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# **SESSIONS ORGANIZED BY THE FAO FISHERIES AND AQUACULTURE DEPARTMENT AND THE IUCN FISHERIES EXPERT GROUP AT THE FOURTH INTERNATIONAL MARINE PROTECTED AREAS CONGRESS (IMPAC4)**

**La Serena, Chile  
5–8 September 2017**





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## PREