and gaps in geographical coverage. The draft results of the literature review were submitted in June 2017. Additional literature identified during the course of the Task 4 consultations was subsequently incorporated into the finalised literature review.

1.4.2 Task 4 – Stakeholder consultation

Building upon the outputs of Tasks 1-3, Task 4 consulted with stakeholders, principally across the EU, to identify additional evidence and opinions relevant to the study objectives. The consultations provided a wider range of evidence, collecting informed views and opinions as well as practical examples.

A stakeholder inventory was created to provide an extensive contact base and a resource for consultation communications. It also informed the sampling approach for targeting the consultation tools, supporting efforts to ensure representation across sectors, organisation types and geographies.

The task deployed three research tools between April and July 2017 (see Table 2):

- Online survey: 186 usable responses from 21 EU countries.
- In-depth interviews: 62 participants from 11 EU countries.
- Workshops: over 60 participants at two study workshops⁹ and through informal engagement at an external conference¹⁰.

⁹ One workshop was conducted as a session of European Maritime Day Poole 2017, 18-19 May 2017, Poole, UK

¹⁰ Informal interviews and discussions on the side of the 'MSP for Blue Growth Conference - How to plan for a Sustainable Blue Economy?' 11-12 October 2017, Brussels, Belgium.

Table 2. Task 4 consultation tools by target stakeholder group

Target audience	Online survey	In-depth interviews	Workshops
MPA management stakeholders	✓	✓	
Blue economy stakeholders	✓	✓	✓
Institutional stakeholders	✓	✓	✓

1.4.3 Task 5: Case studies

Ten case studies were undertaken to evaluate issues identified in Tasks 1-4 in real world situations. Cases study options were identified from tasks 1 to 4, stakeholder recommendations and further research. The final ten were then agreed with the Commission. These are listed below, and the location of those in Europe shown in Figure 4:

- Kosterhavet Marine National Park (Spain)
- Wadden Sea (multiple designations) (Netherlands)
- Iroise Marine National Park (France)
- Os Miñarzos Marine Reserve of Fishing Interest (Spain)
- Parque Nacional Marítimo - Terrestre del Archipiélago de Cabrera (Spain)
- Torre Guaceto MPA (Italy)
- Egadi Islands MPA (Italy)
- Sečovlje Salina Nature Park (Slovenia)
- Artificial reef programme (Cyprus)
- Bonaire Marine Park (Bonaire, Dutch Caribbean)

The case studies were undertaken in two stages:

- Preparatory research drawing on a review of locally relevant literature and a scoping interview with the MPA/SPM manager (or other responsible body) to refine case study research questions.
- Field missions to undertake further stakeholder interviews and data collection (between September and November 2017) and preparation of a case study report.

Figure 4. Location of the study's nine European case studies



1.4.3.1 Task 6: Reporting and critical review

The final report takes a holistic view of the evidence generated to provide conclusions with regard to the study objectives. The draft report was subjected to a critical stakeholder review at a workshop on 8th February 2018 (see Annex 2 for workshop note), and the final report revised to take account of the review outcomes. Draft study findings were also presented and subject to questions at a number of conferences¹¹.

¹¹ Hattam, C. 2017. Study on the Economic Benefits of MPAs. Marine Protected Areas and recreational fisheries - sustainable management and benefits, 9 October 2017, Brussels, Belgium.

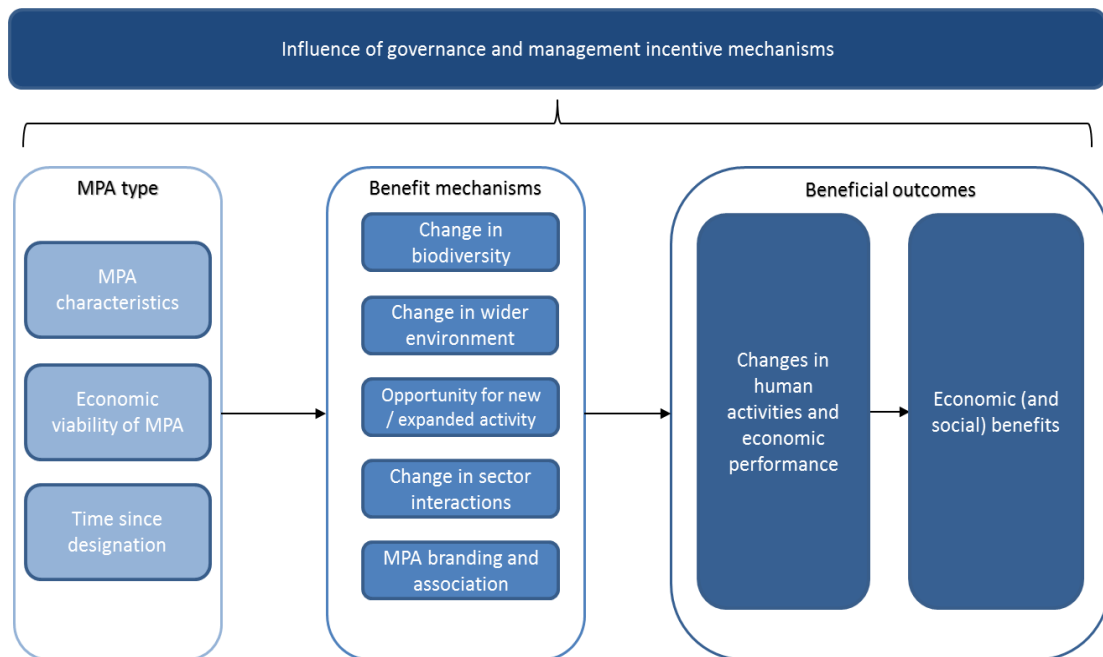
Russi, D. 2017. Socio-economic benefits of MPAs: the success story of Torre Guaceto (southern Italy). Workshop on Marine Protected Areas and Management Plants. 4-5 December 2017. Ílhavo, Portugal.

Haines, R. 2018. Blue economy benefits of MPAs and other spatial protection measures. Coastal Futures 2018, 17-18 January 2018, London, UK.

2 A framework for analysing economic benefits

A conceptual framework of how MPAs provide blue economy benefits was used to guide the research and refined as the study progressed (Figure 5). It recognises that there are a number of site specific characteristics that may influence the likelihood of benefits occurring, and that there are multiple mechanisms, or pathways, through which benefits are derived. It also recognises that effective governance and management (including enforcement) plays a critical role in defining site characteristics and enabling the flow of benefits from benefit mechanisms.

Figure 5. Conceptual framework of MPA economic benefit pathways



Source: Own representation

2.1.1.1 MPA type

The extent to which different mechanisms are likely to generate economic benefits is dependent upon a number of MPA-specific characteristics. Study evidence identified the following as important:

- MPA characteristics: including the ecology of a site, type of designation, size of the MPA, location (e.g. inshore vs. offshore) and MPA objectives and management (e.g. no-take vs multiple-use).
- Economic viability: the suitability of a site for different sectoral activities, which varies depending on a number of sector-specific factors such as water quality or market access.
- Time since designation: there is a time lag between the designation of an MPA and the receipt of economic benefits. The extent of this time lag varies depending on the above factors as well as the type of benefit mechanism(s).

2.1.1.2 Benefit mechanisms

Existing evidence on the economic benefits of MPAs, as demonstrated by this study's literature review, focuses primarily on how changes in the quality of the marine environment can support flows of ecosystem services for fisheries and tourism. The consultations and case studies, however, identified additional mechanisms and sub-mechanisms through which MPAs can support the creation of benefits, including for other sectors of the economy beyond fisheries and tourism.

It is important to recognise that individual mechanisms do not work in isolation and multiple mechanisms may be in operation in any given MPA. In many cases it is unclear which mechanism, or combination of mechanisms, produces economic benefits in a specific area. For example, it is difficult to distinguish whether the increase in visitors to an MPA is due to actual ecosystem improvements or to a change in reputation following designation.

While some mechanisms may occur as a consequence of sound MPA management (i.e. changes in biodiversity and the wider environment), others require additional intervention by some or all stakeholders (e.g. the creation of a successful MPA brand or label). Understanding the mechanisms through which sectors benefit is therefore an essential element of improving MPA management and policy to support the realisation of potential benefits.

2.1.1.3 Beneficial outcomes

Economic impact analysis typically classifies impacts into direct, indirect and induced, which combined are considered to be the total economic impact of an activity and may include both costs and benefits. This study focused mainly on beneficial impacts, and given the limited evidence available, examined principally direct benefits and to a lesser extent indirect benefits. More limited consideration was given to costs compared to benefits.

Direct benefits include positive changes at the individual businesses level resulting in increased income, revenues and employment. For example, increased visitor numbers at an MPA may directly lead to increased revenues to tourism businesses and a growth in their number of employees. Indirect benefits result from changes in the interactions between businesses with a supply chain. For example, as a recreational dive business expands as a result of increased diver numbers, the dive business may purchase another boat, more dive equipment and other goods and services from other businesses.

2.1.1.4 The role of governance

MPA governance, combined with effective management, can play an important role in bringing about behaviour change (both positive and negative), ensuring the sustainable use of MPAs, fostering the realisation of synergies and addressing stakeholder conflicts, all of which help to realise the potential economic benefits that MPAs offer. Measures used in this regard were examined and classified drawing on the incentive mechanism typology proposed by Jones et al (2011):

- Economic mechanisms: using economic approaches to promote the fulfilment of MPA objectives (e.g. branding and labelling schemes).
- Knowledge and interpretative mechanisms: drawing on all form of knowledge and educating and raising awareness of MPA stakeholders.
- Legal mechanisms: establishment and enforcement of relevant laws and regulations to encourage the achievement of MPA objectives.
- Participative mechanisms: providing for different stakeholders and interest groups to participate in and influence MPA decision-making to encourage ownership of the MPA and cooperation in the implementation of decisions and management.

3 Economic Benefits by Sector

3.1 Economic benefits for commercial fishing

The EU fishing industry has been in long-term decline, but has seen improvements in recent years. Through the Common Fisheries Policy (CFP), the EU introduced mechanisms to reduce overcapacity, protect the reproductive capacity of fish stocks, make fishing more selective and reduce the amount of by-catch and reduce the impact of fishing on the wider ecosystem. Total catch fell over the mid-1990s to mid-2000s. Since 2008, total fleet capacity has continued to fall but the economic performance of the sector has improved. Overall, profitability has increased, and the number of fish stocks being fished at rates consistent with the objective of achieving MSY has increased (European Commission, 2017).

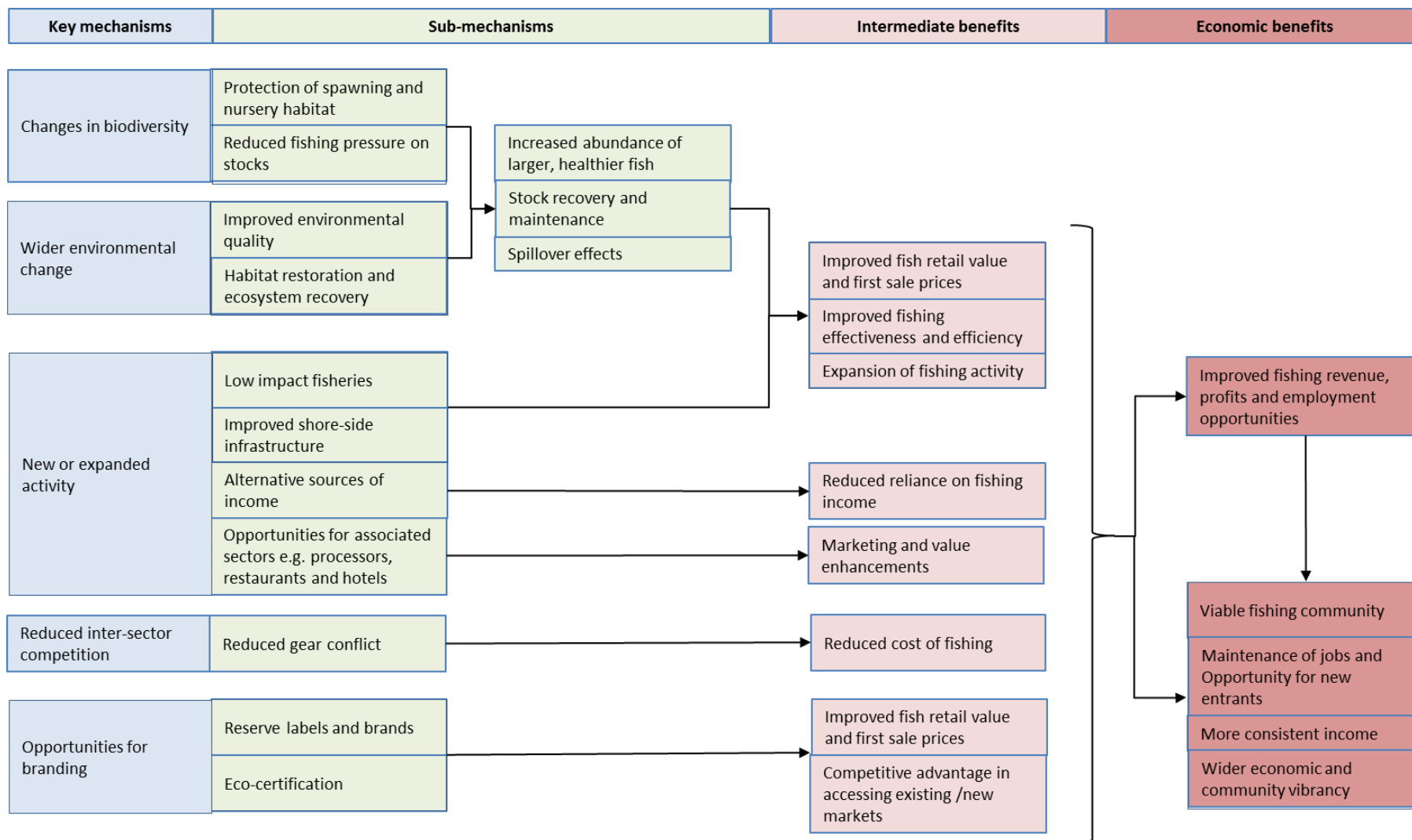
Evidence indicates that MPAs and SPMs can, under certain conditions, benefit parts of the commercial fishing sector by helping to lower production costs, improve fish stock status and provide opportunities to increase incomes. As a result, MPAs and SPMs can lead to direct benefits such as increases in revenue and jobs, and/or improvements in profitability (either via cost efficiencies or unit value improvements). There are also broader indirect benefits such as supporting fishing-based (or fishing-dominant) livelihoods and maintaining local area economies under pressure from broader sectoral decline.

These benefits, however, do not occur in all cases and are not common across all types of MPA and SPM or across all forms of fishing. Artisanal and static gear fishers appear to benefit most as mobile gear fishers, notably trawlers (including those within small-scale, inshore fleets), are often excluded from MPAs. Exclusion may result in costs for the displacement fishing vessels i.e. there are winners and losers within the sector.

The economic literature is focussed principally on illustrating how MPAs can enhance the flow of 'ecosystem services' that the sector relies on, providing benefit by enhancing the fishery resource and thereby improving fishing performance. The economic benefits of maintaining these ecosystem services against a baseline of further degradation is less well reflected in the empirical literature – but may arguably generate at least the same economic benefit. This is clearly an important mechanism, and one which has the potential to support a long term improvement in sector performance. However, a number of other MPA-related mechanisms can also support improvements in sector performance, over both the short and long term (e.g. opportunities for branding or changes in competition). There is less systematic evidence supporting the occurrence of such mechanisms – either in the literature or through stakeholder knowledge. In many cases, capitalising on these other mechanisms requires both investment and entrepreneurial activity – both issues where there can be an important supporting role for MPA management bodies.

Figure 6 summarises the economic benefit pathways for the fisheries sector. The remainder of this subsection discusses the key benefit mechanisms.

Figure 6. Fisheries sector economic benefit pathways



Source: Own representation

3.1.1 Ecosystem service improvements from changes in biodiversity and the wider environment

The most commonly cited benefit mechanism of MPAs and SPMs (including de facto refuges) – in the economic literature and in the view of online survey respondents – is that they can enhance commercially targeted fish stocks either in or outside their boundaries and thereby contribute to higher and/or better quality catches and/or reduced fishing effort-related costs, which can increase revenue and profitability.

Fundamentally, this depends on whether the MPA or SPM has an adequate influence on fishing pressure and fish habitats to allow for stock recovery, or maintenance. There are a number of factors that determine the likelihood that MPAs will deliver improvements in fish stocks (see Box 1)

Box 1. Key factors that determine the effects of MPAs (and SPMs)

The effects of MPAs on species of commercial interest depend on a number of factors. The FAO (2011) list the following as key factors determining the protective effects of MPAs on fishery resources:

- The **location of an MPA** determines what it protects, and the location of MPAs relative to each other (their connectivity) influences their networking benefits;
- The **size of an MPA**, the number of MPAs in a network and the total size of the network determine their effect. The larger the total area protected, the greater protective benefit (all else equal). However, the relative effect of a single MPA compared to a network covering the same total area is less obvious.
- The **nature of protection** measures inside the MPA. No-take zones provide greater conservation benefits than multi-use areas, but from a fisheries point of view, the role of no-take depends on, for instance, to what extent fishermen can capitalise on spillover effects.
- The **movement of organisms** in and out of the site, with less movement of a species or population out of the site, for example by low-mobility invertebrate or sedentary species, leading to greater protection benefits.
- The **activities outside the MPA** – if surrounding habitats and water quality are degraded, the effectiveness of the MPA may be undermined. Similarly, the greater the fishing pressure on stocks outside the MPA, the larger the share of the targeted stock protected inside the MPA must be to sustain the resources being fished.

The objective of an MPA or SPM is an important determinant of whether the factors listed in Box 1 will be adequately addressed. While fisheries SPMs are usually stock-specific – commonly used to target improvements in the stocks of commercially important species – per definition, MPAs are a spatial tool that focuses on delivering wider conservation objectives and foremost protect benthic ecosystems located within their boundaries. Most MPAs in Europe (e.g. the network of marine Natura 2000 sites which constitutes 70% of EU MPAs) only provide legal protection for the species and/or habitats for which the respective site has been designated (e.g. as listed in the Annexes of the EU Habitats Directive). Protection of other species, including those targeted by commercial fisheries, is mainly indirect.

A small number of MPAs and SPMs across Europe are designed specifically to enhance commercial fish and shellfish species for the benefit of fishermen. As can be anticipated, out of the ten case studies completed for this study, the two providing the clearest and most significant benefits to the commercial fishing sector had fishing sector benefits as primary objectives (see Box 2). However there is also evidence of benefits occurring, under certain conditions, as a result of management imposed in MPAs purely for conservation purposes.

Box 2. The effects of MPAs may be enhanced when designed expressly for commercial fishing sector benefit – case studies of Torre Guaceto and Os Miñarzos

In Torre Guaceto MPA (Italy) and Os Miñarzos Marine Reserve of Fishing Interest (Spain) the MPAs were demonstrated to have supported stock improvements for a number of species and resulted in fishermen benefitting economically, mainly through increased catch per unit effort (CPUE). This led to catches increasing by well over 100% for some species. In some instances fishermen also benefited as the individual specimens being landed were larger than before the MPA, and hence fetch a higher price in markets. In Torre Guaceto it has been calculated that the average income of a fishing day with a 1000 trammel net is around €140/day inside the MPA compared to €70/day nearby outside the MPA.

A majority of the economic evidence focuses on relatively low mobility species and static gear / artisanal fishing. **There is little evidence for more mobile species and dispersed fisheries, and industrial and mobile gear fishing.** Some study workshop consultees suggested that individual MPAs are often too small and unconnected to have any meaningful effect on more mobile species (in part as they are not designed with commercial species benefits in mind).

Whilst there are a number of large fishery SPMs that have been established to enhance mobile species for commercial gain, there is a lack of economic evidence of their impacts. Anecdotal evidence from stakeholder consultations indicates that they can be effective in some cases - fisheries SPMs in the Barents Sea are reported to have helped cod stock recovery and contributed to recent increases in quotas (and hence economic performance). Demonstrating effectiveness can be hampered in larger or more complex fisheries when multiple fisheries management measures (not just spatial measures) are used to target stock recovery (see Box 3). Such attribution challenges may in part explain the gap in the economic literature.

Box 3. Challenges in attributing benefits to MPAs and SPMs – the case of North Sea cod

Scottish and English cod boats operating in the North Sea have recently (July 2017) received MSC certification, recognising both the improvement in cod stocks and the efforts undertaken to ensure the stocks' sustainable management through the cod recovery plan, introduced in 2004. The cod recovery plan has included a range of spatial measures: real time closures to protect cod aggregations, "amber" areas where stocks may be abundant but that fishers can voluntarily avoid in exchange for additional days at sea, and permanent and seasonal area closures. Other measures including the trialling of new nets and remote electronic monitoring using on board CCTV have also been introduced. However evaluation have not been able to attributing impacts to the SPMs has not to-date been feasible, and hence the contribution of the different measures (including SPMs) remains unclear.

In the economic literature, **the most studied "sub-mechanism" is spillover of juvenile and adult fish from no-take MPAs (or zones)**. There are few empirical studies¹². The evidence available indicates that fishermen who target relatively low-mobility species (with lobsters the most studied species) may be most likely to benefit (e.g. see Box 4), although evidence that these constitute a net economic benefit is limited. Whilst some consulted stakeholders¹³ argued that more mobile species may also benefit if MPAs are large enough or protect key life cycle stages, there is still little evidence of this in practice. However, across the EU, only a fraction of MPAs (or zones of

¹² The literature review identified six empirical ex-post evaluations of the economic impacts of no-take zones

¹³ Via study interviews and workshops

MPAs) are closed to all fishing¹⁴. Torre Guaceto MPA demonstrated a novel approach to boosting multiple-use MPA fishing benefits through a time-limited no-take management measure (see Box 5).

Box 4. Economic benefits from the spillover of lobster, Columbretes Islands Marine Reserve (Spain)

- A number of studies identified in the literature review illustrate economic benefits to lobster fisheries around the Columbretes Islands marine reserve in Spain. Goñi, Quetglas and Reñones (2006) compare catch and effort data of surrounding fisheries with experimental CPUE data from inside the site, and show that lobster export is sufficient to maintain stable catch rates up to 1,500 m away from the reserve boundaries. Three years later, Stobart et al. (2009) confirmed spillover at the site, this time looking at the entire exploited assemblage of species which are caught and marketed by trammel net fishing in the area (the most commonly used gear type in the area). They studied catch trends (by species and length of individual specimen) of commercial fishing in gradients from the MPA border (up to 0.5 km from the boundary) over an 8-year period post protection, and found clear evidence of spillover of fish from the site. Goñi et al (2010) claimed to be the first to illustrate net benefits to surrounding fisheries from spillover from the Columbretes no-take zone (i.e. benefits from the site are higher than the costs incurred by displacement). The net benefit to the fishery resulted in a 10% increase in mean annual yield (in weight) of spiny lobster. The findings were based on tag-recapture data using the same fishing gear as the local fleet (wide mesh trammel nets of standard length).

Box 5. Time-limited no take management in Torre Guaceto MPA (Italy)

Case study evidence demonstrates how a time-limited no take closure was used to rapidly boost fish biomass in the MPA before it was re-opened to a managed level of sustainable fishing with trammel nets. Immediately after the four-year closure in Torre Guaceto, the CPUE in the MPA was more than four times that outside. After the fishing activities had resumed this decreased, but stabilised at around twice the CPUE of outside the MPA. Whilst there is a short term cost, this approach was credited with both bringing forward and enhancing the targeted economic benefits. The expectation and rapid realisation of this increase in the trammel net CPUE was also key in gaining the support of initially sceptical fishermen.

In multiple-use MPAs, fishermen’s ability to realise the benefits of on-site stock enhancements may be determined by MPA management gear restrictions. On-site benefits may be realised only by those vessels permitted to fish within the MPA. These are typically the artisanal, small scale fishing sector as those with the most significant seabed impact (e.g. mobile benthic gears or larger vessels) are commonly restricted. Case study evidence from Os Miñarzos (Spain) demonstrates such economic benefits. However, the literature review indicated that there is very limited evidence on the economic benefits occurring in multiple use MPAs. Where there is evidence, it is not always clear whether economic benefits stem from an underlying improvement in fish stocks, or simply an ability to exert more fishing pressure in a less crowded area (i.e. an opportunity for expanded activity and reduced competition), as occurred initially in Lyme Bay MPA (UK) for example (see Box 8). What is clear is that there is a distributional effect in terms of winners and losers based on the allocation of access rights.

¹⁴ In the Mediterranean, the inclusion of no-take zones as integral parts of multiple-use MPAs is relatively common; however, these zones are often very small.

Capture of the benefits of stock enhancements may be determined by proximity.

In some cases this may be deliberately built into MPA management. For example, in Italy, MPA law states that MPAs may only be used by local fishermen. In MPAs such as Torre Guaceto and Punto Campanella, successful stock recovery has been supported by the allocation of permits to fishers from the surrounding municipalities, restricting the number of users, and determining the vessel size and gear types in use. Such approaches help to provide a clear allocation of resource rights to local fishermen, and especially in circumstances where co-management arrangements exist, appear central to the ability to both implement and attain compliance with the sustainable use measures necessary to achieve fishery related economic benefits. Whilst proximity-based management can enhance MPA effectiveness, it also accentuates distributional effects across different geographic fleet segments. In other MPAs, access constraints are a simple artefact of the MPA and fishing port locations – for example, the case study of Cabrera MPA (Spain) indicates that the translation of fish stock enhancement into economic benefits was relatively limited because the MPA was too far from fishing ports to be a regular fishing ground.

3.1.2 Product branding

Product branding is perceived to be an important potential mechanism – the online survey results indicate that stakeholders identify product branding as the third most important mechanism after changes in biodiversity and wider environmental change. There are a small number of examples where economic benefits have occurred¹⁵ from product branding, although it appears to have been relatively little studied and potentially underutilised.

Two distinct forms of product branding were identified:

- Eco-certification of fisheries e.g. through the Marine Stewardship Council (MSC), where MPAs can help to demonstrate satisfaction of certain assessment criteria.
- Labels and brands developed around individual MPAs, often linking (typically artisanal) fishers with local restaurants through direct marketing schemes; and

Box 6. Example of eco-certification

MSC certification is an outcome-based standard, hence there is no requirement for MPAs as a management tool. However, fisheries seeking certification need to be able to demonstrate their sustainable management against a number of criteria. With regard to the MSC criterion of 'habitat impact', in many cases fisheries managers may opt to close marine areas to fishing to demonstrate achievement. Such areas may end up being designated as MPAs as a result, or may already be MPAs (e.g. see the cod fishery in the Barents Sea). With the introduction of the new MSC 2.0 standards (first introduced in 2014, but with all fisheries transitioning to them by October 2017) it was suggested that the wording is so tight that MPAs will be looked at as a measure to help satisfy these threshold criteria. Hence the use of MPAs to support MSC certification applications may become more widespread in the future.

¹⁵ However product branding is not typically associated with de facto refuges.

Box 7. Example of reserve label and brands

In Lyme Bay (UK), fishers, supported by the Blue Marine Foundation, have set up a 'reserve seafood' label. Through development of and participation with the management committee, adherence to codes of conduct encouraging sustainable practices and better post-harvest handling of the fish catch, fishers (static gear and scallop divers) are able to use the 'reserve seafood' label. Fish are now sold to a particular fish processor which offers a price premium of between 30 and 50% depending on species and season.

MPAs can provide a clear opportunity to make claims of a 'higher value product', e.g. linked to the wider branding/ story-telling of the MPA (e.g. in Lyme Bay MPA (UK), Iroise MPA (France) and Gökova MPA (Turkey)), as well as act as a focal point for the clustering of the resources necessary for such initiatives. Case studies indicate that an external body (e.g. MPA management body or other organisation or individual(s) associated with the MPA), rather than fishermen themselves, often establish such initiatives. Such an external driver appears to be a critical factor in their success. This is thought to emphasise that benefits delivered through this mechanism require additional action beyond the sound management of an MPA.

There can remain societal challenges to the establishment of such initiatives. In the Cabrera MPA (Spain) case study some stakeholders were found to oppose the establishment of an MPA label due to problems with traceability of fish (i.e. whether they are caught inside the MPA) and equity (it is unfair for fishermen not permitted to fish in the MPA). The former has clear links with the need for effective MPA enforcement and monitoring, whilst the latter raises questions more broadly about the equity of the spatial distribution of MPAs.

3.1.3 Reduced competition

Reduced competition can allow for an expansion of permitted fishing activities, increasing sector revenues for those fishermen permitted to fish in the MPA, and reduce fishing costs by reducing issues of gear conflict¹⁶. The online survey indicated this to be one of the least likely mechanisms for economic benefits, but there are examples¹⁷ where expansion due to reduced competition is identified as a mechanism providing economic benefits to some segments of the fisheries sector, regardless of any improvement in the underlying state of the target species stock (as discussed in Section 3.1.1). More commonly reduced competition allows for stock recovery and benefits via improved fish stocks (as previously discussed).

For example, in the Gulf of Castellammare fishery exclusive zone (Italy), artisanal fishermen (using trammel nets and set gillnets) experienced less competition for targeted species inside the MPA which resulted in improved catches and revenue. In Lyme Bay (UK) (see Box 8), static gear fishermen (using pots and set nets) were able to increase the volume of gear used (and hence landings and revenue) due to reduced competition for space. In both cases benefits were also felt through reduced gear conflict, which reduced fishing costs¹⁸. What is unclear is the extent to which such expansions of permitted fishing activities may affect the attainment of MPA conservation objectives. In Lyme Bay there was concern that the expansion in the use of static gear was detrimental to fish and shellfish stocks, which in part contributed to the development of a voluntary code of fisheries conduct. In addition, the displacement of fishing can result in increased

¹⁶ Where fishing gear is damaged by other fishermen – typically static gear such as pots and nets being 'towed away' by trawling vessels.

¹⁷ In the economic literature or identified via study consultation exercises

¹⁸ See Technical Annex A for details on the two studies associated with these examples: Whitmarsh et al, 2002; Mangi et al, 2012

competition outside of the MPA, with negative economic and environmental consequences.

Box 8. Benefits from reduced competition for space in Lyme Bay MPA (UK)

In Lyme Bay (UK) mobile gear has been prohibited since 2008. A study by Mangi, Rodwell and Hattam (2011) shows that as a result of that, static gear fishermen inside the site boundaries had been able to increase their fishing effort as a result of reduced competition for space. In 2012, Mangi et al published another paper based on stakeholder surveys from Lyme Bay supported by secondary commercial fisheries data such as wet weight value of landings, showing that the static gear fishermen inside the restricted zone had experienced increased incomes as a result of the new dynamics. Towed gear fishermen who were displaced to surrounding areas had, on the contrary, experienced increased costs by having to fish elsewhere since the site was established, and there were also concerns from the recreational fishing sector about increased competition from the increase in static gear use inside the MPA (see also Rees et al, 2013, and Mangi et al, 2012).

3.1.4 Opportunities for new or improved activity

A number of different types of opportunity can be facilitated by MPAs:

3.1.4.1 Lower impact fisheries

MPAs can act as a catalyst to encourage the development of new or modified fishing practices that have lower impacts on certain MPA features. Fishermen can capitalise on other MPA benefit mechanisms by developing or adopting such practices, which allows them to fish within the MPA. Case study examples indicate that such transition can be inhibited by short-term costs, but can be encouraged through the provision of financial and educational support (e.g. see case study on Torre Guaceto, Italy).

3.1.4.2 Alternative sources of income

MPAs can offer opportunities for fishermen to diversify their income sources. There are a number of examples of diversification into fisheries-related tourism or second jobs within tourism (e.g. pescaturism in Os Miñarzos, Spain and Egadi Islands MPA, Italy case studies). The Egadi case study demonstrates that the value of pescaturism can be sufficient for many fishermen to concentrate solely on that activity during the summer tourism season instead of fishing. There is in general however a lack of evidence on the economic value of such diversification. There can be significant barriers to entry for pescaturism, in terms of whether national legislation permits the use of registered fishing vessels (particularly small vessels) for tourism activities, and the capital costs of investing in vessel modifications to enable the practical and safe carriage of tourists, as well as skills appropriate for the service sector. As a result, it is suggested that pescaturism may often be delivered by tourism operators, with only a limited role for fishermen. Other opportunities exist for fishermen to support MPA ecological monitoring activities as well as infrastructure construction linked to future de facto refuges¹⁹; however, such opportunities may be infrequent and relatively insignificant sources of income.

¹⁹ E.g. see News Letter (2014). Offshore wind farms blow new energy into Kilkeel fishing fleet's sails. <http://www.newsletter.co.uk/news/business/offshore-wind-farms-blow-new-energy-into-kilkeel-fishing-fleet-s-sails-1-5806543> (accessed 21/05/15).

Box 9. Improved shore-side infrastructure:

MPAs have been used to attract funding to improve facilities (e.g. post-harvest handling of fish) and allow fishers to enhance the quality of their product. For example, working with fishers operating inside Lyme Bay MPA (UK), the Blue Marine Foundation gained funding from the European Fisheries Fund to install chiller units and ice boxes in local harbours and train fishers in how to better handle their catch.

3.2 Benefits for the tourism sector

3.2.1 Introduction

The marine and coastal tourism sector is well established in Europe and is the largest of the maritime sectors with solid growth of 2-3% forecast for the coming years - it generates €183 billion in gross value added, representing over one third of the maritime economy, and employs over 3.2 million people (Ecorys, 2013). However, the sector faces a number of challenges in unlocking further growth and better supporting coastal economies. These include, amongst others, a lack of innovation and diversification, limited visibility against worldwide competition, poor access to finance, demand volatility and seasonality, and growing environmental pressures (Ecorys, 2013). Evidence indicates that MPAs, and to a lesser extent SPMs, can play a role in helping to address a number of these challenges.

Literature and consultation evidence indicate that economic benefits result from increasing visitor numbers and changes in visitor behaviour, leading to higher revenues, increased jobs and additional livelihood opportunities. Specifically, MPAs can directly and indirectly influence the quantity and quality of tourism including:

- Increased visitor numbers and hence business opportunities and revenue.
- Increased length of visitor stay, and hence the ability to capture increased tourism expenditure.
- Extension to the season / increased activity outside of the peak season, which helps to combat the perennial problem of seasonality in tourism (particularly coastal tourism) dependent economies.
- Eco-tourism and other forms of specialised tourism can allow for a shift towards higher value tourism – both higher spend per visitor, but also greater benefits per spend resulting from a higher local retention of revenues.

The evidence also indicates the potential for improvements in the recreation and tourism offer, and overall sector performance, to spill over into the wider economy and community. This includes the wider coastal tourism sector such as hotels and restaurants as well as non-tourism aspects such as increased local real estate values and improved community infrastructure and vibrancy (e.g. Leigh Reserve, New Zealand).

Box 10. Tourism income and job creation in Southern Mediterranean MPAs

Roncin et al (2008) summarise the EMPAFISH project (www.um.es/empafish) results, which explored the impact of Southern European MPAs on local economies via surveys with fishermen and divers (1,836 questionnaires) and empirical evidence. Roncin et al calculate that the mean local added value due to the expenditures of non-resident recreational fishers and scuba divers is respectively €88,319/yr. and €551,481/yr. per MPA. According to the authors, the yearly local income related to services to non-resident recreational user is €640,000/yr. per MPA. This results in a mean generation of jobs related to local expenditures of non-resident recreational fishers and scuba divers of respectively 2.1 and 13 yearly full time equivalent.

Such economic **benefits may be enhanced where policies or particular activities are implemented that increase the share of income retained in local economies** (often a key feature of ecotourism models). Financial support to and training of local business can support supply-side investment and information campaigns in favour of local touristic products and supply chains.

The impact of the designation of a MPA on tourism can depend on a range of factors, including for example the age of the MPA, the socioeconomic and cultural context, the number and quality of communication activities carried out and also the established reputation of a specific area. For example, if the area is already well known and popular, the designation effect may be less significant.

Most studies analysing the perceptions of stakeholders' show that they believe MPAs provide benefits to the tourism sector; however, this view is not always universally held. This may indicate that some segments of the industry (particularly where the activity may be restricted in some MPAs e.g. recreational fishing in German Natura 2000 sites) and of society may not always benefit. Where benefits do occur, the significance of impact varies considerably across MPAs. In Bonaire, the economic impact is clearly considerable. The MPA has been a critical factor supporting the development of the tourism sector, which has been the main engine of economic growth on the island for the last thirty years. However, in Cyprus, the impacts of an MPA Artificial Reef programme on tourism activities have been modest and have not occurred for all of the artificial reefs installed.

The impact of the designation of a MPA may take time, although positive impacts can start to occur relatively quickly. For example, the Lyme Bay MPA (UK) had limited effect on visitor demand in its first year but a significant effect quickly emerged in its second and third years (see Box 11).

Box 11. Increase in tourism sector income in Lyme Bay MPA (UK)

The impact of the designation of the Lyme Bay MPA increased over time. The divers, anglers and charter boat operators in the Lyme Bay MPA surveyed by Rees et al (2015) in the designation year reported that the MPA designation had only a small to moderate effect on their decision as to their destination in the Lyme Bay area. However, these results changed when annual surveys were carried in the two subsequent years, showing an increasing impact of the MPA on the choice of a location for recreational activities since designation (although other factors such as better weather in these years are also thought to have had an effect).

Three years after the MPA designation, income generated inside the MPA had increased by £2.2 million. In particular, angler and diver expenditure had increased by £1.5 million and £0.5 million respectively (due to an increase in visits of 19% and 35%), whereas the turnover of charter boat operators and dive business had increased by £108,427 and £39,864 respectively (due to an increase in their activities by 51% and 201%).

Tourism benefits primarily accrue from inshore/coastal MPAs, which may be expected given the access constraints for offshore sites, and from multiple-use MPAs (including MPAs with integral no-take zones). There is far less evidence that the tourism sector benefits from fisheries SPMs. The only identified example of benefits to the tourism sector brought about by a SPM is the Oz Miñarzos Marine Reserve of Fishing Interest, which was designed primarily to support the fisheries sector, but also delivers tourism benefits.

There are also examples of de-facto refugees that provide economic benefits to the tourism sector. For example, dive tours at the Swan ship, the largest dive wreck in the Southern Hemisphere, is reported to have returned a pre-tax profit of \$20,000 in its first year. There are examples of tourism visits to offshore wind farms (OWFs) like the

London Array (UK), with some building visitor centres to promote visits. A survey (Hooper et al, 2017) showed that in general, sea anglers in the UK have a positive perception of OWFs as an angling resource, due both to the potential artificial reef effect and the exclusion of commercial fishing. However, there is no robust literature on these economic effects.

3.2.2 Benefit mechanisms

There are number of different mechanisms through which MPAs can support the tourism sector. However, isolating the effect of each mechanism is difficult. Most literature does not explicitly identify the mechanism through which MPAs provide benefits to the sector, and in case study analyses it was commonly demonstrated for multiple mechanisms to be active in support of economic benefits (e.g. see Box 12).

Box 12. Benefits mechanisms supporting tourism activity in Bonaire National Marine Park

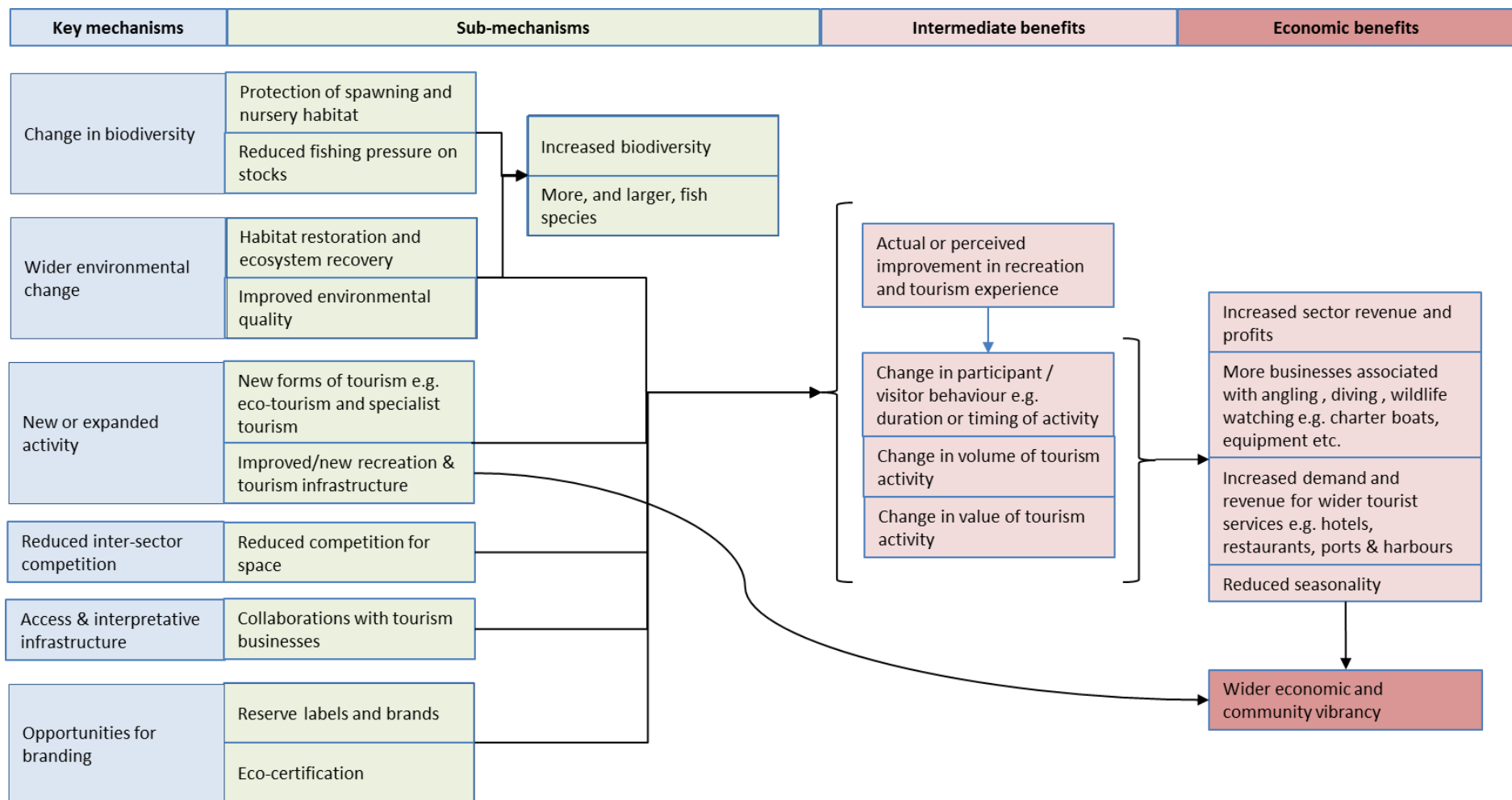
The Bonaire National Marine Park case study demonstrates how it has played a major role in supporting the development of the island's tourism industry, which is focussed on dive tourism. The park was established in 1979. Tourist arrivals have grown from just a few thousand in the 1970s to around 130,000 today. Tourism has been, and continues to be, the main engine of economic growth. Tourism expenditure was estimated to be USD160million in 2012, directly generating gross value added of USD60million, equivalent to 16.4% of Bonaire's GDP.

The marine park directly supports Bonaire's status as a premium dive destination. The main mechanisms through which the park benefits the tourism sector are:

- Maintenance of the quality of the reef and other intertidal habitats – many tourism activities (particularly dive tourism) directly rely on the quality of the reef. Bonaire benefits from a high proportion of repeat visitors – a survey indicates that just 10% of stay-over tourist respondents would return to Bonaire if coral reef quality declined significantly.
- Enhancing the experience of diving and other water sports on Bonaire - the rules and regulations, education and communication, and visibility of effective marine park management is thought to enhance the experience for dive and other tourists (as well as support compliance with sustainable use measures and manage potential spatial conflicts)
- Directly and indirectly supporting marketing and the differentiation of Bonaire from other tourism destinations - Both the quality of the reef and the marine park status are key marketing tools for Bonaire as a destination. Visibility of the management body within marketing activity is also seen as important by the tourism industry

Figure 7 illustrates the benefit pathways for the tourism sector. The remainder of this subsection discussed tourism benefits, structured by key mechanism.

Figure 7. Tourism economic benefit pathways



Source: Own representation

3.2.3 Changes in biodiversity and wider environmental change

For no-take reserves, multiple use MPAs, and fisheries SPMs, the respondents of the online survey considered changes in biodiversity and wider environmental change as the second and third most important mechanisms through which economic benefits emerge for the tourism sector. For de facto refuges, they considered them the first and second most important. This section discusses them as a single mechanism.

The mechanism can make an area more appealing to visitors, helping to improve the visitor experience and attract more visitors or visitors that are willing to stay longer and/or spend more. Evidence indicates that **this mechanism may be a more important driver of tourism demand for visitors undertaking activities which directly depend on the quality of biodiversity and the wider environment**. For example, in-depth interview and workshop participants identified changes in terms of more and larger species within MPAs, and protection of spawning grounds, as enhancing the angling experience (where angling is permitted), with the potential for associated economic benefits (e.g. see Box 13).

Box 13. Benefits for angling from protection of spawning grounds in Kingmere MCZ (UK)

Kingmere Marine Conservation Zone (MCZ), off the south coast of the UK, contains an important breeding ground for black bream. The MCZ aims to protect black bream breeding stocks and is managed on the basis of four zones, with management measures varying temporally. During the spawning season a no-take zone comes into force (zone 1) in which no angling, dive fishing or commercial fishing is permitted. In zone 2, dive fishing is also prohibited, together with all commercial fishing. In zones 3 and 4 only trawling and netting are prohibited. Out of the spawning season, only trawling is prohibited in zones 1, 2 and 4, and a four bag limit is in place for anglers for black bream. This management only came into force in late 2016, but information collected from anglers so far during 2017, as well as anecdotal evidence, suggests it is having a positive impact for anglers with economic benefits to charter boat operators.

Visitor surveys indicate that **MPAs can have a strong influence on the destination choices of divers and anglers, but also on general visitors as well** (see Box 14). However, the extent to which visitor destination decisions are based on a perception that the environmental quality (and hence activity) will be better in an MPA or demonstrable knowledge that it is better is often unclear. The latter is logically important where sites receive repeat visitors. A survey (Schep et al, 2012) of divers in Bonaire National Marine Park indicated that just 10% would return if reef quality deteriorated.

Box 14. Influence of MPAs on visitor destination decisions

The following evidence are drawn from surveys of visitors:

- In six out of eleven European MPAs, more than 50% of scuba divers stated that the MPA influenced their choice of dive site and in only two of these MPA did less than 25% state this. (Roncin et al, 2008).
- In two out of five European MPAs between 25 and 50% of recreational fishermen stated that their choice of fishing site had been influenced by the existence of the MPA, and in three MPA less than 25% stated this. (Roncin et al, 2008).
- In Alonissos MPA (Greece), 7% of visitors stated that they chose Alonissos as a destination because of the MPA (Trivourea et al., 2011).
- At Tavolara Punta Coda Cavallo MPA (Italy), 36% of the visitors stated that the designation influenced their choice of North-Eastern of Sardinia as a holiday location (Pizzolante, 2009).
- In Cape Rodney Okakari Point Marine Reserve (New Zealand), 54% of the day visitors believe it unlikely they would have visited the area if it had not been a MPA (Hunt, 2008).

In the case study research, it appears that **MPAs often act to conserve rather than improve biodiversity and environmental quality** – ensuring a continued level of quality against broader trends of degradation. Restoration of environmental quality as a mechanism for benefits appears most clearly in cases such as artificial reef de facto MPAs – although here the impact appears to be as much about the significance of the artificial reef (particular if using scuttled ships) as it is biodiversity and environmental change (see Cyprus Artificial Reef case study).

There can be a trade-off between environmental protection and income generated by recreational activities. After a certain threshold, recreational activities result in environmental degradation, which can damage not only the environment but also the sector itself. Hence it is important that sustainable use measures which acknowledge the carrying capacity of the MPA are implemented. There are a number of examples where concerns regarding carrying capacities are raised and additional measures are often needed to address impacts (e.g. carrying capacity concerns for high volume cruise tourism on Bonaire – see case study in Technical Annex C).

3.2.4 Product branding

MPA product branding did not rank as one of the more important mechanisms in the online survey. However, other consultations and literature indicate the use of MPAs for destination marketing to be an important benefit mechanism.

Two forms of branding were identified:

- Individual MPA brands/marketing that promote environmental protection and environmental quality as a way of attracting visitors.
- Using an MPA to support applications for other sustainability certifications and designations such as CETS, the European Charter for Sustainable Tourism (see the Torre Guaceto example in Box 15).

Two case studies demonstrate that **the marketing pull of an MPA may be enhanced when it is has a particularly unique feature**: Os Miñarzos and Bonaire (see Box 12) for Bonaire, where the quality and accessibility of its coral reef is the primary feature). The Os Miñarzos case study demonstrates that its status as one of the first co-managed MPAs in Europe made it a particular attraction – indicating that it's not solely environmental features that can act as attractors. The research and media attention that

this drew was capitalised on to launch tourism events (although activity has reduced since funding cuts have reduced the MPA's effectiveness).

Capitalising on the potential marketing power of an MPA designation requires relevant partners and initiatives to be established. Case studies on Iroise and Os Miñarzos demonstrate that MPA management bodies (and associated NGOs) can be particularly proactive in directly undertaking initiatives but also in facilitating partnership creation between tourism operators and with and other sectors. In Kosterhavet Marine National Park (Sweden) there were complaints that there insufficient centralised effort was put into marketing of the MPA.

Where tourism businesses within MPAs obtain certifications in existing schemes, it can provide **an opportunity for promotion via the broader marketing networks of the scheme certification body**, which may come at no cost to the tourism businesses – although effort (and cost) is still required to obtain the certification in the first instance, particularly if it is a destination-level certification (see Box 15).

Box 15. Sustainability certification in Torre Guaceto (Italy)

The Torre Guaceto terrestrial and marine protected area (Italy) obtained the European Charter for Sustainable Tourism (CETS), a label granted by Federparchi, the Italian branch of Europarc. The CETS is a voluntary agreement: the operators who meet at least half of a list of sustainability criteria are included in a catalogue disseminated by the managing body, which provides them with free publicity. In addition, three Slow Food Presidia (i.e. labels granted by the Slow Food international association for high quality and sustainable food products) have been granted to three Torre Guaceto products, including the fish caught in the MPA, providing marketing benefits for the products and local area more generally.

3.2.5 Opportunities for new and/or expanded activity

Online survey respondents indicated that opportunities for new and/or expanded activity were one of the most important benefit mechanisms. Participants in in-depth interviews and workshops highlighted that increased visitor numbers to MPAs are associated with the expansion of existing businesses as well as the creation of new ones (e.g. hotels and restaurants as well as specialist tourism activities). Participants cautioned however that not all MPAs are sufficiently well-known to create these effects i.e. **capitalising on new opportunities is reliant on other mechanisms (e.g. improved biodiversity, MPA branding/marketing) to support visitor demand.**

A key aspect identified during interviews and workshops was opportunities for **the development of eco-tourism and specialised forms of tourism.** Such opportunities can deliver important types of benefit. For example, generating higher profits through premium prices (e.g. kayak tours in Kosterhavet, Sweden), extending the tourism season (see Box 16), or support livelihood diversification for fishermen (e.g. pesca-tourism in Egadi Islands MPA, Italy). Small-scale eco-tourism, where local people have competitive advantages with respect to big companies due to their presence in the territory, their knowledge and their network of contacts can help to ensure that a greater proportion of economic benefits are retained in local economies.

Box 16. Business opportunities extending the tourism season in Kosterhavet

Kosterhavet marine national park (Sweden) was designated in 2009. The tourism sector is an important economic driver in the region bringing direct income from recreational activity and indirect revenue to tourism infrastructure such as accommodation and restaurants. While the area was a popular tourism destination before the park, the national park has attracted a new group of visitors who come primarily for the natural experience. The number of visitors has increased significantly since the park was established, and in particular during the non-summer months. A range of tourism service providers in and near the park report significantly better business outside of the main season.

Opportunities to capitalise on MPAs are not solely for businesses providing MPA-related experiences/activities, but **benefits are also felt throughout the broader tourism sector** (which may be outside the MPA boundary) e.g. accommodation and restaurants (see Box 17).

Box 17. Wider benefits on the tourism sector in Alonissos MPA (Greece)

A number of ex-post analyses are available for the National Marine Park of Alonissos (Greece). Owners of tourist agencies, hoteliers and owners of rooms to let felt they had benefited from the MPA, and 44% of the residents believe that the MPA designation has had a positive impact on the livelihoods of people working in the tourism sector.

The impact of the MPA is examined quantitatively drawing on neighbouring islands to act as counterfactuals. Seven years after the designation of the MPA, the number of beds available on the island of Alonissos had increased by 10.5%, whereas in the neighbouring islands of Skiathos and Skopelos (which do not have MPAs) the change was 2.4% and -9.5% respectively.

Park management and other local bodies can provide important support to help businesses take advantage of these opportunities. In Iroise (France), the park encourages development of eco-tourism and more sustainable tourism through the award of a charter mark. It has worked through partnerships to secure the designation of six lighthouses as heritage sites, which enables them to access public funding. In the German Wadden Sea, partnership programmes have been created between the MPA and tourism entrepreneurs – the MPA supports the education of the tourism businesses (as opposed to the visitors), which allows them to gain insights into the tourism market making them better placed to react to changing market demands.

3.2.6 Access and interpretative infrastructure

The development and use of education and awareness raising materials have helped MPAs to improve visitor experience and attract more visitors, often accompanying and reinforcing the effects of branding and marketing initiatives (see Box 18).

Box 18. Examples of education and awareness raising material use

- In Kosterhavet (Sweden) education materials are reported to contribute to the visitor experience and support tourism businesses to expand their offer and improve their product.
- In Bonaire National Marine Park training and education of marine park users, in particular divers, are a central part of ensuring a high quality experience for tourists.
- Some Italian and Spanish MPAs have developed educational material to inform recreational fishers, including brochures and leaflets providing information on sustainable local fish consumption and existing regulations on recreational fisheries.

Tourism growth, and management, often requires infrastructure, as indicated in the Sečovelje Salina (Slovenia) and Cabrera (Spain) case studies. In the former, on-site infrastructure has improved physical accessibility enabling an increase in visitor numbers whilst also ensuring that sustainable use is maintained (i.e. it raises the carrying capacity of the site). In Cabrera, infrastructure including mooring buoys are said to have improved boater safety as well as provide for environmental protection of seagrass beds.

3.2.7 Reduced competition

Reduced competition was not considered an important mechanism for the creation of economic benefits by online survey respondents. During the in-depth interviews and workshops reduced competition was mostly commented upon in terms of decreasing competition for space between anglers, divers and commercial fishers, leading to improved recreational experiences. Such benefits may occur where MPA management creates opportunities for new activity due to the removal of others through zoning for conservation purposes or to address safety issues (see Box 19). Where benefits are created as a result of reduced competition, there is the potential for costs to those activities that are displaced (e.g. opportunity costs of foregone activity, or increased costs of altered activities).

Box 19. Benefits from MPA zoning in Plemmirio

In Plemmirio MPA, Italy, the MPA is divided into three zones. Different activities are permitted in each of the three zones, reducing competition between different users for space. Zone A is a no-take zone where diving is the only permitted use. Zone B is a general reserve where recreational activities are allowed. Zone C is a partial reserve, where small-scale fishing activities can occur. In 2004, the first year of the MPA, there were 450 users from the dive sector, but in 2017, there were over 3000.

3.3 Economic benefits for other blue economy sectors

3.3.1 Introduction

Other blue economy sectors refer to all sectors other than tourism and fisheries. It therefore covers blue growth sectors such as aquaculture, blue biotech and ocean energy as well as traditional maritime sectors such as ports and shipping, shipbuilding, as well as other sectors that provide MPA services (such as MPA management and monitoring) and other services such as engineering and technology.

Many of these sectors are most commonly thought to incur costs from MPAs rather than benefits, particularly opportunity costs through restrictions on activity and mitigation costs for permitted MPA use. This was reflected in the online survey where a majority of (but not all) respondents stated that such sectors 'never' benefit from MPAs or SPMs – particularly where there is no link between the sector and use of ecosystem services. Indeed, no direct economic evidence was identified in the literature of other blue economy sectors benefiting from MPAs or SPMs, although studies (e.g. for biotechnology in Russi et al, 2016) have demonstrated the theoretical benefits. Some stakeholders suggested that we are limited in our understanding of how these sectors benefit from MPAs, perhaps because there has been no research focus on this issue. This may be due to lack of expectation of benefits or because some sectors (e.g. blue biotechnology or eco-engineering) are still emerging.

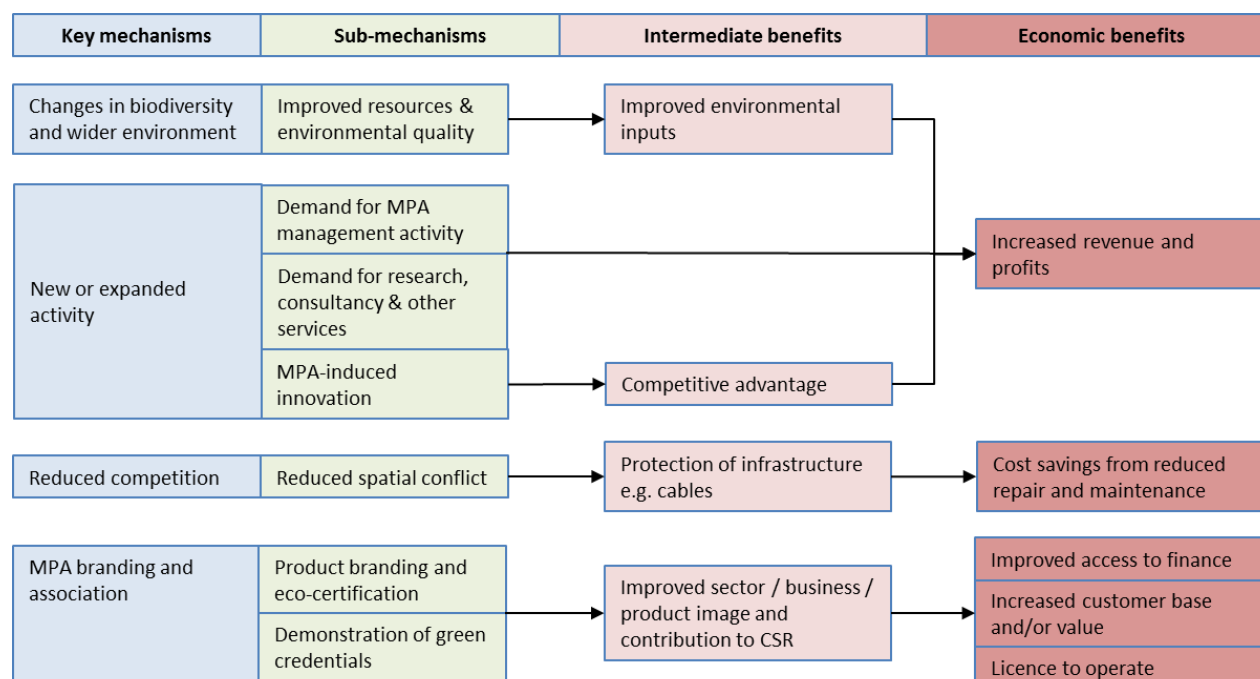
The stakeholder consultations and case studies identified a limited number of other blue economy sector benefit mechanisms and economic benefits. These are not common across all sectors however, and may often reflect isolated cases. These are summarised in Figure 8 and in the list below and then discussed further by key mechanism in the remainder of this section.

Table 3. Strength of evidence of economic benefits across economic sectors/activities and benefit mechanisms

Economic sector / activity	Benefit mechanism*			
	New/expanded activity	MPA product branding & association	Change in biodiversity &	Reduced competition
MPA management and associated research	✓✓✓			
Ecological restoration, enhancement and mitigation services	✓✓	✓		
Environmental consultancy and related services	✓			
Technology developers and operators	✓✓			
Aquaculture and biotechnology	✓	✓	✓	✓
Transport and ports	✓	✓		
Maritime energy		✓		✓

* The greater the number of ✓s, the greater the evidence for such benefits mechanisms

Figure 8. Other blue economy economic benefit pathways



Source: Own representation

3.3.2 Opportunity for new/expanded activity

Online survey respondents indicated that opportunity for new or expanded activity was potentially one of the more important mechanism for both blue economy sectors that utilise marine biodiversity and to a lesser extent for those who do not. Evidence from interviewees, workshop participants and case studies provided examples of other blue

economy benefits through this mechanism, and these were arguably the most concrete in terms of their ability to demonstrate economic benefits.

3.3.2.1 MPA management and research

MPA management bodies: MPA management bodies are generators of employment and purchasers of management support services. Previous research indicates that MPA operating budget in EU Mediterranean MPAs average €0.7million/yr. (Binet et al, 2015). Evidence from six case studies in this study gives an annual budget range of €0.5-2.5million/year (see Box 20). The case studies indicate that direct employment in individual MPA management bodies may range from less than ten to around 30. The designation of MPAs thereby contributes to the blue economy through work in administering MPA planning and ongoing monitoring, enforcement and engagement activities.

Box 20. Case study evidence on MPA management budgets and employment

- Kosterhavet Marine National Park (Sweden): Annual budget of about €1.5million to cover costs of management, maintenance, monitoring and reporting, including costs for 7 FTEs, summer seasonal employment and around 15 FTEs for park maintenance (although the latter covers multiple nature reserves in the area).
- Iroise Marine Natural Park (France): Annual budget of about €2.5million covering infrastructure, staff and projects. Approximately €1million is on staff costs, supporting 25 jobs.
- Cabrera National Park (Spain): Annual budget of around €1.9million, of which €0.7 million is on staff costs.
- Torre Guaceto MPA (Italy): Annual budget around €1 million.
- Sečovelje Salina Nature Park (Slovenia): Annual budget of around €0.5 million, of which €0.23 million on staff costs supporting 10 jobs.
- Bonaire National Marine Park (Bonaire): Annual budget of around €1.2million, which includes staff costs for approximately 28 jobs.

MPA research: There are numerous opportunities for research and consultancy services to support MPA policy and management²⁰. These may be national or internationally funded research projects or MPA specific contracts or partnerships to collect and analyse environmental and socioeconomic data relevant to MPAs and user impacts (e.g. see Box 21). These provide economic value to the research sector, and also into local economies from local expenditure during field visits. And the market has clearly grown as MPAs have become more widespread across Europe (e.g. see Box 22).

Previous research (ICF GHK et al, 2012) has indicated that, for the Natura 2000 network (terrestrial and marine) **every €1billion of expenditure supports almost 30,000 jobs, with 60% of these on activities directly related to site management** (e.g. designation, management, conservation actions, monitoring and research). If the rate of growth in the number and area of MPA designations are taken as an indicator of the demand for management services, it can be assumed that the last decade or so will have seen an expansion of this sector, which may be set to continue.

In addition, MPA management bodies can operate directly as the providers of other infrastructure and services: in MPAs such as Cabrera (Spain) and Torre Guaceto (Italy) the management bodies have taken on a wider remit than just environmental management. In both cases they provide infrastructure and services, in either marine or terrestrial areas, which are essentially tourism sector businesses generating revenue

²⁰ See Box 5.17, Technical Annex B, for examples of research supporting MPA management decisions.

(often to fund MPA management) and jobs. Such activity tends to occur where an MPA management body also has control over some terrestrial resources.

Box 21. Examples of MPA research values

Examples of MPA-specific research activity:

- In 2014, the Cabrera national park received approximately 153 scientists, belonging to 28 different research teams, who visited the archipelago to collect field data for their research
- Local expenditure of resident and visiting researchers on Bonaire was estimated to equal between USD1.2 million and USD1.5 million in 2011. This excludes management and travel cost for external researchers travelling to Bonaire, and is not solely attributed to the marine environment or just the marine park (Van Beukering and Wolfs (2012).

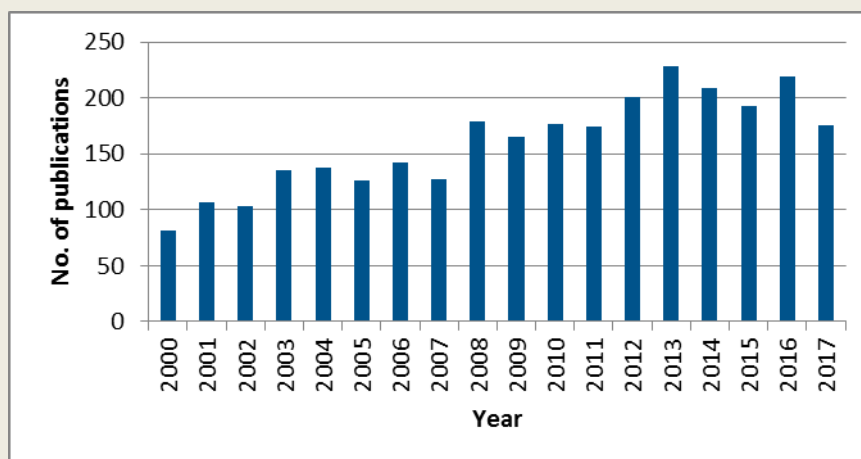
Examples of European funded research activity:

- PROTOMEDEA - Towards the establishment of Marine Protected Area Networks in the Eastern Mediterranean (2015-19). Total funding of €0.6million with 90% from EMFF.
- AMARe - Actions for Marine Protected Areas (2016-19). Total funding of €2.7million, with €2.3million from Interreg.

Box 22. Growth in MPA-related research

Although the exact value of MPA related research is unknown, the number of publications featuring MPAs can be used as an indication of how this research area is growing. The following graph shows the number of publications with either “marine protected area”, “marine reserve” or “marine park” in its title, as found in Google Scholar, since the year 2000 (data extracted 31/10/17). The growth in papers suggests an increase in funding and research effort in this area.

Figure 9. Number of MPA-related research publications



3.3.2.2 Ecological restoration, enhancement and mitigation services

Ecological restoration and enhancement may be carried out to improve or recover the natural environment within an MPA, or to offset or minimise the potential negative effects of a permitted development on the features of an MPA. In both cases there are a range of different sectors that may benefit, depending on the nature of the work. In the case studies three examples were demonstrated: conservation NGO restoration activity (coral reef restoration in Bonaire), artificial reef design and construction (artificial reef

programme in Cyprus – see Box 24), and eco-engineering (various projects in the Wadden Sea).

The most economically significant example was major **eco-engineering projects** identified in the Wadden Sea case study. Whilst part of a broader trend, the presence of MPAs and demand from MPAs themselves are a driver of demand for such services. Examples from the Wadden Sea demonstrate that contracts for eco-engineering services (or nature-based solutions) can be worth many millions of Euros, although the volume of such contracts will be few (see Box 23). In addition to direct contract values it is thought that the successful delivery of such schemes – which are still considered experimental and hence are not commonplace across the market – provide an opportunity for the export of such services. More broadly eco-engineering projects can provide:

- Benefits for developers: Adoption of eco-engineering solutions are thought to increase the chances of positive decisions based on EIAs for physical development. Eco-engineering has also been found to reduce costs, particularly maintenance costs but also up-front investment costs, compared to traditional 'hard solutions'.
- Benefits for the environment: Environmental NGOs strongly support the 'building with nature' trend because over recent years, it has aided the sustainable enlargement and more cost-effective protection and restoration of existing MPAs.
- Benefits for ecosystem services users: an aspect of many eco-engineering projects are the additional ecosystem service benefits that can be captured via natural solutions rather than traditional 'hard' solutions, including those linked to climate change adaptation and mitigation.

Box 23. Eco-engineering in the Wadden Sea

Over the last 40 years, "building with nature" has become an important topic in the Netherlands, particularly in marine and coastal areas. Eco-engineering is used to protect and restore islands and salt marshes in the Wadden Sea for conservation and other environmental purposes. Eco-engineering solutions have also become of interest to nature conservation organisations to protect, improve and enlarge protected areas.

Example: The island of Griend is located within the UNESCO World Heritage Site and is a Natura 2000 site. The island has been threatened for decades as a result of heavy erosion and geomorphological changes. An eco-engineering project was commissioned to enable continual nourishment of the island. The contract value was €2.5-3million.

Box 24. Artificial reef and associated infrastructure preparation in Cyprus

The Artificial Reef programme in Cyprus is a government-sponsored scheme, which since 2009 has created five Artificial Reefs (ARs) and designated the surrounding areas as Marine Protected Areas (MPAs). To date the preparation, cleaning and deployment of all sunk vessels has cost around €300,000, cost for non-vessel infrastructure including buoys marking the protected areas and mooring points to allow easy mooring near all five MPAs, has cost around €685,000.

3.3.2.3 Environmental consultancy and related services

Opportunities exist for research and consultancy companies who benefit from contracts to collect and analyse data relevant to MPAs and user impacts on them to support licence applications and designs.

3.3.2.4 Technology developers and operators

MPAs both stimulate and act as new markets for the application of new and emerging technologies. Examples were identified where the need for better MPA surveillance and

solutions for practices sustainable use measures have led to economic growth in an MPA-related technology market (see Box 25), such as one of the drivers for increase adoption of iVMS (inshore vessel monitoring system). The ecological restoration and mitigation markets may also see MPA-induced innovation.

Box 25. Example of opportunities for new technologies

- Machine learning based on satellite data and imagery is being used to track and monitor vessel behaviour in remote MPAs, such as around the Pitcairn Islands and Ascension Island (both UK Overseas Territories), and to identify illegal, unreported and unregulated (IUU) fishing activities. The use of unmanned surface vessels (SUVs) is also being explored in these areas to support MPA border patrols and identify IUU fishing. Using data from the SUVs, enforcement vessels can be targeted more effectively at locations where vessels are suspected of undertaking illegal fishing activities. An increasing number of organisations are offering such services, or components of such services.
- A project in Mallorca, 'Techbuoy' (<http://www.techbuoy.eu/>), co-funded by the EU's Eco-Innovation Initiative, developed an innovative solution for regulating recreational anchoring in Posidonia oceanica meadows. The system concept is based on a series of buoys which define a spatial area, with a gate/barrier controlling access to the area, with eco-moorings within it. Only recognised boats (those with reservations or other access permissions) can open the gate. Access and management are supported by an online platform and App. It offers a cost-effective solution to managing access and use of the moorings and avoids the costs and challenges of trying to control boat movement and collect user fees at the point of use. The innovation also has economic benefits for the technology developer/owner. The project trials completed in early 2017, with the first commercial sale of the technology in summer 2017. Additional applications have been identified for the technology and are being targeted – essentially any market where localised spatial access controls are necessary – such as fisheries management, ports and harbours and military areas.

3.3.2.5 Aquaculture and biotechnology

Where permitted within an MPA, benefits may occur for aquaculture and biotechnology sectors. The evidence identified a small number of examples where such benefits occur for shellfish aquaculture and for algae cultivation and related biotechnology applications.

In the Dutch Wadden Sea, degraded mussel stocks due to overfishing and storms, and expansion of MPAs, has prompted a shift toward new, more sustainable practices. The sector has shifted from mussel seed dredging to rope grown **mussel cultivation**. Growers have benefited through more consistent mussel seed supply, and hence production, and as a result of attaining MSC certification which has helped secure **access to key European markets and buyers**. Whilst some growers successfully transitioned, others have struggled with the investment costs of changing practices and higher production costs. Funding and education has been provided to support the sector's transition.

Development of blue biotechnology is dependent on the availability and state of marine genetic biodiversity, and the protection of marine environments in MPAs may play a role in supporting this development, subject to adequate management to ensure no adverse effect on MAP conservation objectives (Russi et al, 2016). A small number of examples were identified where novel approaches to **algae production** are being trialled in order to develop practices that are acceptable within MPAs. The case study of Kosterhavet (Sweden) demonstrates both the potential but also the challenges for innovation in emerging sectors – despite showing potential macro algae production innovators have found that the costs of seeking permissions to operate in the MPA can undermine the economic viability of their business. For example, Grebbestad Tångknäcke produces food

products including seaweed bread and dried seaweed / seaweed salt (“seaweed hard bread”). They received a permit to farm their own macro algae per year inside KHNP but have not taken up as the costs (e.g. to comply with monitoring requirements) are too high.

Iroise Marine National Park (France) is an example where the MPA management body has sought to support the industry in defining **sustainable harvesting techniques** that can enable operations to take place within an MPA. The park was a project partner on the Almarbio project, which designed good practice guidance for the industry and ultimately led to a bio label for near-shore seaweed harvesting throughout Brittany. More generally Iroise is an example of where **park management can play an important supporting role** in encouraging new, and expansion of, **sustainable aquaculture operations**. For example, provides not only financial support to new projects, but also provides individual expertise and assistance with project. Today, the aquaculture sector in the Park employs 20.5 full time equivalent (FTE).

Box 26. Algae cultivation in Kosterhavet Marine National Park (Sweden)

Seafarm is a large-scale (two hectare) state-funded research project exploring commercial opportunities of macro algae (*Saccharina latissima*) production. Up to 75 tonnes of algae is produced annually. Seafarm is located in the park partly for the benefits that it affords: it has ideal natural conditions for cultivation. There are also other reasons such as proximity to the Sven Loven research centre and the algae refinery site.

The project has received funding from the Swedish Research Council, the EU, Swedish authorities and private companies. The aim is to develop a closed loop production model that produces zero waste, primarily by introducing additional steps in the biorefinery of algae to produce a wider range of marketable products. These include: food, animal fodder, medicine, biogas/biofuel, and industrial materials. The researchers behind Seafarm set up a private company in 2016 called KosterAlg AB, selling the algae produced in the project. The company is still in the start-up phase.

3.3.2.6 Transport and ports

Evidence from the consultations indicated economic benefits to transport companies (such as ferries from increased recreation and tourism travel) and to ports and harbours as a result of increased activity in sectors that use their infrastructure and services (most notably tourism for the former and fisheries for the latter). This was considered more significant for smaller ports that may be more dependent on those sectors where the influence of an MPA may be greater such as fishing, tourism and recreation activities. In Cabrera (Spain) two ferry companies are granted licences to transport tourists to and from the island, generating an estimated €1.9 million in revenue per annum; in Lyme Bay (UK), the local harbours were reported to be benefiting from increased fishing activity associated with the improved fish handling facilities that were installed.

3.3.3 Branding and association

There is evidence that other blue economy sectors benefit by using MPA branding and association to enhance economic returns, with a number of different sub-mechanisms depending on the nature of the business and benefit. These are outlined in this section.

3.3.3.1 Product branding and eco-certification

Branding and eco-certification of products typically benefits those sectors that rely on marine resources to produce consumer products (e.g. shellfish aquaculture, algae cultivation and biotech, salt production).

Unlike MPA product branding for commercial fishing, branding appears to be more ad-hoc and company specific. For example²¹, in Kosterharvet, a company selling harvested seaweed and a company cultivating **macroalgae and related biotech** products both recognise the added value of marketing a product from an 'MPA'. In Sečovlje Salina (Slovenia), a company producing consumer **products using salt from the protected area salt pans** has developed a specific logo in order to capitalise on the marketing potential. There is no evidence on the economic value of such branding.

As for artisanal fishing, there is some evidence that MPAs can support shellfish **aquaculture operators'** attainment of eco-certifications, such as that offered by the Marine Stewardship Council.

3.3.3.2 MPA association

A broader reputational benefit was identified in some instances by fostering a favourable association with an MPA that can demonstrate tangible evidence of good Corporate Social Responsibility. Examples were identified in the **ports, energy and telecoms sectors** (see Box 27). Demonstrating support from conservation NGOs or public authorities (e.g. by obtaining permits for activity within protected areas, or being cited as best practice for sustainable use in MPAs) provides tangible evidence of a company's environmental credentials. This may have a positive impact on a company's image amongst its customers as well as corporate investors. A similar effect can also be fostered through direct investment in MPAs by non-related sectors. However, there were differences in stakeholder opinion as to how large such benefits may be and whether they could be quantified. No studies were identified that have examined these benefits.

Box 27. Example of opportunities for MPA association to demonstrate green credentials

- The Port of Rotterdam uses its association with the Voordelta MPA in some of its advertising, although the port authority considers the economic benefits to be minimal.
- Oil and gas companies typically cannot operate within MPAs. In the Wadden Sea it was reported that an oil and gas company developed innovative solutions (i.e. horizontal drilling) allowing them to prospect from the land to the sea. This activity was thought to have improved the company's image, which may have implications for market positioning.
- A European port operator reported that it could demonstrate its environmental credentials by indicating where conservation bodies had highlighted it as delivering best practices for others to follow, or indicating where overlapping or adjacent MPAs to the port operation were performing well. This provided tangible evidence that helped tick the 'environmental' box when marketing itself to financial investors.
- In Sečovlje Salina Nature Park (Slovenia), a telecommunications company invested in the MPA through the purchase of the on-site salt production works and provision of financial investment to support the restoration and management of the park. The company benefited directly through the commercial successes of the salt company and indirectly through an improved corporate image, which was reported to have commercial benefits.

²¹ See Technical Annex 3 for further details of these examples.

3.3.4 Changes in biodiversity and wider environmental change

There is limited evidence on the benefits arising from changes in biodiversity or wider environmental change for biodiversity-dependent sectors such as aquaculture and blue biotech. Case studies such as Kosterhavet (Sweden) recognise the importance of quality of the marine environment, as does the wider literature on these sectors. However, there is little evidence examining the economic value of MPAs in this regard.

Economic benefits for coastal businesses and communities linked to coastal protection and climate change adaptation can be identified, although were not the main focus of the study. One example identified was of insurance premium benefits. There are examples of insurance firms taking into account ecosystem condition and services - for example, the role of coral reefs in coastal protection and how they lower the risk to infrastructure on land from seaward hazards. Lower premiums may be offered to coastal development and infrastructure operators. Eco-engineering solutions for coastal erosion management that are in part encouraged due to the presence of MPAs (e.g. in the Wadden Sea) and prove more cost effective than traditional hard solutions, particularly in face of rising sea levels.

3.3.5 Reduced competition for space

Consulted stakeholders did not on the whole think that any of the other blue economy sectors benefit through reduced competition for space. One example was identified: where submarine cable owners/user (e.g. telecoms or energy producers) may save costs if MPAs protect submarine cables from damage by trawlers, as a result of excluding trawling in the MPA. No specific examples for this emerged, however.

A further example was identified, which demonstrated how improved data and knowledge sharing provided benefits through a more effective use of space (see Box 28).

Box 28. Knowledge Sharing in the Stellwagen Bank National Marine Sanctuary

In the Stellwagen Bank National Marine Sanctuary (SBNMS) area off the North American Boston coast, analysis of whale monitoring data revealed that the Traffic Separation Scheme through the SBNMS routed shipping over high density whale areas. Following detailed consultation, the International Marine Organisation agreed to a small northward shift of the Traffic Separation Scheme into low density areas. This reduced the risk of ships striking whales by 81%. Whilst there were costs associated with this move due to a small increase in steaming times, there may also be benefits through reduced ship damage and improved safety.

4 A Comparative View of the Benefits

Conclusions about which sectors benefit the most frequently and significantly, and how different MPA types influence these are hampered by a lack of genuine ex-post impact analyses of MPAs. Particularly for tourism, a majority of the economic literature assess solely the current value of MPAs, rather than the value against a counterfactual²². The heterogeneity of MPAs in terms of ecological, social and governance characteristics, and limited number of robust cost-benefit analysis estimates, means only crude generalisations are feasible from the limited evidence base.

4.1 Benefits across sectors

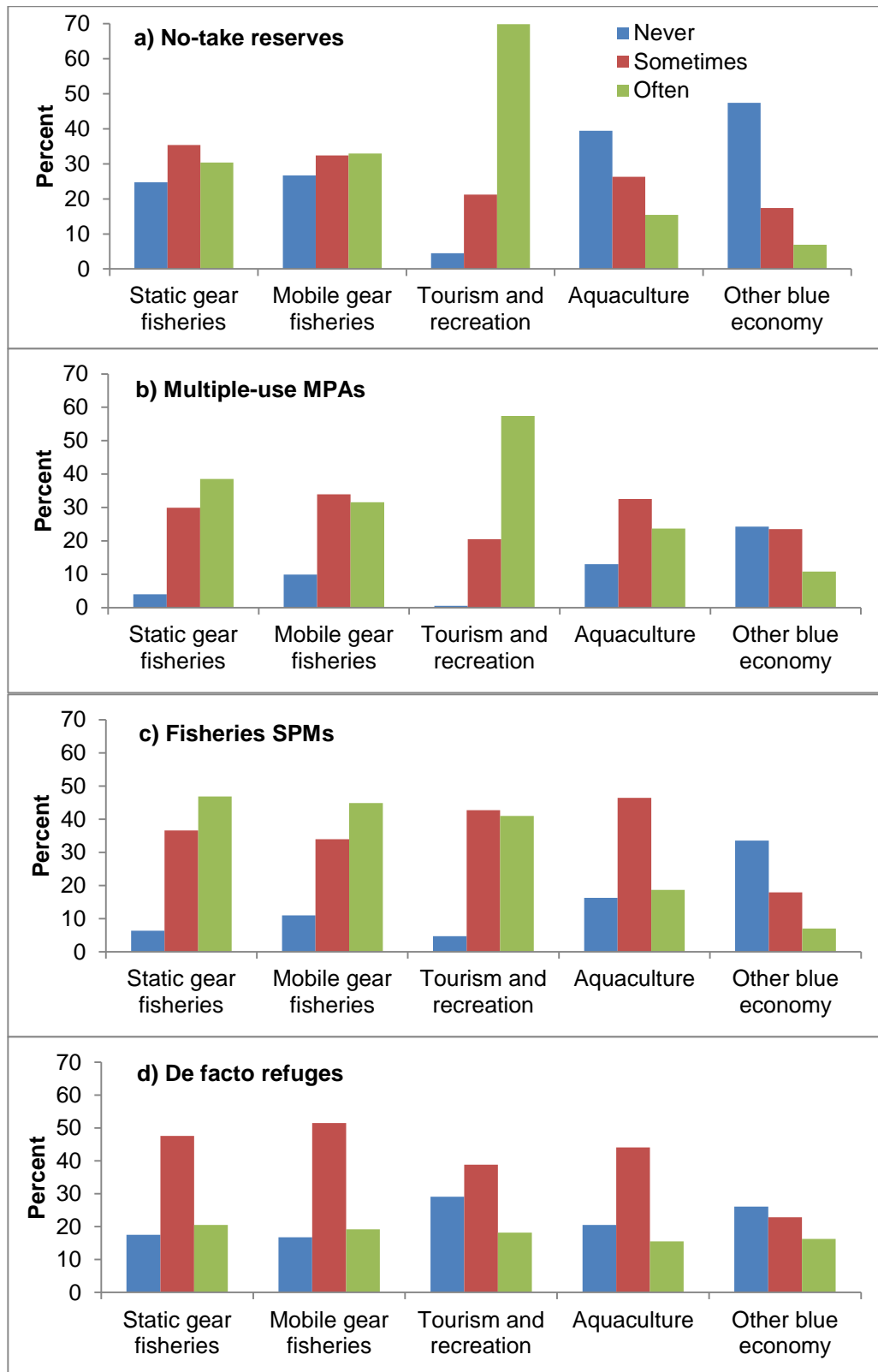
The benefits most frequently identified in the literature are summarised in Table 4. It demonstrates that there is a slightly greater body of economic literature on the economic benefits for fisheries (principally for inshore MPAs for artisanal fishers) than for tourism – although in both cases the body of evidence is small. There is no evidence in the literature on other blue economy economic benefits (based on the robust economic evidence methodology applied). However, the online survey – providing a view of informed stakeholder opinion – indicates that all maritime sector groups can benefit from MPAs and SPMs (see Figure 10). In particular stakeholder opinion indicates a strong emphasis on tourism benefits, particularly from no-take and multiple-use MPAs. But there is also a notable 30% who consider that other blue economy sectors benefit ‘sometimes’ or ‘often’ – this is clearly a more positive outlook than one may draw from the available literature. In general, survey respondent groups did not differ significantly in their opinions of sector benefits. However, responses from fisheries stakeholders tended to be more negative than other groups about the extent to which they gain from MPAs.

Table 4. Availability of robust economic benefit evidence (number of papers)

	Fishing	Tourism	Other blue economy
Type of MPA			
No-take MPA	8	2	0
Multi-use MPA	4	2	0
Combination/ zoning	2	4	0
Multiple sites/ protection types	4	6	0
SPM	2	0	0
Point of study			
Ex ante	1	1	0
Ex post	17	13	0
Type of study			
Assessment of change	13	3	0
Baseline study	5	11	0
Combination	0	0	0

²² i.e. either a pre-MPA counterfactual or hypothetical counterfactual for the current situation without the MPA.

Figure 10. Online survey opinion on which major economic sectors benefit from a) no-take MPAs (N=172), b) multiple-use MPAs (N=168), c) fisheries SPMS (N=166), d) de facto refuges (N=161)



The available data (see Annex 1) indicate that (in the cases where benefits do occur) the scale of benefits achieved by both the fishing (principally artisanal fisheries) and tourism sectors (e.g. increased revenues) range from just a few percent to hundreds of percent of the local baseline value. In absolute terms such increases are generally found to be larger for the tourism sector (examples range from tens of thousands to a few million Euros) than the fisheries sector (where examples range from tens of thousands to a few hundred thousand Euros). The relatively higher baseline value of the tourism sector helps to explain the greater absolute increase achieved by the tourism sector.

Other blue economy benefits linked to MPA management and associated research are arguably the more frequent, and given this may also be of greatest value overall. Individual MPA budgets can be up to around €2million/yr. and support funding and economic activity across government, consultancy and contractors, research and NGOs. This includes demands on technology providers, with increasingly large MPA networks and adoption of MPA management arrangements requiring new innovative solutions to surveillance and enforcement. Where significant capital works are required the economic value can outstrip that of tourism and fisheries benefits (e.g. in the tens of millions for eco-engineering services), however such cases are rare.

Aquaculture (notably shellfish aquaculture and algae cultivation) and biotechnology can benefit from MPAs, but the frequency and scale of these benefits is not clear. Similarly, other sectors such as ports and energy may benefit, but such instances appear rare and the significance of these benefits is difficult to conclude on.

4.2 Benefits across designation type

4.2.1.1 No-take and multiple-use MPAs

The literature review found evidence of benefits to the fisheries sector (mainly artisanal fisheries) from no-take reserves in coastal areas, but a notable gap in evidence for multiple-use MPAs. This contrasts with consultation, and some case study, findings which provide examples of benefits to the fisheries sector from both forms of MPA in coastal areas.

Fishermen using static gear to target low-mobility and benthic species are the segment of the sector most likely to benefit. Opinion from the online survey suggested almost equal benefits to both sectors, but this view doesn't appear to be supported by other evidence.

No evidence was found for economic benefits from offshore MPAs, beyond potential (and to date non-attributable) benefits to the fishing industry.

The clearest links between no-take reserves and multiple use MPAs for other blue economy sectors is to those sectors that can play a positive role in supporting the delivery of MPA conservation objectives – such as site management activities, environmental monitoring and research, environmental restoration works and surveillance and enforcement technology.

4.2.1.2 Fisheries SPMs

Whilst the case study of Os Miñarzos demonstrates the potential benefits of successful fisheries SPMs, there is little robust economic evidence in the literature. Consultees could only speculate on the extent of economic benefits. Online survey responses also indicated possible tourism benefits, but no evidence was found. Given the offshore location of many SPMs, the potential for tourism to benefit may be limited.

4.2.1.3 De facto refuges

Online survey respondents most commonly considered that de facto refuges 'sometimes' generate economic benefits for the fisheries, aquaculture and tourism sectors (between 40% and 60% of respondents depending on the sector). Other blue economy sectors were thought less likely to benefit.

Evidence both from the literature review and the consultation interviews most commonly infers possible tourism and fisheries economic benefits from de-facto refugees, with only a few examples demonstrating an actual impact on sector performance. There is greater economic evidence on artificial reef de facto refugees than other forms (e.g. de facto refugees around energy installations and their bases).

For artificial reefs experimental studies (rather than studies based on actual commercial fishing vessel performance) have demonstrated improved catches in artificial reef sites compared to control sites (e.g. 70% increase in catch per unit effort reported by Whitmarsh et al, 2008). Artificial reefs can be highly valued by divers and anglers. At the HMS Scylla artificial reef (UK), an estimated 42,000 divers contributed £25-30 million to the local economy during its first five years.

There is growing ecological evidence on the benefits of offshore energy installations, mostly relating to the artificial reefs created by their infrastructure. However, there is little economic evidence. One example is the Westermost Rough Windfarm (UK)²³, which created a temporary de facto refuge closed to fishing during wind farm construction. It reportedly benefited lobster populations and landings once it reopened. However, it is not clear whether this benefit was sufficient to compensate the loss of landings from the closure period.

4.3 Benefits against the costs

There are relatively few comprehensive ex-ante or ex-post cost benefit analyses (CBAs) of MPAs currently available from either within or outside Europe, making it difficult to draw overall conclusions about the net benefits of individual MPAs or MPA networks in Europe. No CBAs of European SPMs were identified.

Existing studies comparing the costs and benefits of MPAs use primarily an ecosystem services framework and suggest that a large proportion of benefits relate to non-market improvements in welfare rather than real economy benefits to sectors.

Empirical evidence of benefits in monetary terms is limited and CBAs are generally more complete in their monetary valuation of costs than benefits. Despite being unable to account for a comprehensive representation of benefits, these studies still indicate that the overall welfare benefits (when non-market benefits are included) of MPAs exceed total costs.

In terms of real economy, market benefits to blue economy sectors, there is very limited evidence examining the costs and benefits for any given sector. This hinders the assessment of the overall net effects of MPAs.

Given the apparent lighter level of management imposed on tourism, and the scope for both frequent and significant tourism benefits, one might reasonably infer that net benefits are most likely for the tourism sector.

For the commercial fishing sector, net benefits from multiple-use MPAs may be assumed where those fleet segments excluded from the MPA are able to redistribute their fishing effort with relatively minimal cost compared to the benefits for fleet segments permitted to continue (e.g. see Oz Miñarzos and Torre Guaceto case studies); although such costs are not always minimal and benefits do not always occur (e.g. see Egadi case study). For no-take MPAs, the picture is less clear, i.e. do the benefits from spillover effects outweigh the costs of displacement? Only one known study (Goñi et al, 2010), of the lobster fishery at Columbretes Islands Marine Reserve (Spain), has demonstrated a net gain where the benefits of spillover outweighed the cost of the no-take zone lost fishing opportunities.

For other blue economy sectors the situation is even less clear. There is a clear net benefit for sectors which see MPAs as direct drivers of demand, and which do not conflict

²³ see Technical Annex B for further details.

with conservation objectives – for example, MPA management, research, restoration activities, and surveillance technology. For sectors that use marine resources or space within an MPA, and have the potential to have negative effects on conservation objectives, it is not clear whether the benefits identified outweigh the costs. In many cases the scale and commonality of the benefits themselves is unclear.

5 Managing the Realisation of Economic Benefits

MPAs and SPMs, to achieve their conservation objectives and enable the realisation of potential economic benefits, require sound governance that provides the basis for implementing, enforcing and reviewing effective management and other supporting measures. In doing so, MPA and SPM governance and management needs to enable the realisation of any potential economic benefits without undermining site conservation objectives and in a way that supports a just and equitable allocation of marine resources.

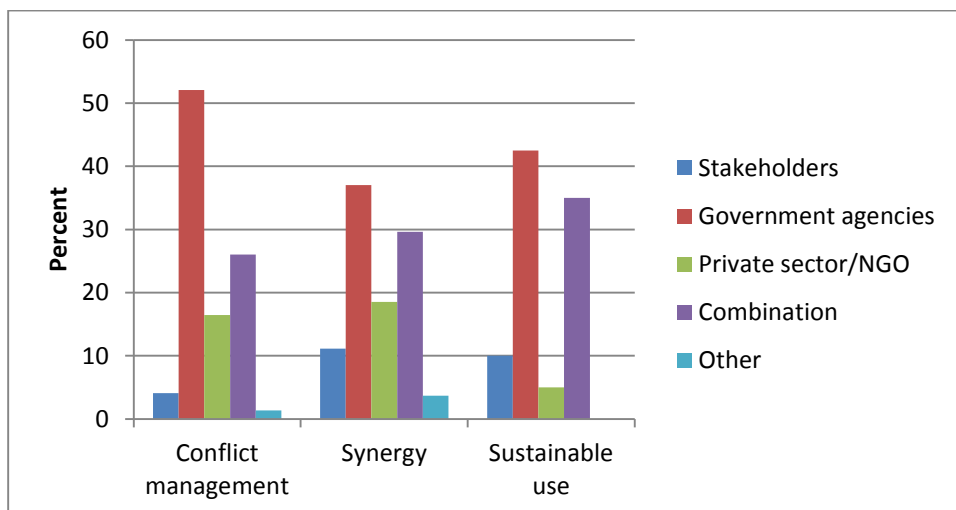
In this regard, this section synthesises study findings, identifying good practice examples, on the (i) mechanisms applied to ensure a sustainable use of MPA resources that is compatible with site conservation objectives, (ii) the nature of economic synergies that can maximise the economic benefits of sustainable use, and (iii) approaches to resolve conflicts between users and interests. In presenting the findings we draw on the typology of incentive mechanisms developed by Jones et al. (2011) (see Section 0).

Aichi Biodiversity Target 11 requires MPAs that are “effectively and equitably managed”. As a large proportion of MPAs in the EU are considered to lack effective management (e.g. see Milieu et al, 2016), any lessons learnt regarding successful governance and management solutions are important.

The research did not look at the impact of governance structures, although Jones et al (2011) categorise incentive mechanisms into three main governance types: top-down (legal mechanisms), bottom-up (participatory mechanisms) market led (economic mechanisms), with knowledge and interpretative mechanisms being a mix of all three approaches. Data from the online survey provides an indication of the prominence of different governance types in terms of the organisations seen as initiating mechanisms to support sustainable use, creation of synergies and conflict management (see Figure 11). Within this, a number of consultees emphasised the importance of appropriately skilled and motivated individuals for spearheading successful MPA initiatives and actions on sustainable use, synergies and conflict management.

In all cases (sustainable use, synergies and conflict resolution), awareness raising and collaboration mechanisms were rated as the most important by survey respondents.

Figure 11. Role of different actors in conflict management, creation of synergies and implementation of sustainable use mechanisms



5.1 Ensuring sustainable use of MPAs

European MPAs are primarily conservation tools applied to protect vulnerable species or habitats, and any human activity permitted within them needs to operate in balance with the site's conservation objectives. Economic objectives are typically secondary to conservation objectives. Some MPAs and SPMs are designated partly or entirely to protect cultural values, local communities or livelihoods (e.g. under national designation schemes), or resource using sectors (e.g. fisheries). For all types of MPAs, however, ensuring that use of the site and its resources is managed at a sustainable level is essential for its primary objectives to be met. There is much guidance on how sectors can operate within MPAs.²⁴

MPA management measures may establish which activities are permitted to operate within the site, or the conditions with which permitted activity must comply, to attain the conservation (or other) objectives. This may include restrictions on the use of particular equipment (e.g. fishing gear), practices (e.g. actions that remove or damage particular species or habitats), or the spatial zones or timing in which activities can take place. Such restrictions may be laid down in legal instruments and applied to regulated activities via licenses or permits, or applied directly to unregulated activities, or implemented via voluntary agreements and codes of practice.

Such measures provide a first order determination of sustainable use. This section considers the extent to which further incentive mechanisms are used to ensure that those activities permitted to benefit from MPAs do so in a way that ensures that benefits are realised without undermining the attainment of MPA objectives or potential benefits for other sectors.

The online survey indicates the extent to which stakeholders had experienced certain measures to be successful in ensuring sustainable use (see Figure 12). In reality, a combination of measures are typically used.

The three measures most commonly considered as successful or somewhat successful are:

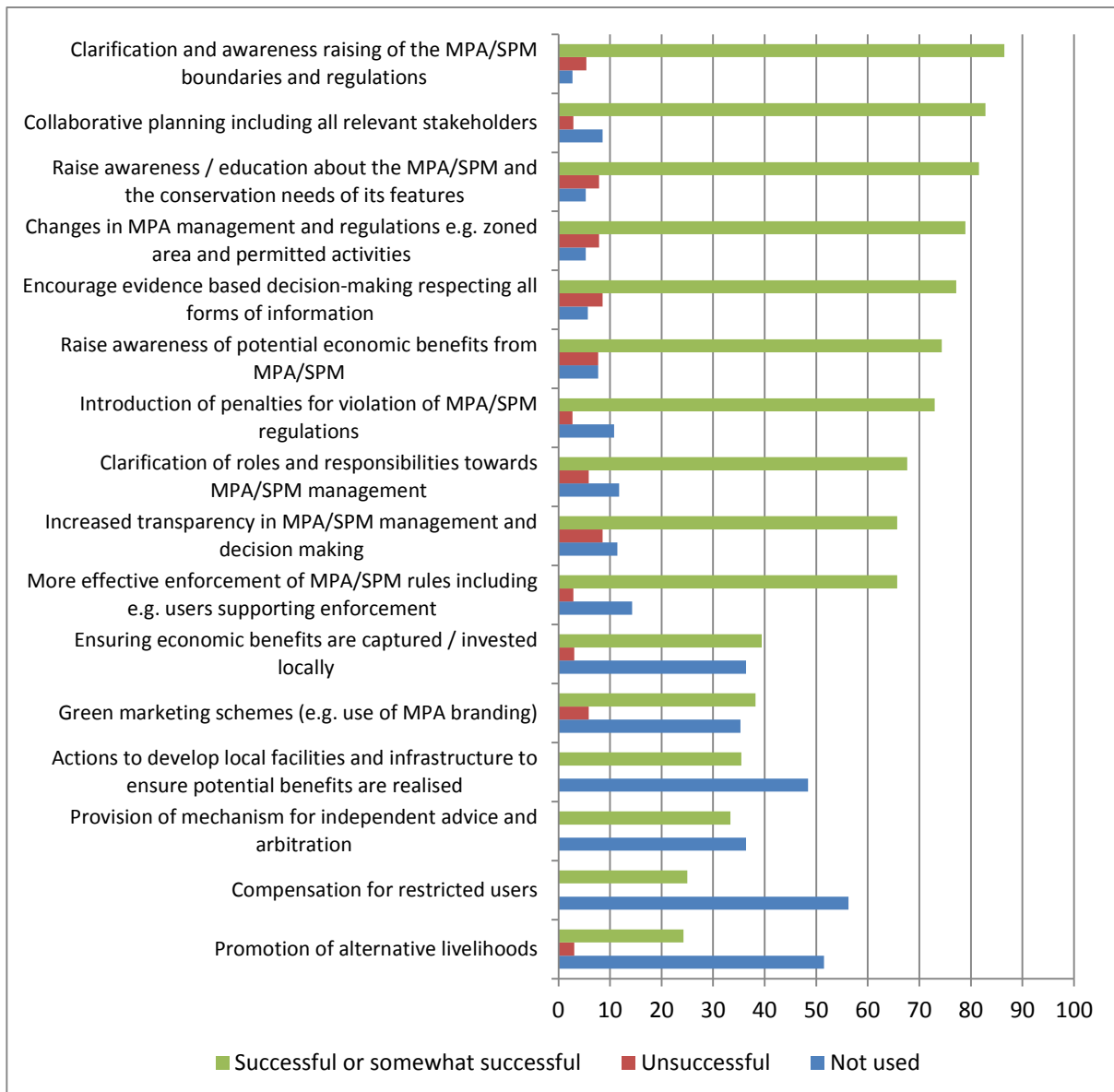
- Clarification and awareness raising of the MPA/SPM boundaries and regulations (86%)
- Collaborative planning including all relevant stakeholders (83%)
- Raising awareness/education about the MPA/SPM and the conservation needs of its features (82%)

5.1.1 Knowledge and interpretative mechanisms to ensure sustainable use

Knowledge and interpretative mechanisms refer to the use of different forms of knowledge and information, and building understanding to enhance management design and to encourage stakeholders to adopt more sustainable practices. These include awareness raising measures, which account for three of the top five measures cited by online survey respondents (see Figure 12).

²⁴ For example, see: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

Figure 12. Measures implemented to encourage sustainable use and their level of success (N=40)



Source: Online survey – Technical Annex B

5.1.1.1 Communication

Communication raises awareness on what the MPA management measures are and education on why they are being implemented – both why they are needed and what the potential benefits are. Communication is used in many MPAs to encourage compliance and more sustainable practices. This can be particularly important for tourists, who may have little knowledge of the MPA when visiting. This is also relevant for other sectors – the Cyprus AR case demonstrates the compliance problems that can occur when a lack of communication creates uncertainty for fishermen over the location and rules of an MPA.

To be effective, communication and education promoters need to be able to access MPA users in a way that allows the messages and learning to occur. In Bonaire, communication and education are the principal tools used to encourage water sport participants to comply with the rules (see Box 29). Historically, these have been very effective. However, there has been insufficient opportunity to engage with cruise tourists,

who only visit the island for a few hours, and hence this approach to ensuring compliance is becoming less effective (at least with this market segment).

Box 29. Geographical break down of the evidence base on economic benefits to the fisheries sector (n = 44).

Whilst there are formal penalties in place to support enforcement of many of the park's management measures, the principal means of encouraging compliance is through communication and education. Education in particular is seen as critical: if individuals understand why the rules are there they are more likely to follow them. The two main channels used for education are:

- Mandatory dive orientation education and practical test of competence for every diver
- General educational communications to ensure people understand the legislation and regulations in place for the park.

For activities outside of diving, the same approach is applied, but there are less formal opportunities for the 'education aspect'.

5.1.1.2 Training and educating stakeholders

Improving stakeholder knowledge through training and education was demonstrated to support the adoption of more sustainable practices. In the Wadden Sea, efforts to transition mussel cultivators to new more sustainable practices were supported by an education programme; in Iroise MPA (France), fishers were trained in how to minimise the risk of sudden pollution incidents. In Kosterhavet (Sweden), fishermen were encouraged to introduce closed areas for trawling after having seen ROV footage of trawl damage to coral reefs.

Box 30. Knowledge and interpretative mechanisms in Torre Guaceto (Italy)

In Torre Guaceto MPA (Italy), fishermen permitted to fish inside the MPA have learnt about the economic benefits of sustainable fishing. These fishermen have also started to use the 30-mm mesh nets required to fish inside the MPA in their fishing grounds outside of the MPA (where the legal minimum is smaller at 22 mm). They understand that larger mesh size helps to avoid capturing juveniles, improves localised stocks and supports catching lower amounts of higher-priced big fish – this enables them to be more economically profitable and less labour-intensive than when catching larger amounts of smaller fish.

5.1.1.3 Complementary tools and processes

Practical tools can be used to allow stakeholders to be more aware of their own compliance with MPA rules. For example, in some Italian MPAs, recreational fishers are provided with educational material on MPA rules and sustainable fish consumption together with logbooks to help them track their own catch against these.

5.1.1.4 Using scientific and stakeholder knowledge

Formal scientific knowledge, e.g. through MPA research and monitoring, typically underpins management decisions. For example, in Iroise (France), the management body has undertaken research mapping and monitoring of kelp growth and the impact of fishing activities on the resource, which has helped to refine rules controlling harvesting.

Improving such formal knowledge, and complementing it with stakeholder knowledge, can further enhance sustainable use (and foster MPA buy-in). For example, in Gökova MPA (Turkey), negotiations about no-fishing zones are based on data from the Ministry of Environment, but are complemented by local knowledge which is confirmed by scientific

data. Harvesting data from mobile phone Apps that provide tourist information on MPAs may provide an opportunity for building better information and understanding of the distribution of tourism activities, which can help management design.

The importance of adequate knowledge was recognised for enabling adaptive management to be undertaken in MPAs, to ensure that MPA management remains appropriate in the face of changing environmental and socioeconomic conditions. In Torre Guaceto MPA (Italy), fishermen participate in regular monitoring programmes and have signed a document stating that they would accept management adaptations if monitoring data indicated it was necessary.

5.1.2 Legal mechanisms to ensure sustainable use

Legal mechanisms are commonly used to define activity zones or place limits on activity levels in order to ensure sustainable levels of use. As an extension to this the role of MSP was raised by a number of stakeholders as a process for wider spatial management and zoning.

For MPAs to deliver their expected conservation and economic benefits, the management measures need to be effectively enforced. Regardless of the appropriateness of an MPA management plan, insufficient enforcement can undermine effectiveness. Di Franco et al (2016)²⁵ demonstrated that there is a strong relationship between high enforcement and fishermen incomes in MPAs.

Key factors identified in this study as important to enable sufficient enforcement included: adequate resources for surveillance and enforcement; and adequate penalties and institutional mechanisms to act as a deterrent (as well as the rules themselves being clear and understood – see previous sub-section 5.1.1).

The case study of Os Miñarzos provides a clear example of how an effective MPA can deliver benefits for the fishing and tourism sectors, and how these benefits can then be undermined if the funding required for effective enforcement is removed. Sensible planning of enforcement activities can help to ensure cost effectiveness. This may include risk-based deployment of resources (e.g. in Zakynthos MPA, Greece, the enforcement presence increases during the high tourist season when non-compliance risk is greatest), and/or adoption of new surveillance technology as a more cost-effective solution than at-sea patrols (e.g. the proliferation of VMS and iVMS for fishing vessels, for both MPA and wider fisheries management purposes).

The need for adequate deterrents is demonstrated through two examples. In the case study of artificial reefs in Cyprus, fishermen reported that the cost of the fine for illegal fishing is lower than the potential economic benefit from an illegal catch and as a result is ineffective in deterring potential violations. In the Bonaire case study, it was suggested that there is insufficient institutional capacity to ensure that permit conditions regulating the impacts of coastal development are adhered to, undermining their effectiveness.

5.1.3 Participative mechanisms to ensure sustainable use

Participatory MPA management can support sustainable use in two main ways: participative enforcement and participatory planning.

Participative enforcement, where stakeholders participate in self-policing, which can provide an effective supplement to formal enforcement, increasing the likelihood of management measure compliance by users of the MPA and hence ensuring sustainable use. Key drivers for self-policing include a sense of ownership and recognition of the importance of compliance for both MPA conservation objectives and realisation of the potential economic benefits, which can be fostered through stakeholder involvement in MPA management and through formal allocation of user rights. An adequate system for acknowledging the legitimacy of self-policing and for providing a system for reporting breaches of MPA rules is also necessary.

²⁵ Based on analysis of small-scale fisheries within 25 Mediterranean MPA buffer zones

Participative planning can both improve decision making by bringing in stakeholder knowledge (see Section 5.1.1.4) and foster higher compliance levels due to high stakeholder buy-in to the MPA (see Section 5.3.2.2).

5.1.4 Economic mechanisms to ensure sustainable use

Economic mechanisms use market-based incentives to encourage behavioural changes and/or to enhance the capture of MPA benefits. A number of such mechanisms were identified, including:

- Assigning property/user rights.
- Branding, labelling and certification.
- Direct support for operators to shift towards more sustainable practices.

5.1.4.1 Assigning property/user rights

Assignment of property rights can be used to promote ownership and stewardship to encourage more sustainable practices that serve the self-interest of those involved, as well as those of the MPA. This mechanism was most commonly found applied to the commercial fishing sector, in MPAs including Cabrera and Os Miñarzos (Spain), and Punto Campanella and Torre Guaceto (Italy). In each of these examples, MPA access is restricted to fishermen from neighbouring municipalities (and in the case of Os Miñarzos, to those who fish above a minimum number of days). Conferring such user rights ensures fishermen realise the economic benefits of any actions they take to enhance fish stocks within the MPA. This is reported to have encouraged self-policing as well as engagement in other practices that can further enhance both economic and conservation benefits of the MPA.

Box 31. The benefits of local fishing user rights in Torre Guaceto MPA (Italy)

In **Torre Guaceto** (Italy), only fishermen that are resident in one of the two adjacent municipalities are permitted to operate inside the MPA. For this reason, ensuring the long term sustainability of commercial species in the area is in the best interest of the fishermen, who are the only beneficiaries. For this reason the fishermen not only respect the restrictions on fishery activities, but also collaborate with the monitoring activities carried out by the MPA staff and report illegal fishing activity

5.1.4.2 Branding, labelling and certification

Branding, labelling and certification schemes may be introduced to support businesses with lower environmental impacts, for instance small-scale, low-impact fisheries or certification of so called 'eco-tourism'. This provides a mechanism that incentivises increased environmental sustainability, beyond that required of any formal MPA management measures (although consultees appear to principally consider it as an economic benefit generating mechanism - see Section 0).

Box 32. Branding, labelling and certification to encourage a shift towards sustainable practices

In the **Iroise MPA** (France), the park management works closely with harbours, fisheries and discovery activities to develop partnerships (or “charters”) through which fishing businesses commit to certain sustainable practices, including transparency about the origin, techniques and volumes fished; to bring back to shore any waste collected in their nets; to take observers on board (whether for control or scientific purposes), and undertake certain training (e.g. pollution prevention training). In return, they are permitted to use a product label of ‘Partner of the Park’ that certifies their commitments and eligible for financial support (grants) for activities contributing to the MPA management plan.

5.1.4.3 Direct support for operators to shift towards more sustainable practices

A range of direct support mechanism – access to finance, technical and administrative support – have been successfully employed in MPAs to help operators shift towards more sustainable practices. These may enable operators to adopt known MPA-compliant practices, or to foster innovation in sustainable practices. In Kosterhavet Marine National Park (Sweden), the costs of seeking permissions to operate within the MPA were seen as holding back potential biotech innovation associated with macro algae.

In a number of MPAs (e.g. Torre Guaceto, Iroise) short term incentives via the provision of funding, or at least support to access funding, has been successfully used to support fishermen in the transition to the lower impact gears (or alternative practices) required to comply with the MPA management measures. In the Wadden Sea case, the provision of funding (and education) has been coupled with a transition period, which gives both the financial resource and time necessary for mussel farm operators to invest in new equipment and techniques required to comply with MPA management.

Box 33. MPA management body support for aquaculture operations and innovation in Iroise (France)

The Iroise Marine National Park case study demonstrates how the park provides support to professional activities that contribute to the objectives set out in the management plan. In particular, it aims to help new businesses that are willing to start an activity in the Park. The park management body has provided such support to a number of shellfish aquaculture and algae cultivation businesses which between them now employ 22 FTEs. Recently, the Park’s authorities have been cooperating with the regional committee of shellfish farming of north Brittany (CRC Nord-Bretagne) on an integrated multi-trophic aquaculture project off the coast of Molène. The objective is to reproduce a natural ecosystem to farm various shellfish (including abalone) and algae types. The project partners approached various stakeholders to investigate both the scientific and technical aspects of the project and discussed its feasibility with local stakeholders (e.g. municipality). In 2016 a 10 ha concession was granted off the coast of the island and an operator was selected.

5.2 Promoting synergies

MPAs, SPMs and their surrounding areas are commonly used for a range of activities. Theoretically, synergistic effects – or “win-wins” – may occur between different users, for example, mussel cultivation in combination with offshore energy installations located in an MPA, or between conservation objectives and blue economy sectors. These can enhance the scale of economic benefits that can feasibly be realised without compromising the sustainable use levels necessary to achieve site conservation objectives.

Online survey results indicate that stakeholders think that MPAs and SPMs can help to create synergies. However, the literature review and stakeholder consultations found little evidence or knowledge about how synergies or mutual reinforcements between multiple economic sectors linked to MPAs and SPMs are creating opportunities for the European blue economy. Hence there was little evidence on the mechanisms that are used to encourage the creation of synergies.

Case studies undertaken for this study did however identify a number of synergies occurring in MPAs. This indicates that there may be a general lack of awareness and lack of formal knowledge of what types of synergies can occur and under what conditions.

5.2.1 Examples of MPA-related synergies

The examples are presented across three types of synergies:

- **Cross-sectoral synergies** can occur between any two sectors, but often appear to be linked to tourism – which may be because it is the sector considered to most often benefit from MPAs.
- **Single sector synergies** refer to cases where organisations within a single sector work together in order to enhance the benefits that they can realise from the MPA. These typically go beyond simple supply chain benefits.
- **Sector and MPA/MPA management authority synergies** refer to situations where the second beneficiary is the MPA environment or managing body.

Box 34. Examples of cross sectoral synergies

- In Kosterhavet Marine National Park (Sweden), a macro-algae harvester (Catxalot) collaborates with a local brewery producing an algae beer and with a company making algae ice cream. Catxalot sees potential in also bundling algae harvesting with park-based tourism products, such as courses in outdoor survival and seafood foraging.
- In Bonaire National Marine Park, there are synergies between the tourism sector and the NGO conservation sector. These occur through the creation of conservation-orientated tourist activities, principally for diving. They benefit the conservation sector through the supply of volunteers to carry out their conservation activities (e.g. coral restoration and transplanting) and fund-raising opportunities. They benefit tourism operators by providing an opportunity for product differentiation. The marine park facilitates this synergy by providing the regulatory framework to enable successful environmental activities by other organisations and through its role in supporting the dive sector (and benefits from the conservation activities).
- In the Wadden Sea, eco-engineering (i.e. building with nature) projects (e.g. using artificial mussel beds for coastal erosion management), in part stimulated by the protected area designations, can provide for a broader range of ecosystem service benefits than traditional approaches.
- In the Maritime-Terrestrial National Park of the Cabrera (Spain), researchers have collaborated with fishermen in order to trial lobster trap designs that may be most suitable to currently used trammel nets.
- In the National Marine Park of Alonissos (Greece), there are synergistic benefits among fisheries, tourism and the local community as a result of increased involvement of fishermen in local tourism (Trivourea et al, 2011).

Box 35. Examples of single sector synergies

- In the Maritime-Terrestrial National Park of the Cabrera (Spain), there is a synergy between nearby hotels and other tourism operators. The hotels promote trips to Cabrera archipelago as part of their marketing, which supports demand for other tourism operators associated with the park e.g. ferry companies
- In artificial reef MPAs (Cyprus), there is a synergy between dive operators in different locations. Some diving tour operators have collaborated as part of package dive tours to multiple artificial reef MPAs and share key resources (e.g. boats) in order to enhance their product offer (and allow overcrowding at the most populated locations to be managed).
- In artificial reef MPAs (Cyprus), there is a synergy between dive operators and the hotels industry. In exchange for supporting dive tourism demand, tourist operators within hotels or hotel employees receive varying levels of commission, which tend to be between 10-20% of the total price of the diving package sold.
- In Torre Guaceto MPA (Italy), tourism sector benefits are captured across multiple traditional sectors (e.g. food producers and suppliers, and traditional tourism service operators) sector. There are synergistic benefits of working through the extensive and multiple MPA branding schemes to raise awareness of the destination, and benefit from pooled publicity and supporting services.

Box 36. Examples of synergies between economic sectors and MPAs / MPA management bodies

- In Vama Veche – 2 Mai marine reserve in Romania, synergies have been created between the dive sector and the reserve management authority. The management authority has provided dive centres with educational materials about the reserve, enhancing the dive experience, which in turn has brought income to local businesses. In return the visitors provide the management authority with observational data, photographs and videos of the reserve that can support management activities.
- In Sečovelje Salina Nature Park (Slovenia), there is a synergistic relationship between the traditional salt production and the park's environment and cultural heritage. The concession for traditional salt production provides two key benefits for the park: (i) it directly maintains the cultural heritage assets and practices of the park and thereby also directly supports the maintenance of the environmental processes in place in the park's habitats, (ii) it generates revenue which provides a major source of income for the physical management (restoration and maintenance) of the park's assets. The park in turn provides the salt production company with the unique selling point for its salt and related products, which the company capitalises on via brand trademarks.
- In Bonaire National Marine Park, the park management body (STINAPA) and a salt producer (Cargill) both enhance their 'social licence' to operate by collaborating to address the potential environmental impacts of salt production infrastructure maintenance and other works. For both organisations this addresses local negative image perceptions. For Cargill, they are seen as making every effort to minimise environmental impacts, and it provides them with support if residual environmental issues do arise. For STINAPA, it demonstrates a positive attitude towards economic activity in the park, enhancing its image as a facilitator of sustainable use rather than as a barrier to economic progress (an issue that causes conflict on the island).
- In Bonaire National Marine Park, there is a synergistic effect between the park authority and the tourism sector. Nearly all of the management body's funding comes from a tourism fee (for using either Bonaire's marine park or terrestrial park), hence it benefits from a strong tourism sector. The tourism sector benefits from the marine park, not only through its efforts to maintain the quality of the marine environment, but also through its marine park status and education programmes which enhance the tourism brand. The sector also benefits directly from the infrastructure maintenance funded by the fee e.g. of mooring buoys.

5.2.2 Mechanisms to encourage the creation of synergies

Of the online survey respondents who were familiar with an MPA related synergy (34 in total), 77% stated that actions had occurred to encourage synergies. The three measures that were most frequently reported as being successful or somewhat successful were:

- Raise awareness of potential economic benefits from MPA/SPM (91%).
- Raise awareness / education about the MPA/SPM and the conservation needs of its features (87%).
- Collaborative planning including all relevant stakeholders (87%).

Interview and workshop consultees recognised similar participatory, knowledge and interpretation mechanisms – particularly emphasising the role of communication, consultation and dialogue, the sharing of data between stakeholders, and the establishment of formal partnerships.

5.2.2.1 Knowledge, interpretative and economic mechanisms

MPAs as economic clusters

The limited stakeholder evidence available indicates that, in terms of the creation of synergies, an important route for encouraging their formation could be to set the right conditions to allow stakeholders to identify and form synergistic partnerships. The MPA management body (or other organisations) may provide the fora or processes that can facilitate engagement between different stakeholders. MPA management bodies may take this role further through the provision of a range of direct business support mechanisms that MPA management bodies can offer – either from their own human or financial resources or by engaging partners.

In this regard, case studies of Iroise, and at a broader scale Torre Guaceto, indicate that they can act as an economic cluster – the hub around which various partnerships and synergies come together, bringing the institutional and financial resources necessary to create synergies and drive innovation.

MPAs as part of Maritime Spatial Planning

To date, MPA planning has largely taken place outside of MSP processes, driven directly by the requirements set out in legislation such as the Nature Directives. Some stakeholders suggested that maximising the economic potential of MPAs and bringing stakeholders together to facilitate exploration of synergies, may be more likely if MPAs planning processes are more closely co-ordinated with the multi-objective process of MSP. For example, it may allow for greater recognition of factors that can enhance economic benefits (without undermining conservation priorities) – such as the location (and protection) of spawning and land-sea interactions, and hence be better supported by the land-based development required to take advantage of MPA induced economic benefits. In Kosterhavet Marine National Park (Sweden) it is hoped that an ongoing spatial planning process (which emphasis ecosystem service concepts in line with the national park objectives) will help provide greater clarity on spatial aspects of conservation and economic priorities, thereby reducing misunderstandings, bottlenecks and conflict.

5.2.2.2 Legal mechanisms – licence awards and conditions

Licenses or permits determine the right to build or operate within an MPA/SPM and standards/conditions may be attached to these – typically in relation to mitigating environmental impacts. This study found two ways in which such licensing processes may be used to promote the creation of synergies:

- Public procurement evaluation criteria can place an emphasis on creating the conditions for co-benefits. This was highlighted as a currently missed opportunity regarding de facto refuges and co-location of activities. For example, in the UK, bids for offshore wind licences are awarded principally on cost of production criteria. They do not take into account meaningful consideration of other quality criteria such as how wind farms designs might best offer co-benefit – hence there is little incentive for offshore wind developers to design infrastructure or operational processes in a way which may allow for co-location benefits to arise.
- Licence conditions can be used to ensure permitted activities take place in such a way so as to generate co-benefits for other users. For example, in Cabrera, ferry companies are granted permits to operate in the MPA subject to their agreement to deliver adequate mobility access and environmental education actions, which can enhance access and experience for tourists, and hence support tourism sector benefits.

5.3 Resolving conflict and attaining stakeholder buy-in

5.3.1 The main conflicts related to MPAs

MPAs and SPMs, by imposing new management on marine activities, restricting some activities while others are allowed to continue (e.g. low-impact fishing or recreational diving), or otherwise altering the existing spatial distribution of activities, can be met with opposition. This can create conflicts between or within different user groups due to changes in dynamics and competition. Globally, conflicts between stakeholders are believed to be one of the reasons for the high rate of MPAs failing to achieve their management goals (Hargreaves-Allen et al, 2011).

Conflicts related to MPAs may occur between sectors, within sectors or between sectors and MPA management authorities or environmental NGOs. All forms of MPAs were thought by online survey respondents (n=175) to cause conflict. The most common response for each MPA type was that they 'often'²⁶ lead to conflict. The second most common response was that they 'sometimes' lead to conflict, except for no-take MPAs where the second most common response (26%) was that they 'always' lead to conflict.

According to online survey respondents' experiences²⁷, conflicts occurred before, during and after MPA designation with conflict peaking post designation: 70% stated that conflict occurred post designation, compared to 54% pre-designation and 65% during designation (multiple answers were possible).

5.3.2 Mechanisms used to resolve conflict

Some evidence suggests that initial stakeholder opposition to MPAs might fade with time, especially if the MPA results in benefits and opportunities to the local community, if the feared costs do not materialise or can be indirectly resolved by one party readily adopting a new behaviour.

In many cases, however, different measures have been required to address and resolve conflicts. The online survey showed that of respondents familiar with an MPA related conflict, 72% stated that actions were taken to resolve the conflict. The three measures that were most often thought to be either successful or somewhat successful are (see Figure 13):

- Raising awareness / education about the MPA/SPM and the conservation needs of its features (65%).
- Clarification and awareness raising of the MPA/SPM boundaries and regulations (63%).
- Collaborative planning including all relevant stakeholders (62%).

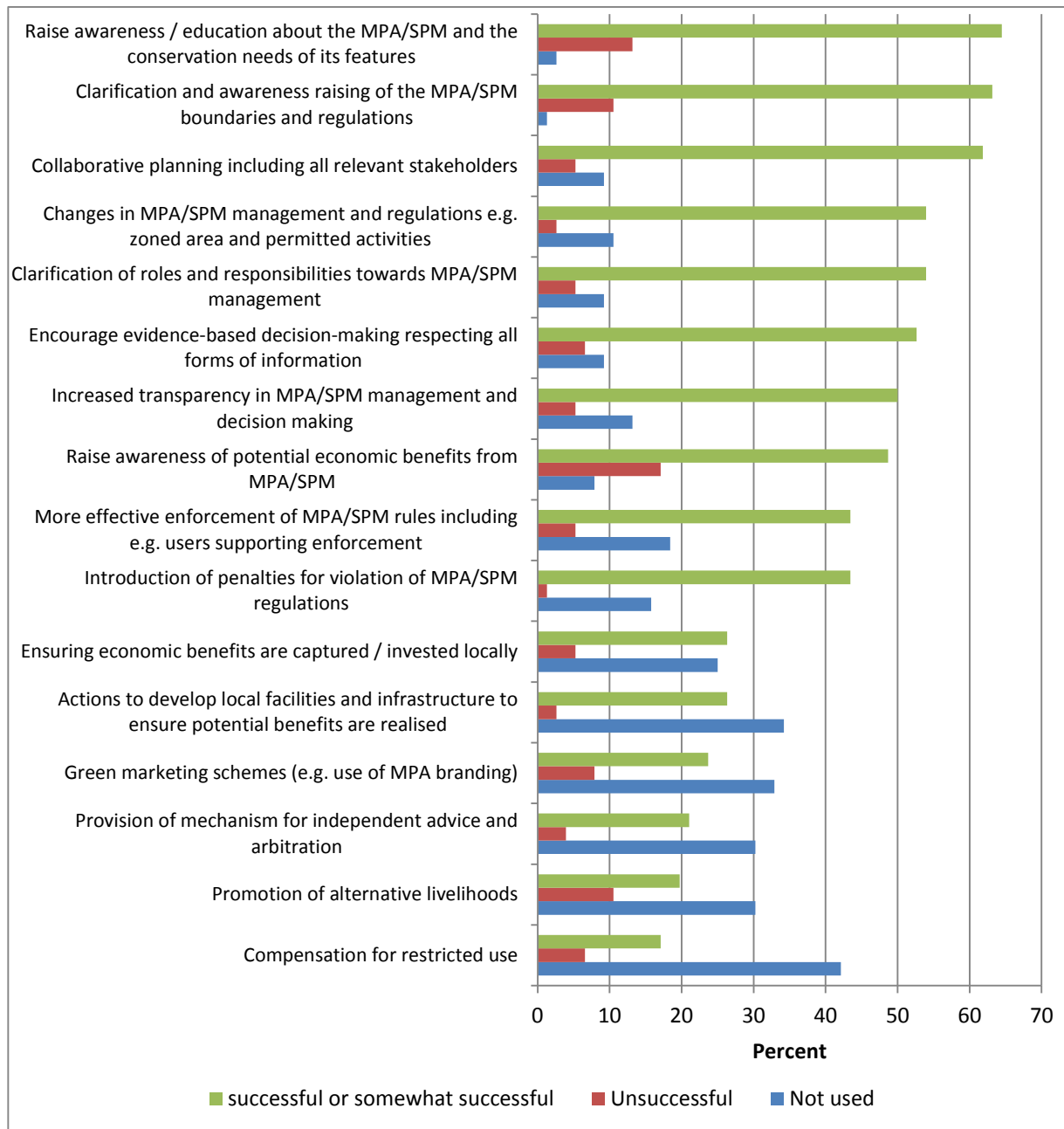
Survey responses, as well as other consultation information, indicate that such interpretative mechanisms and participatory mechanisms are arguably the most important for addressing conflicts.

While the mechanisms for conflict management are presented below on a one-by-one basis, it is important to note that many of the examples given of successful conflict management by interviewees involved a combination of approaches (e.g. dialogue, data, guidelines, responsive management and its enforcement). It was also considered that getting different stakeholder groups involved in and supportive of MPAs and to bring about the resolution of conflict, required substantial periods of time.

²⁶ Response options were: "never, sometimes, often, always, don't know".

²⁷ Only respondents familiar with an MPA/SPM related conflict were asked to complete this question (n=105).

Figure 13. Online survey responses on measures implemented to resolve conflict and their level of success (N=76)²⁸



5.3.2.1 Knowledge and interpretive mechanisms

The evidence gathered during in-depth interviews and workshops suggests that awareness-raising activities – about the conservation need and potential economic benefits of an MPA, and about the MPA boundary and regulations – are key to resolving, or avoiding MPA-related conflicts. A supporting point is the need to utilise a sound evidence base that incorporates all forms of available knowledge. The consultations underlined that such mechanisms need to occur early on in the MPA designation process and should be context-specific.

Knowledge and interpretative mechanisms are important because the perception of legitimacy is one of the most important aspects for the success of MPAs. To reduce

²⁸ Only respondents familiar with a conflict and the success of measures to resolve it were asked to respond.

conflicts, it is important that the reasons behind site designations are made clear, that stakeholders believe that decisions have been made on the best available evidence and know what they can expect as a result of the MPA designation. In particular, such mechanisms can help to foster early buy-in by dispelling unfounded concerns about the potential impact of an MPA.

Raising awareness and educating stakeholders

Awareness raising often takes place through stakeholder meetings, which may be general or sector-specific. For example, in Torre Guaceto (Italy), a number of sectoral meetings were held between local fishermen and the park management, a local MPA branding organisation and an academic, which enabled fishermen to be educated on the need for and expectations of the MPA, including of the potential economic benefits they would receive.

A number of consultees cautioned against the risk of falsely raising stakeholder expectations of economic benefits, which may help to alleviate conflict at the planning stage only to intensify it in the medium term if expectations are not met. If anticipated benefits do not emerge, it is important that stakeholders understand why if they are to continue to support the theory that an MPA will provide economic benefits. This was the case for the Cyprus Artificial Reef programme, where spillover benefits for fishermen have not been witnessed, but fishermen agree that this is in large part due to continued illegal fishing in the MPA.

Peer-to-peer learning

Peer-to-peer learning was recognised as a useful tool for addressing conflict with the fisheries sector during MPA designation. Consultees cited that face-to-face education with sector peers can hold more resonance than education provided by the MPA proponents or supporting researchers. Such learning exchanges do not appear overly common, although use has increased markedly (mainly in the Americas) over the last 10-15 years, from only a few per year to close to 20 in 2013 (Lekelia et al, 2017).

A number of examples were identified, although none from Europe. For example, artisanal fishermen who had opposed the establishment of an MPA in Taza, Algeria, became more favourable to it after some of them visited the Scandola Marine Reserve in France, where they learnt from the experience of local French fishermen (Boubekri and Djebar, 2016). A similar example was indicated where Tunisian fishermen visited fishermen from a successful MPA in Spain to better understand the potential benefits of MPAs, and returned in favour of a Tunisian MPA.

Sharing of data and information

Sharing of data between blue economy sectors and conservation agencies can help to resolve and avoid conflicts by providing for a common understanding of the evidence base.

Where data sharing improves the evidence base it can result in better MPA planning and management decisions. The use of VMS on fishing vessels is a form of data sharing facilitated by technological developments. In Lyme Bay (UK), IVMS (inshore vessel monitoring system) was trialled on vessels under 12m, to examine whether it could reduce conflict by allowing vessels greater access by more accurately ensuring that fishermen are avoiding the MPA's sensitive conservation features.

Sharing of data and information can support negotiations over what activity can and cannot take place within MPAs (and what forms of environmental mitigation may be necessary to support permitted activity). An aquaculture sector interviewee reported that the aquaculture industry is sharing data and reports with conservation agencies to support discussions about the acceptability of different forms of aquaculture within MPAs.

In the UK, Natural England is developing a tool to improve the consistency, certainty and transparency of conservation advice that it provides to support licensing decisions in MPAs (see Box 37).

Involving stakeholders in the data collection process, especially when data are used to set activity restrictions, can help to ensure buy-in. This may also have relevance for research that underpins decisions. For example, in Bonaire, various research reports which examine the potential MPA benefits and carrying capacity are available, but opinions on the validity of their conclusions vary across stakeholder groups – it was suggested that greater involvement in both the research and its dissemination may support greater / more aligned acceptance by stakeholders.

Box 37. Information sharing to enhance MPA licence application processes in the UK

Natural England (a government Statutory Nature Conservation Advisor) is developing a new tool to support early engagement with marine developers on the potential environmental impacts of development proposals in MPAs. The tool will be targeted particularly at complex projects, such as offshore wind farms, which may impact multiple MPAs, have multiple activity-MPA feature interactions, and in-combination effects to consider. It is hoped that the tool will bring a number of benefits for environment authorities, regulators and developers. These include: support a more efficient start to the conservation advice and development consenting process through faster access to information and identification of issues of concern; improve certainty, consistency and transparency in how and why issues are identified and decisions made; and support standardisation of assessment output layouts. All of these aspects are expected to provide time and cost savings to both regulators and developers compared to the current situation, and help to avoid unnecessary delays and conflicts

5.3.2.2 Participatory mechanisms

It is widely accepted that participative mechanisms are essential for conflict resolution, as suggested by the online survey and by many references collected in the literature review. Where stakeholder engagement is good, stakeholders were generally reported as having greater ownership of the MPA and respect for its management.

Participatory activities complement other aspects of successful MPA management, helping to form and strengthen collaborations between stakeholder groups; co-develop management measures (e.g. charters or codes of conduct) and innovative solutions; increase the transparency of decision-making; encourage self-policing and enforcement; and provide an opportunity to share data.

A number of examples were reported where conflict had been managed and stakeholder buy-in fostered through different stakeholder forums, notably:

- Meetings with stakeholders and members of the public raising issues early on; and
- Creation of MPA related forums and management bodies that communicate with stakeholder groups.

There are a number of examples (see Jentoft et al, 2012; Leleu et al, 2011; and van de Walle et al, 2015) where stakeholders who were initially sceptical towards MPA designation have later changed their views as a result of becoming more actively involved, meeting MPA management representatives face-to-face as well as witnessing the positive changes within the wider community. The benefit of early engagement with stakeholder to alleviate concerns, raise awareness of benefits and collaborate on MPA planning was emphasised throughout the consultation. In Kosterhavet, Sweden, concerns were alleviated by such early engagement: meetings between fishermen, scientists and the County Administration made the different parties realise they had a common goal –

the park proponents wanted to preserve the local ways of living as part of a sustainably used national park, and the fishermen wanted to make sure their livelihoods could continue.

However, in cases where major conflicts occur in the early stages of designation of MPAs, a top-down government approach may give better results and help to find a solution, as argued by Jones and Burgess (2005). The authors present a preliminary analysis of 15 case studies of inshore MPAs in the UK and find that it is not always true that local initiatives are necessarily better than centralised ones for achieving conservation objectives and that they could even undermine the potential for cooperation. Some stakeholders suggested that, because MSP processes may be viewed more positively than MPA processes, stronger alignment between the two may alleviate some unnecessary conflicts at the MPA planning stages.

Clear communication and aligned expectations between the different authorities and stakeholders involved were reported as essential by workshop participants. Common complaints about participatory mechanisms are that the balance of stakeholder interests are inappropriate, that stakeholders lack decision-making power (or their expectations of decision outcomes are not met) and that participation is only short-term. For example, in the UK, there has been considerable stakeholder engagement and sharing of data by stakeholders for MPA planning, but the final decision on where to locate MPAs is a political one and not everyone's wishes can be taken into account (see Box 38).

Box 38. The importance of continued engagement and managed expectation in Marine Conservation Zone planning (England, UK)

The MCZ participatory planning process engaged thousands of stakeholders via a number of different stakeholder fora. These included four Steering Groups, one in each geographical corner of England, multiple local and working groups, all guided by regional project teams, who led the identification and recommendation of 127 MCZs over an (approximately) 2 year period. This process was credited with fostering buy-in to the recommendations and social capital supporting MCZ designations. However these benefits are broadly thought to have been undermined due to the lack of any continued participatory processes following the submission of the recommendations to Government, as well as change to and delays in the designation of the recommended MCZs.

Box 39. Stakeholder forum in Kosterhavet Marine National Park (Sweden)

Kosterhavet Delegation for the Kosterhavet MPA, Sweden, is a forum comprising stakeholders and members of the public. Members of the delegation pick up concerns from their respective stakeholder groups for discussion among the delegation and communicate points of interest back to their stakeholder groups. The delegation is also involved in decision-making for the development of the area.

The management model gives stakeholders a voice and is credited with helping to bring the local community together. Enabling the community to work with the park authorities has helped to alleviate initial concerns about the MPA, and provides an ongoing mechanism for raising issues for discussion. All stakeholder groups are represented and the Delegation meets on a regular basis (four times per year).

Nevertheless, some stakeholders feel that improvements could be made. They question the extent to which stakeholders truly influence decisions, whether the balance of stakeholder representatives is appropriate and whether more regular, informal meetings are necessary

Box 40. Co-management in Os Miñarzos Marine Reserve of Fishing Interest (Spain)

The coordinators of the MPA extension planning process (Fundación Lonxanet) suggest that the co-management approach for the MPA encourages dialogue between the different stakeholder groups and ensures conflicts are avoided or minimized. The co-management governance is thought to facilitate a greater willingness for dialogue, collaboration and interaction, especially within the fisheries sector, but also with the scientists and public administrations involved. A social monitoring survey from 2010 indicated that fishermen thought that the sector was better organized at the local level as a result of the MPA.

Whilst participation is key, it is also recognised that the right individuals are needed to galvanise and drive forward participatory approaches and help resolve conflicts. For example, the important role of a local politician was recognised in Kosterhavet Marine National Park (Sweden) in resolving conflicts with fishermen and in establishing the park.

Consultees suggested that training is needed to help individuals and organisations to run workshops on MPA planning and management, taking into consideration cultural differences. The importance of well-trained individuals was demonstrated in Torsviken MPA (Sweden), where an open forum dialogue with stakeholders led by an external moderator was used to resolve conflict between stakeholders regarding a proposed expansion of the Port of Gothenburg.

5.3.2.3 Legal mechanisms

Legal mechanisms are commonly used to define activity zones or place limits on activity levels which can help resolve conflicts between sectors (as opposed to address potential impacts on features of conservation importance) – this was the fourth most common successful measures according to the online survey (see Figure 13). The former in particular is broadly used (although not solely for conflict management purposes). Such mechanisms are most commonly applied to tourism and fishing activities to address spatial conflicts within or between the sectors.

As an extension to the potential of spatial conflict management via zoning, the role of MSP was raised by a number of stakeholders. This was particularly as a means to address unanticipated off-site conflicts (e.g. due to displacement) and to avoid conflict over economic priorities for both the MPA and in the context of its surrounding area. However, some stakeholders expressed the view that there is currently insufficient join up between MPA and MSP processes.

In some cases, recourse to the courts may also be used to settle disputes. Well defined MPA rules and responsibilities in legal documents are necessary to enable legal processes to arbitrate such disputes. In the examples identified, such legal mechanisms appear only to be partially successful in addressing conflicts. For example, in Sečovlje Salina Nature Park (Slovenia), the private company that manages the park took the Government to court, as the Government provided only half of their planned financial contribution, and received a partial settlement. In Bonaire National Marine Park, whilst legal action has been successful in preventing potentially damaging activities from being granted permits, the act of legal challenge has undermined the working relationship between the independent park management body and the government (the two parties involved).

Box 41. Examples of activity zonation and limitation to address conflicts

- Zoning in Cabrera MPA (Spain): Diving activities have become regulated and zones are now devoted to diving and artisanal fishing. This zoning has reduced conflict between these sectors by reducing their interaction. Both divers and small-scale fishermen indicate that the zoning has supported the performance of their activity as it avoids possible accidents or disturbances.
- Activity level limits in Tabarca marine reserve (Spain): A significant increase in the number of diving licenses following the establishment of the reserve generated opposition from local fishermen. As a result of this opposition, diving was restricted in 1993 and the number of licenses stabilised or declined slightly thereafter (Badalamenti et al (2000)).
- In Os Miñarzos, the Galician Federation of Underwater Activities (FEGAS) was opposed to the existing ban on spearfishing. Support for the MPA extension was secured by offering FEGAS continued spearfishing access to the expanded area on the condition of developing a rigorous and verifiable regulatory system. This proposal was accepted by FEGAS, which also sees this as an opportunity to improve its public image by demonstrating improved regulation. As a result, FEGAS is now in favour of the proposed extension of the MPA.

5.3.2.4 Economic mechanisms

Economic mechanisms appear to be the least commonly used means of conflict resolution. Where such mechanisms were identified they principally sought to provide compensation to address the conflict. Compensation may take a number of different forms:

- **Financial compensation.** In Torre Guaceto MPA (Italy), for example, fishermen received a single year payment for reducing fishing effort; other of financial compensation for fishermen were in the Great Barrier Reef Marine Park, Australia, and the Soufriere Marine Management Area, St Lucia.
- **Provision of employment and livelihood opportunities.** In La Restinga (Spain), for example, although initially sceptical, fishermen now see the MPA as an opportunity to diversify their livelihoods into tourism while still maintaining their traditional culture and identity. Examples of direct offers of employment to compensate for MPA restrictions appear less common in Europe, although are commonly talked about with regards to offshore wind farm de facto refuges (e.g. fishing vessels being employed to support surveillance, monitoring and other activities).
- **Provision of infrastructure and services.** In Bonaire National Marine Park, the MPA management body offered infrastructure and services (e.g. mooring buoys) to help avoid conflict when a new diver access fee and rules were introduced. In a Slovenian MPA example local fishermen were given new fishing gear in return for agreeing to extend a fishing closure by two months.

6 Conclusions, Implications and Research Needs

6.1 Conclusions

6.1.1 The economic benefits of MPAs and SPMs

There is evidence that demonstrates that MPAs and SPMs can provide economic benefits.

Parts of the fisheries and tourism sectors are those most commonly found to benefit from MPAs – although robust ex-post evaluation evidence that clearly attributes changes to an MPA is limited. There are also opportunities for other sectors, even when they are not directly reliant on the ecosystem services supported by MPAs and SPMs. This is most clearly identified for those sectors that benefit from MPAs as direct drivers of demand (e.g. MPA administration and monitoring, conservation management and restoration work, research, surveillance and environmental service providers).

Whilst improvements in biodiversity, the wider environment and resulting ecosystem services are most commonly perceived as the mechanism through which MPAs provide economic benefits, there are a number of other important benefit mechanisms, such as MPA branding and capitalising on opportunities from new and more sustainable practices. Many of these other mechanisms require additional entrepreneurial or institutional effort, beyond sound MPA environmental management, to capitalise on them.

However, there is limited evidence on the extent to which blue economy benefits outweigh costs – for individual businesses or more broadly within sectors where there are distributional effects. This is the case for relatively well studied sectors such as fisheries as well as other sectors. The case for net benefits is greatest for the tourism sector as well as sectors for which MPAs are clear drivers of demand (e.g. MPA management, research, restoration activities, and surveillance and monitoring).

6.1.1.1 Economic benefits to the commercial fishing sector

Segments of the commercial fishing sector can benefit economically from MPAs and SPMs, under the right conditions. The scale and extent of economic benefits varies considerably, overall and across fleet segments and geographies (i.e. they depend on the access arrangements and geographic distribution of MPAs/SPMs). The principal beneficiaries are typically small-scale, artisanal fleets using static fishing gears in coastal areas. Examples indicate that where benefit do occur, MPAs may help to increase the incomes of fishermen – by amounts ranging from just a few percent to increases of many hundreds of percent. This can support absolute increases in fleet revenues of tens of thousands to hundreds of thousands of Euros. However, it is not clear that such benefits always constitute net benefits for individual fishermen, or that they result in net benefits once MPA costs to non-beneficiary fleet segments are accounted for.

The fisheries sector obtains economic benefits most commonly as a result of changes in biodiversity/environmental quality. Where improvements occur in fish stocks, MPAs can support increased catch per unit effort, principally for low mobility species, both within an MPA and through spillover effects. Most evidence is for coastal MPAs – there is more limited evidence for offshore MPAs and SPMs, and the effect is harder to determine in more complex fisheries. There are a number of factors that determine the likelihood of such benefits – this includes whether the site, and hence its management, is specifically designed to benefit commercially targeted species, which most EU MPAs are not.

Examples also exist of economic benefits stemming from MPA product branding, although there is a lack of formal economic research on these. Two forms were identified. Firstly, MPA labels and brands have been developed around individual MPAs, often combined with direct selling initiatives. Secondly, MPAs have played a role in the eco-certification of fisheries (e.g. through the Marine Stewardship Council). In both cases, these require fishers to implement and follow sustainable use practices; in return, these provide economic benefits through improved market access and, in some instances, through higher prices.

Accessing such benefits can require fishermen to transition to more sustainable fishing practices. In some cases, MPA management bodies offer financial and educational resources to support this. In this sense, MPAs and SPMs provide incentives to shift the sector towards a more environmentally sustainable model.

6.1.1.2 Economic benefits to the tourism sector

The sector is arguably the one that gains the most economically – both in terms of frequency and scale. Economic evidence indicates that MPAs can support significant tourism value; however, there is limited robust ex-post analysis that can attribute changes (or maintenance) in that value to MPAs²⁹. Examples indicate that MPAs may help to raise incomes by amounts ranging from just a few percent to many hundreds of percent, supporting absolute increases for the sector of tens of thousands to a few million Euros. However, the scale of benefit varies significantly across MPAs depending on factors including the local tourism market dynamics, the scale and nature of the MPA and its attractiveness and accessibility for tourism.

Certain parts of the tourism industry have strong positive links with MPAs – notably those more directly reliant on environmental quality (e.g. diving), whilst others in some instances may be excluded from certain types of MPA (e.g. recreational angling and spear fishing from no-take MPAs), which can influence the attainment of economic benefits. However more general forms of tourism can also benefit from MPAs.

Improvements/conservation of biodiversity and the wider environment, MPA branding and marketing, and capitalisation on new opportunities for tourism services are the three most commonly identified benefit mechanisms. However, it is hard to isolate the contribution of each mechanism. It is generally difficult to determine the extent to which benefits are generated by actual environmental improvement/conservation or a perception of such improvements or via other mechanisms. A number of examples indicate a combination of mechanisms, and that this is arguably a more powerful generator of benefits than individual mechanisms acting in isolation.

As well as raising the economic output of the sector, MPAs can also play a role in addressing many of the structural challenges facing the sector. There are examples of MPAs providing an avenue for tourism marketing, helping to differentiate and raise the profile of coastal tourism. MPAs were reported to be providing the impetus – and in some cases business support services – for the development of new tourism products which diversify the tourism offer. In some cases, this was found to support higher value tourism and increased tourism activity outside of the peak summer season. MPAs can also play an important role – through the implementation of sustainable use measures, opportunities for product/service eco-certification and in catalysing niche services such as eco-tourism – in encouraging a shift in the sector towards a more environmentally sustainable model.

6.1.1.3 Economic benefits to other blue economy sectors

Whilst there is a dominant view that sectors other than fisheries and tourism do not benefit from MPAs and SPMs, such benefits do occur. However, they are little recognised, documented or quantified, may occur only in isolated cases and may not be significant compared to the potential costs of an MPA. As such, in many instances it is hard to make broad generalisations, particularly regarding the scale and frequency of benefits.

Opportunities for new and expanded activities which are necessary for the good management of MPAs offer the clearest route for economic benefits. In this sense, MPAs/SPMs generate direct demand for MPA administration and conservation management, monitoring, surveillance and scientific research jobs. In addition, they generate demand for other services, such as technology for improved MPA surveillance and management, and eco-engineering and ecological services to provide for environmental restoration or mitigation of the environmental impacts of new activities. Of

²⁹ Either before and after comparison of tourism value or comparisons against a without-MPA counterfactual.

the few examples identified, contracts for such services may range from the tens of thousands of Euros to tens of millions of Euros.

There are examples of shellfish and algae aquaculture and biotechnology benefits, although no literature was identified that researches these economic benefits. A combination of mechanisms can work to provide benefits for the sector, linking to MPAs providing good environmental conditions, supporting more sustainable practices as well as branding and eco-certification. However, the extent to which such benefits, where they occur, outweigh costs of MPAs is not clear.

Maritime sectors such as ports, harbours and transport providers can benefit indirectly as a result of increased demand from the tourism and fisheries sectors, where MPAs stimulate improved performance in those sectors. It is suggested, but not evidenced, that there may also be benefits for submarine infrastructure, for example where submarine cable providers/users may benefit from reduced damage where MPAs remove trawling damage risks.

More broadly, there is some evidence suggesting a link with MPAs and other blue economy sectors, when MPAs can be used by companies to demonstrate their environmental credentials through the adoption or innovation of lower/best environmental impact practices or through direct green investment. There are indications that this can benefit companies in the eyes of their customers and investors, although there are differences in opinion on the significance of such benefits.

6.1.1.4 De facto refuges

Much of the evidence indicates that economic value may be generated by the ability of structures on the sea bed to support new areas of biodiversity rather than support the conservation of existing biodiversity. For example, mussel strings and turbine bases can offer habitat for species and therefore support biodiversity, although not in places where these species would typically have been found. The clearest examples (although robust economic evidence is lacking) are where artificial reefs are installed with the dual purpose of benefitting both biodiversity and dive tourism – although such economic benefits are often as much due to the nature of the structure as they are to the biodiversity benefits provided by the artificial reef. The extent to which potential benefits may be realised depend in part on where the de facto refuges is and who has access to it.

For de facto refuges to be classified as 'other area based conservation measures' that contribute to MPA networks, they may need to exclude certain sectors to ensure they offer the same conservation benefits as designated MPAs. Consequently, de facto refuges – particularly if they are to contribute to MPA networks – may offer only limited opportunities for some economic sectors to access the refuges in order to benefit from them. Further, stakeholders consider that there are insufficient incentives for the economic sectors which create de facto refuges to design their operations or infrastructure in such a way that would allow 'co-location' of other sectors such that they too could benefit.

6.1.1.5 Net benefits

Whilst there is evidence that MPAs can deliver net benefits (i.e. benefits of greater value than costs) when measured in terms of societal welfare (considering both market and non-market impacts), when solely market impacts are considered there is very little evidence to consider.

There is a lack of robust ex-post evaluations of the economic impact of MPAs to draw firm conclusions about the scale of market economic benefits, the likelihood with which they occur, or the extent to which they outweigh costs. This may be a reflection of the relatively short time since many European MPAs were designated and received effective management, of economic effects not being of primary interest for monitoring programmes (as the primary objectives for MPAs are conservation-orientated), as well as of a lack of investment in MPA monitoring and evaluation more generally.

Qualitative case studies undertaken in this study provide a weak indication that net benefits may be more likely in situations when the market benefits are of a meaningful scale.

6.1.2 Managing the realisation of benefits

Evidence gathered throughout this project has pointed to the success of MPAs, including the extent to which they generate economic benefits, being dependent (at least in part) upon MPA governance and management. However, a large proportion of MPAs in the EU are considered to lack effective management (e.g. see Milieu et al, 2016). Hence Aichi Biodiversity Target 11, which requires MPAs that are “effectively and equitably managed”, cannot be considered met despite a significant increase in the area under MPA designation.

A number of different mechanisms can be deployed to ensure that economic benefits are realised sustainably, that synergies which seek to maximise sustainable economic returns are encouraged, and that potential conflicts are avoided or resolved.

Good governance and management takes time and resources to put in place and, in some cases, may require support from agencies not initially included within the original stakeholder group (e.g. NGOs external to the location undertaking activities such as supporting the creation of stakeholder forums and guiding the development of sustainable use measures). It is widely demonstrated in the literature that for MPA management to be successful in the longer term, stakeholders need to be actively involved in the process. Furthermore, management needs to be adaptive to changing environmental and social contexts.

6.1.2.1 Ensuring sustainable use

MPA management measures may establish which activities are permitted to operate within the site, or the conditions permitted activity must comply with, in order that conservation (or other) objectives can be attained. Thereby they provide a first order determination of sustainable use. A robust evidence base is recognised as essential to the creation of fair and effective restrictions and regulations. This may be enhanced where participatory approaches draw in all forms of relevant knowledge and allow for regular monitoring data to be collected.

A combination of mechanisms need to be employed to ensure that the potential benefits of MPAs are realised sustainably, i.e. that MPA management measures are adhered to. In particular, these mechanisms need to make sure that stakeholders know and understand the rules and regulations of the MPA, are educated to understand why the MPA is in place and what economic benefits it may provide over the short-, medium- and long-term, and that there is adequate enforcement to ensure that non-compliance can be identified and addressed. Participation of stakeholders in MPA design and management can support these needs by providing forums for engagement and encouraging compliance and self-policing. This may be most clearly fostered through the adoption of co-management approaches – although there are few such examples in Europe. In general, education and awareness can be hard to deliver where stakeholders are difficult to reach, which can reduce the likelihood of them either knowing or adhering to rules and best practices. A clear example of such a stakeholder group is cruise ship tourists.

6.1.2.2 Synergies

There is a general lack of understanding about the nature of potential synergies that MPAs can support. There are few known examples of clear synergistic economic benefits and, in this regard, little explicit discussion of MPA synergies in the literature. Synergies that were identified can be classified across three types:

- Single sector synergies (beyond simple supply chain linkages) identified mostly within the tourism sector.
- Cross-sectoral synergies, most commonly between tourism and other sectors.

- Sector-MPA synergies, between economic sectors and MPA management bodies / MPA environmental enhancement (or the funding to do so).

MPAs, where they facilitate area-based stakeholder interaction (e.g. through their participatory management approaches), can act as a forum for business collaboration in the same way that area-based maritime clusters do. A small number of examples were found (e.g. the Iroise Natural Marine Park, France), where local MPA management authorities appear to be proactively supporting the creation of an MPA economic cluster, i.e. they create a real or virtual space to enable dialogue between different actors (research, different private sectors, etc.), including offering financial incentives (e.g. easier funding access or fiscal benefits) and technical and administrative support (e.g. training).

There are also opportunities to formally encourage the creation of synergies via licensing award criteria and conditions.

More generally, close connections between MPA planning and management and MSP may provide a ready-made forum for positive dialogue between economic sectors.

Cooperation between MPA management bodies and economic sectors is critical in realising sector-MPA synergies. Where MPAs help to stimulate innovation and shifts towards green practices (lowering the environmental impact of activity within an MPA), institutional and other resources are often needed to determine and agree acceptable practices and to support investment.

6.1.2.3 Conflict resolution and stakeholder buy-in

Conflicts related to MPAs may occur between sectors, within sectors or between sectors and MPA management authorities or environmental NGOs. They can occur before, during or after designation. Worldwide, conflicts between stakeholders are believed to be one of the reasons for the high rate of MPAs failing to achieve their management goals.

Evidence from the literature, consultations and case studies demonstrate the primary importance of participatory mechanisms, such as co-management, that enable and promote dialogue, as well as knowledge and interpretative mechanisms that support the use of best available evidence and a shared understanding of issues. Early implementation of these mechanisms can help to overcome pre-designation conflicts, which may be in part based on stakeholder concerns about the unknown impacts of an MPA.

However, it is important for these mechanisms to be maintained over the longer-term to ensure that any social capital and buy-in is not eroded over time and that concerns do not return. Formal roles for stakeholders on MPA management groups is a commonly employed mechanism that enables ongoing dialogue and involvement.

In some cases, conflicts can be managed via amendments to zoning or codes of conduct that help to limit the cost impacts of MPAs on stakeholders whose activities need to be managed. Closer connection between MPA planning and management and MSP may also help to better manage off-site conflicts of MPAs that result from displacement. For residual impacts, compensation mechanisms can be deployed, but they appear little used in Europe.

6.2 Implications

There are a number of implications that can be drawn from this study to help ensure that the role of MPAs and SPMs in supporting the blue economy is maximised, and that the potential economic benefits are realised in a way that does not undermine their environmental objectives.

6.2.1 Planning for economic benefits

MPAs are, first and foremost, a conservation tool designed to protect species and habitats in an attempt to halt and potentially reverse the decline in marine biodiversity.

The generation of economic benefits has not, to date, been a key driver of such designation, save for some fisheries SPMs.

Economic benefits may be more likely to materialise if they are planned for as a component of MPA design, management and governance. Given the need to work with sectors, the design and management of MPAs (in pursuit of conservation objectives) needs to systematically take account of sector needs, and establish plans which can identify and support opportunities to promote synergies, manage conflicts and maximise economic benefits where this does not compromise conservation objectives. As MPA coverage continues to increase, this will become increasingly important if MPAs are to best support all facets of a blue economy and to ensure continued stakeholder buy-in.

Stakeholder participation is as important for planning for / enabling economic benefits as it is for ensuring conservation benefits and stakeholder buy-in.

Stakeholder participation can play an important role in the creation of benefits, especially through processes such as MPA design and management, awareness raising and understanding, and data and knowledge sharing between stakeholders for use in decision-making. By increasing dialogue with sectors that do not typically interact with MPAs, opportunities for benefits (including synergies) may be more readily identified.

Transitions necessary to ensure economic operators' compatibility with MPA requirements may be more effective where there is time to plan for them. If economic operators are approached in advance of designation, then opportunities to explore and implement changes to address key concerns can be taken up. Such transitions may require investment and training, which both need adequate time to be implemented. For instance, economic activities creating pressures on the environment that would jeopardise the attainment of an MPA's conservation objectives might be able to adopt alternative practices that are compatible with attainment of those conservation objectives. This may both limit the economic costs of MPA designation, because operators can continue instead of facing prohibitions, and encourage and demonstrate 'greener' economic practices that could be taken up more widely by the sector as a whole.

The potential for MPAs to act as economic clusters could be better acknowledged and supported. MPAs can act as a focus for institutional support to transition the maritime economy towards a blue (i.e. green) economy that is more compatible with environmental objectives, promoting green innovation and synergies between sectors.

6.2.2 Placing MPAs within the broader environmental and economic context

Impacts (including costs and benefits) of MPAs are not confined to MPA borders and are not confined to individual MPAs in isolation. Better planning for MPA networks is needed, as is the need for MPA planning and management to sit within management of the wider marine area.

MPAs should be seen as being at the core of the EU's blue infrastructure, and this should be recognised within (or at least in concert with) an MSP system that meets both environmental and economic objectives. The system as a whole needs to meet multiple objectives, enhance synergies and manage conflicts. Greater coherence with such a multi-objective process as MSP may better support the creation of a functioning blue infrastructure network that provides for the most appropriate distribution of conservation and economic activity (including additional designations or zones that complement MPAs and meet blue economy objectives) and improved land-sea interactions.

MPAs need to be placed in their wider environmental context, for example, their role in contributing to GES under the MSFD and climate change objectives³⁰. The role and impact of MPAs, including their offsite impacts (e.g. via displacement) needs to be well understood in order to maximise their environmental benefits and to maximise net

³⁰ See Russi et al (2016) for further discussion on the role of MPAs in supporting climate change mitigation and adaptation.

economic benefits. As the marine area under MPA designation continues to increase, robust evaluations of their effectiveness should be undertaken. There must be a willingness to not only adapt management but redesign the spatial footprint of MPAs, or de/re-designate MPAs, where deficiencies are found, or changes in the distribution of ecological features occur (e.g. due to climate change), in order to optimise MPA networks.

6.2.3 Provide the support necessary to capitalise on economic opportunities

Evidence demonstrates that capitalising on the economic opportunities offered by MPAs requires more than just sound MPA design and management. Capitalising on improved environmental resources in MPAs often requires investment by the beneficiary sectors to transition towards more sustainable practices which can enable them to operate inside MPAs. Capitalising on other MPA benefit mechanisms often required additional institutional action to design and implement initiatives and programmes.

MPA management bodies and other institutions can play an important enabling role, e.g. provision of finance or support in accessing finance; technical support for innovation and business planning; increasing dialogue between sectors (both private and public) and the setting-up of initiatives and programmes. In many cases, this may require investment in the capacity and capabilities of MPA management bodies, or other institutions and individuals, who can spearhead initiatives.

Proactive MPA management bodies can provide an important function in bringing businesses from different sectors together, providing a platform from cross-sectoral economic synergies and supporting sectors active within MPAs to capitalise on available opportunities. However, this needs to be placed within the context of the conservation objectives and carrying capacities relevant to each individual MPA.

6.2.4 Evidence and engagement for effective MPA management and enforcement

6.2.4.1 Adaptive management

MPA management needs to be responsive to change. The stakeholder support to both collect the data necessary for adaptive management decisions, and for acceptance of changes in management (particularly if they result in greater restriction), requires a mix of participatory, knowledge and interpretative (i.e. education and awareness raising) mechanisms.

6.2.4.2 Enforcement and monitoring is essential for the achievement of MPA conservation objectives and Aichi Biodiversity Target 11 and for the generation of economic benefits

There are clear examples where a lack or deterioration in formal enforcement undermines the generation of economic benefits, stakeholder buy-in and self-policing. The reverse is also true – a common characteristic of the MPAs where benefits have emerged is good stakeholder engagement and buy-in, including a role for self-enforcement.

6.2.5 Diversified and stable funding sources

More sustainable and diversified funding sources are necessary for effective MPAs. A diversified income, away from public sector sources and time-limited grants, can provide some level of budgetary resilience to changes in public policy priorities and funding cycles that may affect funding availability. A relatively high level of self-generated funding is achievable through accessing a mix of often readily available sources. For example, in Egadi MPA (Italy) around 50% of the annual budget is provided through a mix of the following: fines for illegal activities, permissions/authorisations, use of MPA infrastructure (e.g. mooring buoys), tourism entrance fees and merchandising, sponsorship and donations.

Self-financing through payments by MPA beneficiaries (payment for ecosystem services) still appears to be little used across Europe. However, cases such as Bonaire National

Marine Park (Dutch Caribbean), which is over 90% self-financed through a user fees system, demonstrates what can be achieved under favourable conditions. Better recognition and planning for the broadest set of potential economic benefits may create more opportunities to generate funds from MPA beneficiaries – charging for use of ecosystem services or other services offered by MPAs (e.g. user fees).

Sustainable financing also includes novel, alternative sources, such as the use of venture capital, engagement with the insurance industry, biodiversity offsetting and the creation of blue bonds. In addition, there are emerging opportunities for new technologies (from VMS to unmanned aerial vehicles) to reduce the costs of day-to-day MPA management by supporting MPA monitoring and enforcement as well as providing economic benefits/opportunities for the businesses involved.

To encourage greater take-up of accessible opportunities, obligations can be attached to time-limited grants that require MPA management bodies to put in place mechanisms to enable a certain level of self-funding before the end of the grant period.

6.2.6 Incentives for de facto refuge

Incentive mechanisms may be necessary to encourage de facto refuge to provide longer term environmental benefits and be delivered in a way that enables promoted economic co-benefits to materialise. Such incentives may be initiated via licencing decisions, consenting of planning permissions, planning conditions or other routes.

6.2.7 Improving understanding and evidence of economic benefits

The economic evidence base on blue economy benefits of MPAs and SPMs is still limited, particularly outside of the fisheries and tourism sectors. The currently available evidence is dominated by literature on the economic benefits to tourism and small-scale fisheries and is geographically concentrated on the Mediterranean and North-east Atlantic. But even here there is a lack of robust ex-post evidence that can clearly attribute the scale of observed changes in sector performance to MPAs, and a lack of standardisation across studies. There is a general lack of understanding and evidence on how other sectors may benefit from MPAs. As a result, the distribution and relative scale of MPA economic benefits compared to costs remains poorly understood.

Improved understanding, using a standardised approach, would more clearly portray the role of MPAs in supporting the blue economy. It would provide an improved basis for MPA design and management that can maximise blue economy benefits, and it would provide greater help in ensuring that stakeholder expectations (and MPA-proponent predictions) of economic benefits are better aligned to reality. There are opportunities to incorporate greater socioeconomically relevant indicators into MPA monitoring programmes. For example, Natura 2000 sites could monitor the status of commercial species – currently monitoring in such sites typically focusses on the species and/or habitats for which the respective site has been designated. Similarly, de-facto refuges infrastructure operators could incorporate socioeconomic indicators into their environmental monitoring programmes.

6.3 Research needs

6.3.1 Research on economic benefits

Research ought to focus, as a priority, on improving quantitative **ex-post assessment evidence** on the scale and nature of costs and benefits, and hence **net benefits**, and the extent to which changes are attributable to MPAs and SPMs. The geographic coverage of evidence also needs to be improved (notably for the Black Sea as MPA management becomes better established). Continued advances in natural capital accounting may provide a vehicle for addressing some of the below stated priorities.

6.3.1.1 Commercial fishing

- Baseline studies of fisheries activities in MPAs and SPMs currently going through the designation process are needed to enable future evaluation. Monitoring and evaluation plans should be put in place for MPAs to support this and standardised where possible to allow intra-site comparison.
- Monitoring of commercial fish species status could be added to MPA ecological monitoring indicators even when such species are not a designated MPA feature.
- Monitoring and evaluation should focus on the net economic benefits, and distribution of benefits across the sector, of multi-use MPAs as these are the dominant type in Europe (whereas existing economic research is predominantly focussed on no-take MPA benefits).
- The scale and distribution of the net benefits that can be generated by different benefit mechanisms for different fleet segments under different conditions requires further investigation (e.g. the impact of MPA labelling and branding schemes is a notable gap).
- Systematic evaluation of the success factors associated with different benefit mechanisms.
- Empirical research of distributional effects (environmental and economic) resulting from displaced activities surrounding MPAs and SPMs is required to support the planning, design and evaluation of sites.

6.3.1.2 Tourism

- Baseline studies of tourism activities in MPAs currently going through the designation process to enable future evaluation. Monitoring and evaluation plans should be put in place for MPAs to support this and standardised where possible to allow intra-site comparison.
- Evaluation of the relative importance of the mechanisms identified compared to the designation effect, and the success factors associated with each.
- To establish the carrying capacities of different types of MPAs (and environmental features) and the associated effectiveness of different forms of sustainable use management.

6.3.1.3 Other blue economy sectors

- To undertake baseline studies of blue economy activities in and around MPAs currently going through the designation process. Standardised monitoring and evaluation plans should be put in place for MPAs to support this.
- Evaluation of the success and (potential) net economic benefits of innovative aquaculture practices (notably shellfish and algae cultivation) as they are tested and emerge in (and in balance with the objectives of) MPAs.
- To examine and quantify the identified (potential) net benefits from MPAs to the blue biotechnology sector, and determine compatible sustainable use practices.
- To assess the impacts of MPA-induced changes in the distribution of trawling activity on sectors responsible for submarine infrastructure.
- To evaluate the economic impact of association with an MPA on company or sector image and the extent to which this translates into improved competitive position amongst consumers or finance providers.

6.3.1.4 General

- To investigate the potential for knowledge sharing between blue economy sectors and conservation agencies responsible for MPA designation and management and

how this may support blue economy sector-MPA management synergies, including through MSP processes.

- To examine and value the role of MPAs in encouraging innovation in technologies, eco-engineering / nature-based infrastructure solutions, and operational practices.
- To quantify the volume and value of jobs in the conservation sector resulting from the growth in number of MPAs.

6.3.2 Research priorities for improving management to realise potential economic benefits

- Identify the role and type of short term incentives available to support sectoral transitions towards MPA-compatible sustainable practices.
- Assessment of the extent to which economic mechanisms such as labelling, overcome the short-to-medium term losses felt by fishers and other users from the implementation of sustainable use measures.
- To establish approaches for incentivising the realisation of the potential for de-facto refuge (and other activity) co-location benefits.
- To build on existing guidelines for economic activity in MPAs³¹, and examine the feasibility for more proactive support for economic activities in MPAs and their role as MPA/SPM economic clusters.
- To better understand the relationship between conservation objective attainment and economic benefit generation. This should include the full range of mechanisms by which benefits can be generated, and the full range of potential beneficiaries (not just fisheries and tourism but all relevant blue economy sectors), are be reflected in the development of MPA natural capital accounts. The aim should be for MPA CBAs to be able to take a comprehensive view of costs and benefits stemming from both the market and the non-market spheres, with an ability to clearly distinguish between the market and non-market values.
- To determine how MPA planning could be better integrated with MSP to capitalise on the potential economic benefits of a blue infrastructure network.
- To assess the different opportunities for sustainable MPA financing, including the application of beneficiary payment mechanisms to generate MPA funding (payment for ecosystem services), and the conditions under which the different approaches may be successful.

³¹ E.g. guidelines on ensuring compatibility of activities with MPA objectives – see: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

Annex 1 Robust and Quantitative Evidence

This annex provides a table summary of the most robust economic evidence identified in the literature, as well as further quantitative examples drawn from the consultations and case studies.

Table 5. European evidence of quantitative economic benefits of MPAs and SPMs to fisheries

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Columbretes Islands Marine Reserve, Spain	No take	Assessment of change	Ecosystem services, spillover sub-pathway.	Over an 8 to 15 year protection period, harvested spillover offset the loss of yield resulting from the reduction of fishing grounds set aside in the CIMR, producing a mean annual net benefit of 10% of the catch in weight.	Goñi et al, 2010
Columbretes Islands Marine Reserve, Spain	No take	Assessment of change	Ecosystem services, spillover sub-pathway.	Clear evidence of spillover of fish from the site (<0.5 km from the boundary) to the adjacent fishery based on continuously increased commercial fish yields at the zone border during the study period, despite being locally depleted due to fishing effort concentration.	Stobart et al, 2009
Carry-le-Rouet, Cerbère-Banyuls, Medes Islands, Cabo de Palos, Columbretes Islands, La Graciosa and La Restinga	No take zone + multi-use area	Assessment of change	Ecosystem services, spillover sub-pathway.	Catch rates of fisheries adjacent to seven MPAs in Southern Europe increased by 2-4% per year for 30 years (length of study) and are particularly detectable for total marketable catch (i.e. including by-catch of non-targeted commercial species).	Vandeperre et al, 2011
Cerbère-Banyuls; Carry-le-Rouet, France Medes; Cabrera; Tabarca; Cabo de Palos, Spain	No take zone + multi-use area	Assessment of change	Ecosystem services, spillover sub-pathway.	Evidence of effort concentration and high fishery production (CPUA) near fisheries closures for all fishing tactics; significant negative slopes with distance from no-take zones; and revenues generally followed trends similar to CPUA.	Goñi et al, 2008
Tabarca; Cerbère-Banyuls and Carry-le-Rouet marine reserves, Spain and France	No take + multi-use area	Assessment of change	Ecosystem services, spillover sub-pathway.	Significantly higher catches (biomass of total catch) for some target species near MPA borders when fishing on seagrass meadows, but not on sandy bottoms, concluding that spillover is related to distribution of habitat across MPA borders. Spillover was sufficient to provide local benefits to artisanal fisheries (through juvenile and adult spillover).	Forcada et al, 2009

Study on the Economic Benefits of MPAs

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Torre Guaceto, Italy	Multi-use	Assessment of change	Ecosystem service pathway.	CPUE was 400% higher than outside of the MPA following a temporary 4 year closure and then reduced to 200% higher once managed fishing was restricted in the MPA. The net economic value (i.e. profit) of a day inside the MPA is about two times that generated outside (on average €140/day versus €70/day). Total value of landings from the MPA is estimated to be €64,000/yr, hence impact since designation may be an increase of around €32,000/yr.	Guidetti et al, 2010; Guidetti and Claudet, 2010; and case study
12 MPAs in Southern Europe	Multiple types of protection (multiple sites)	Baseline study and assessment of impact	Multiple	Based on survey responses, annual income to commercial fishermen from use of MPA ecosystem services is €720,000 per MPA. The services generate an equivalent 54 jobs per MPA.	Alban et al, 2008, also summarised in Roncin et al, 2008
Gulf of Castellammare, Italy	Fishery exclusion zone	Assessment of change	Changes in ecosystem services and sector interaction.	Artisanal vessels operating inside the trawl ban area (using trammel nets and set gillnets) achieve higher catch rates than those outside. Net financial profit (boat income) in 1998-99 averaged 8.7 million lira (€4,493) per vessel. Just over 15% of operators incurred losses, while some 9% earned profits in excess of 25 million lira (€12,911). Using a 20-year planning horizon produced an internal rate of return of 30%, substantially in excess of the opportunity cost of capital (6-12%). Artisanal vessels outside the ban area have become worse off due to increased activity of displaced trawlers	Whitmarsh et al, 2002
Lyme Bay MPA, UK	Multiple use	Assessment of change	Changes in ecosystem services	Increase in monthly landings of whelks, crabs and scallops from vessels operating within the MPA, and for value of catch (increasing from a mean of £5,411 per vessel per month in 2005/06 to a mean of £7,267 per vessel per month in 2013/14). Not all attributable to the MPA	Rees et al. 2016
Lyme Bay MPA, UK	Multiple use	Assessment of change	Product branding (reserve label)	Premium price on products of between 30 and 50% depending upon species and season	Consultation interview MPA manager
Chichester Harbour SAC, UK	Multiple use	Assessment of change	Changes in ecosystem services	2015 first sale value of £105k for 2 week fishery compared to other local harbours where the oyster beds have disappeared.	Consultation interview MPA manager

Study on the Economic Benefits of MPAs

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Gökova Bay, Turkey	6 no-take zones and area where trawling and purse seining is restricted	Assessment of change	Changes in ecosystem services	400% increase in fishers incomes	Consultation interview MPA manager
Kosterhavet Marine National Park, Sweden	Multiple use	Assessment of change	Changes in ecosystem services	Catches of northern shrimp increased inside the park by 78% over 2012-2015 (all fisheries along the coast have experienced high shrimp catches recently and that the increase is probably not due to the national park)	Case study
Kosterhavet Marine National Park, Sweden	Multiple use	Assessment of change	reduced competition for space and/or improved status of target species	74% increase in catches and number of fishermen in zones closed from trawling (2012-15) (Note, this data is for closed areas in both KHNP and neighbouring Väderö Islands nature reserve	Case study
Os Miñarzos Marine Reserve of Fishing Interest, Spain	Multiple use	Assessment of change	Changes in ecosystem services	Lobster catches are now 50% higher than pre-2007 and some fishermen report that this has led to an increase in their annual profits of up to 10%.	Case study
Os Miñarzos Marine Reserve of Fishing Interest, Spain	Multiple use	Assessment of change	Changes in ecosystem services	Shellfish species: Mussels: In 2009, two years after the creation of the MPA, stock increased and gatherers caught in total 2 tonnes more than in 2008 (with a less than proportionate increase in fishing effort). Sea urchin: Stock increased (in terms of individuals and size) and catches were doubled within the MPA in 2010 compared to 2009 (with a less than proportionate increase in fishing effort). Goose barnacle: Stock increased (in terms of individuals and size) and catches increased following the designation of the MPA, with a considerable decrease in fishing effort. This caused an increase in profits of 150% between 2007 and 2012, of up to €40,000.	Case study
National Park of the	Multiple use	Assessment of	Ecosystem	Increase in total landings of up to €20,000/year (although due	Case study

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Cabrera Archipelago, Spain		change	services	to expected undeclared landings this may be an underestimate)	

Table 6. European evidence of quantitative economic benefits of MPAs and SPMs to tourism

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Several MPAs in Southern Europe	Multiple types of protection (multiple sites)	Baseline study and Assessment of change	Multiple	Mean expenditure: €1,022/yr for recreational fishers, €1,307/yr for scuba divers. Mean local added value due to the expenditures of non-resident MPA recreational fishers and scuba divers: respectively €88,319/yr and €551,481/yr per MPA. Yearly local income related to services to non-resident recreational users: €640,000/yr per MPA. Mean jobs created for MPA management: 8/yr. Mean jobs generated by local expenditures of non-resident recreational fishers and scuba divers: respectively 2.1 and 13 yearly full time equivalent.	<i>Alban et al, 2008, also summarised in (Roncin et al, 2008</i>
Medes Island (Spain)	No-take and multi-use	Baseline study	Ecosystem service pathway	The model provides a business plan for a hypothetical reserve based on data from the Medes Island reserve. It assumes that the tourism sector covers the costs of the reserves and that fishers receive income from tourist access fees. The total annual profits are estimated to increase from €254,000 (fishing only) to €3.3 million eight years after the creation of the reserve. The net present value of the reserve can be between 4 and 12 times greater than that of the same area before the reserve.	<i>Sala et al, 2016</i>
Cap de Creus (Spain)	No-take and multi-use	Baseline study	Ecosystem service pathway	Recreational boat fishers spend approximately 500€/yr/angler on goods and services directly relating to angling, 57.5% do so on one of the villages of the park.	<i>Lloret et al, 2008</i>
Cap de Creus (Spain)	No-take and multi-use	Baseline study	Ecosystem service pathway	Recreational shore fishermen spend about €600/yr. in fishing supplies and car fuel. However, only 20% of the expenditures in fishing supplies are made in the villages of the Park.	Font and Lloret, 2011
Lyme Bay (UK)	No-take and multi-use	Baseline study	Ecosystem service pathway	Total expenditure for recreation activities = £18M/yr (sea anglers= £14M/yr; divers=£1 M/yr; boat charter and dive businesses=£3 M/yr).	Rees et al, 2010

Study on the Economic Benefits of MPAs

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Lyme Bay (UK)	Multi-use	Assessment of change	Ecosystem service pathway	Three years after the MPA designation, the income generated inside it had increased by £2.2 M. In particular, expenditures of anglers and divers have increased by respectively £1,544,068 and £488,613 (due to an increase in visits of 19% and 35%), whereas the turnover of charter boat operators and dive business have increased by respectively £108,427 and £39,864 (due to an increase in their activities by 51% and 201%). Part of this increase may be due to a decrease in activities outside the MPA. In fact, in the same period the expenditures of anglers operating outside the MPA decreased by £1,544,068, whereas the turnover of charter boat operators outside the MPA decreased by £108,427. The expenditures of divers and the turnover of dive business operating outside the MPA increased by respectively £488,613 and 39,864.	Rees et al, 2015
Alonissos (Greece)	No-take and multi-use	Assessment of change	Multiple	40% of the residents believe that the MPA designation results in a considerable increase in local tourism and 44% that it has a positive impact on the livelihood of people working in the tourism sector.	Trivourea et al, 2011
Alonissos (Greece)	No-take and multi-use	Assessment of change	Multiple	Owners of tourist agencies, hoteliers and owners of rooms to let felt strongly to have benefited the most by the MPA. Tourists believe that the MPA constituted a significant advantage for Alonissos compared to other destinations.	Oikonomou and Dikou, 2008
Wadden Sea World Heritage Site and other designations (Germany, Netherlands, Denmark)	No-take and multiple use	Assessment of change	Multiple	The Wadden Sea World Heritage site comprises multiple MPAs across the Netherlands, Germany and Denmark and is used to market the attractiveness of the site to tourists. Its reputation for environmental quality is reported to support tourism demand and helps to sustain around €3 to 5 billion of tourism sector turnover per year	Common Wadden Sea Secretariat, 2014
Plemmirio (Italy)	No-take and multiple use	Assessment of change		Considerable growth in tourism from 450 divers in 2004 to more than 3000 in 2017	Consultation interview MPA manager
Kosterhavet, (Sweden)	Multiple-use	Assessment of change	unknown	The national park has helped create about 15 FTEs (7FTE directly by the park for management, the rest associated with local business start up	Consultation interview MPA manager

Study on the Economic Benefits of MPAs

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Zakynthos (Greece)	No-take and multiple-use	Assessment of change		Arrival of visitors to the island has increased by 50% in 20 years, in part due to the MPA. For every €1 spend on the MPA's operation, €20 are created at the national/local level.	Consultation interview MPA manager
Kosterhavet Marine National Park, Sweden	Multiple use	Assessment of change	Multiple	In the summer of 2006, before KHNP was established, the islands had 90,000 visitors annually (Strömstad Municipality, 2009). In 2015, the national park received about half a million visitors (Ekoturismföreningen, 2015), making it the most popular Swedish national park (SEPA, 2017). KHNP is, for instance, one of the most popular archipelagos for recreational boaters in the region – an industry worth about 0.5 billion SEK per year	Case study
Kosterhavet Marine National Park, Sweden	Multiple use	Assessment of change	Unclear	High demand for new KHNP-related products for one kayaking firm, equivalent to around 5% (€7,200) of turnover.	Case study
National Park of the Cabrera Archipelago, Spain	Multiple use	Assessment of change	Unclear	<p>Since its designation in 1991 visits to the park have increased by over 400% to nearly 90,000 in 2015.</p> <p>In 2015 a total of 38,388 people visited Cabrera through collective transport (see Figure 8.5). The average price per passenger is about €50, hence it is estimated that those companies generated a gross income over €1,900,000.</p> <p>Gross volume of charter business linked to the National Park could reach over €1,409,000.</p> <p>Annual dive operator gross revenue from visits to the park estimated to be €120,000</p>	Case study
Torre Guaceto, Italy	Multi-use	Baseline	Unclear	Multiple marine resreation activity providers generate nearly €190,000 of revenue from their operations inside the protected area. In 2016 the park received nearly 60,000 visits generating revenue of €233,000 in entrance fees and on-site activity and merchandise sales	Case study
Bonaire National Marine Park	Mutiple-use	Assessment of change	Multiple	The park was established in 1979. Tourist arrivals have grown from just a few thousand in the 1970s to around 130,000 today. Tourism has been, and continues to be, the main engine of economic growth. Tourism expenditure was	Case study

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
				estimated to be USD160m in 2012, directly generating gross value added of USD60m, equivalent to 16.4% of Bonaire's GDP	

Table 7. European evidence of quantitative economic benefits of MPAs and SPMs to other blue economy sectors

Area studied	MPA type	Assessment type	Benefit pathway	Benefits identified	Source/Ref.
Kosterhavet Marine National Park, Sweden	Multiple use	Assessment of change	Opportunity for new / expanded business	about 20 part-time jobs were created for coastal litter collection, hay meadow management etc. (Hambrey, 2007)	Kosterhavet Marine National Park, Sweden
Wadden Sea UNESCO and Natura 2000 sites	Multiple use	Assessment of change	Opportunity for new / expanded business	Contract value of €2.5-3million for re-construction of the island of Griend, located within the UNESCO World Heritage Site and is a Natura 2000 site.	Wadden Sea UNESCO and Natura 2000 sites
Iroise Marine National Park, France	Multiple use	Assessment of change	Opportunity for new / expanded business	The number of aquaculture operators has doubled, with eight organisations now operating in the Park employing over 20 FTEs	Iroise Marine National Park, France
National Park of the Cabrera Archipelago, Spain	Multiple use	Baseline	Opportunity for new / expanded business	In 2014 approximately 153 scientists belonging to 28 different research teams visited the archipelago to collect field data for their research.	National Park of the Cabrera Archipelago, Spain
Sečovlje Salina Nature Park, Slovenia	Multiple use	Baseline	Opportunity for new / expanded business	The value of sales in 2016, which includes other non-salt products such as the dining programme and merchandise, was close to €2.5million	Sečovlje Salina Nature Park, Slovenia

Annex 2 Critical Review Workshop

A2.1 Introduction

The purpose of the workshop³² was to present and critically discuss the study's draft findings with a small group of eight stakeholders, representing the blue economy and conservation / MPA managers, and four European Commission officials. The workshop sought opinion on (i) the clarity of the methods, findings and presentation, (ii) the extent to which findings are in line with or contrary to expectations and other evidence, and (iii) the relevance and significance of the findings and conclusions.

The draft final report and summaries of the technical annexes (the study task outputs) were provided in advance to participants. In addition to discussion at the workshop, participants (and other invited stakeholders who were unable to attend on the day) were offered the opportunity to provide written comments.

This note presents a short summary of discussion points and issues raised at the workshop.

A2.2 Study scope and methods

The study scope and method were presented to participants. Participants did not express any fundamental issues or problems with the methodology. Clarification questions and suggestions regarding presentation, were put to the study team. These included:

- It was confirmed that all blue economy sectors, including sector representative bodies and individual businesses, were engaged through the different research tasks.
- It was clarified that a mix of proxies were used to measure economic benefits e.g. added value, turnover/output, jobs, visitors. Perceptions of businesses, residents and tourists were also used.
- It was suggested that the report introduction should more clearly demonstrate the role of the study in complementing other studies³³ and that the study scope focussed mainly on one element of MPA benefits.

A2.3 Sector benefits

Commercial fishing

- The workshop presentation clearly distinguished the benefits between different commercial fishing segments (e.g. small-scale coastal vs others). These distinctions should be more clearly presented in the report.
- The study presents a range of factors that are of relevance in determining the likely benefits for the sector. It should be more clearly stated that the limited evidence available does not allow conclusions to be drawn on 'the most important'.
- The report could better highlight that the literature on ecolabels provides only limited evidence of the extent (positive or negative) to which premium prices and economic benefits are achieved.

³² Held in Brussels on Thursday 8th February 2018; 09:45 – 16:30

³³ Russi D., Pantzar M., Kettunen M., Gitti G., Mutafoğlu K., Kotulak M. & ten Brink P. (2016). Socio-Economic Benefits of the EU Marine Protected Areas. Report prepared by IEEP for DG Environment.

- Conclusions regarding stability of income appear to be overstated in relation to the evidence presented. The inferred strength of the conclusions should be reviewed.
- Better drawing out the information on the impacts on professional fishing jobs presented in the case studies would be of particular interest to the sector.
- From the report, one can conclude that there is in general a lack of socioeconomic monitoring, with MPA monitoring focussed largely on ecological objectives. Addressing this would provide important evidence for better understanding MPA benefits. The findings on monitoring need to come out more strongly as a conclusion from this report.

Benefits to the tourism sector

- The challenges involved in successful pescaturism in practice should be more clearly stated alongside the evidence on potential benefits.
- The workshop participants generally agreed that visitor fees to MPAs could be successfully used to support sustainable use of MPAs. Whilst there are some existing examples of visitor fees in European MPAs, these are not common.
- The study adds to the emerging understanding of the size and impact of recreational fishing. Management of recreational fishing and illegal sale by recreational fishers was suggested as an area that deserved closer policy attention.
- The study's findings on tourist benefits and challenges regarding compatibility with MPA objectives were recognised. It was suggested that through the Commission's work to promote tourism and engage with the cruise tourism sector in particular, issues relating to nature conservation and better management of visitors should be addressed.

Benefits to the other blue economy sectors

- Carbon sequestration by MPA protected habitats may support climate goals. It was suggested that this may reduce the need for climate mitigation investment, thereby freeing up capital for other purposes. While outside the study scope, such benefits have been investigated as part of other recent Commission research that this study complements.
- Aquaculture is a diverse sector with very differing environmental impacts. The report should be clearer on the type of aquaculture being referred to when the benefits of MPAs are presented.
- Eco-engineering as a beneficiary of MPAs had not been appreciated. Many Natura 2000 sites have 'restore' as a conservation objective. This may create an obligation for restoration works, and a number of LIFE projects have funded such works.
- Blue biotechnology was recognised as an evidence gap. The case studies provide interesting examples, presenting a mixed picture in terms of sector benefits and cost.
- MPAs can be seen as important control areas, which can help the study of marine ecosystem and species due to higher data availability. It was questioned how this benefit should be captured. The report acknowledges that improved scientific knowledge can improve the appropriateness of blue economy regulation, which may bring costs or benefits for sectors.
- The investment opportunities presented by MPAs were noted. In particular the opportunity for 'green investment' by sectors not necessarily directly involved in

maritime activities. It was suggested that blue bonds should be a focus of future work.

De facto refuges

- It was agreed that evidence on de-facto refuges is currently limited but will increase in the future – it is still a recent research interest. But that large monitoring programmes by operators (e.g. of offshore wind parks) may not be including economic benefits monitoring. The study recommendations on monitoring should highlight this.
- It was suggested that any benefits of de facto refuges need to be offset against the environmental costs of infrastructure construction.
- It was emphasised that economic win-win situations from de facto refuges require active encouragement to be successful.

A2.4 Governance and management

Sustainable use

- It was agreed that it is important to improve the management of existing sites before declaring the Aichi target 11 as reached i.e. MPAs must be 'effectively managed'.
- On multiple occasions it was stressed that successful enforcement is both very important and closely linked to available resources.
- Lessons and insights shown in the study into measures applied at MPAs to ensure sustainable use were thought to be particularly important. There is a need for scaling of successful practices.
- Self-policing, whilst providing benefits, can also cause disputes if not adequately organised. A structure and clear remit is necessary for those involved to avoid potential conflict between users. A co-management approach, which can bring a structured sense of ownership, can support self-policing well. This should be recognised in the report.
- The examples of hard versus soft enforcement presented in the study were found to be interesting and offer important lessons. This included that hard enforcement requires sanctions to be sufficiently high in order to be effective, whereas soft enforcement might not always work in practice. It was suggested that the most important factor for successful soft enforcement is to have stakeholders (in particular fishermen) involved from the start.
- It was recognised that soft enforcement effectiveness can be undermined when the ability to communicate and educate is limited. The example of cruise tourism was discussed. It was debated whether greater onus for this communication and education should be placed on cruise operators or tour/activity operators local to the MPA.
- Innovation in mobile apps that provide information on MPAs to visitors can also provide useful data on use of an MPA (e.g. visitor profiles, nature and spatial distribution of activity) that can then feed into better monitoring, assessment, management and enforcement.

Synergies

- A participant expressed surprise about the amount of work that some MPA management bodies appear to put into economic development. It was agreed that some MPAs can appear to act as economic clusters.

- A number of participants suggested that the study adds to an existing understanding about a lack of dialogue and understanding between scientists and fishermen, which is key for the success of the MPA (and the related economic benefits). It was emphasised, however, that much is happening at the moment to try to address this.
- There was a general agreement among workshop participants that the Commission and other bodies could play an important role in bringing stakeholders together in dialogue. Several participants mentioned the role of MSP in this context, which is intended to bring people together and is already leading to the establishment of platforms that may enable win-wins to happen.
- It was suggested that conservation shouldn't focus on MPAs alone. The added value of MSP is to manage entire seas with different degrees of protection, involving all relevant stakeholders. There was general agreement that MPA and MSP processes have not to date been well connected. However there were likely to be clear benefits of doing so, in terms of optimising the spatial distribution of conservation and economic activity. It was recognised that closer integration of the two processes should be pursued.

Conflict management

- It was agreed that meaningful consultation is necessary in order to avoid and manage conflicts and to build the trust necessary for success. Specific suggestions included that: the objectives of the consultation should be clear from the start, all interest groups should be included from the start, the process should be supported by actions to build trust, and expectations should be managed and potential benefits of engagement not oversold.
- It was suggested that the benefits of "co-management" could be made more prominent in the study. The benefits of co-management were discussed and whether co-management should be made the primary mechanism for governance of all MPAs. Co-management approaches are increasingly being thought of as successful, but there are still few examples in Europe.
- Conflict management should also consider stakeholders outside the MPA (e.g. excluded fishermen who operate near MPAs), because they can be a source of conflicts. Displacement from a MPA can result in long-standing opposition (e.g. the Os Miñarzos case study), and there are also cases of related intra-sector rivalry and conflicts.
- Conflict between stakeholders often seems unavoidable. Multiple-use MPAs with zoning may be the most effective solution to reduce conflicts. There should also be a link between MPAs and MSP.

A2.5 Conclusions and research needs

Participants offered their reflections on, and suggests for, the conclusions and research needs from the study. Points raised were:

- Economic benefits
 - MPAs can play a role in supporting 'green' economic activity, drawing together /focussing resources and institutions in a way similar to an economic cluster.
 - It is important to recognise the key role of marine natural capital in providing benefit flows. Without taking the wider benefits into account (i.e. the provision of ecosystem services), the costs of maintaining natural capital may seem higher than the benefits.
- Funding MPAs

- Good governance requires investment: the study shows (the Os Miñarzos case in particular) that where investment is put in, and once the governance structure is up and running and working, then the need for further investment may be less; but investment in enforcement on an ongoing basis is necessary.
- The economic benefits generated by MPAs should be accessed to support MPA management by bringing in additional income. MPA managers need to plan how to increase and diversify their funding sources, combining public tenders with private funding.
- Levies (tourist and access fees) can help finance MPAs – there are some examples in Europe (e.g. tourism fee in Lanzarote). They tend to be better than taxes because they can be earmarked, whereas taxes tend to be lost in the general budget.
- Spatial management:
 - It is important to recognise trade-offs. The objective should be to find a balance between environmental protection and economic benefits, i.e. to optimise economic benefits within the constraints of conservation objectives.
 - MPAs will ultimately require the exclusion of some activities. Linking to MSP should allow for different areas to be allocated to different activities.
- Governance
 - Bottom-up governance is preferable. Such approaches may superficially seem less structured. They require significant organisation to be successful.
 - MPA success is in part driven by having the right person in place, with managerial, stakeholder engagement and entrepreneurial skills.
 - Peer to peer learning is important and can support the transfer of good ideas to other MPAs.
- Monitoring
 - Better MPA monitoring data is required to allow for better evidence of economic benefits, better cost-benefit analyses and economic evaluation.
 - MPA managers must ensure monitoring and reporting, and this should be broader than just ecological conservation indicators, but also addresses key economic factors (e.g. commercial fish species monitoring) and economic data (jobs, revenue). De facto refuge monitoring programmes should include economic aspects.
- Guidance
 - Better guidance on incorporating the full range of ecosystem services into cost-benefit analyses.
 - How to set up value chains for direct marketing. There have been different attempts to have short chains and direct sales, but it often only works locally. Legal constraints need to be looked at, especially as to how direct sales can be capitalised upon and the regulation about post-harvest processing. FLAG/Farnet experiences could be capitalised upon.

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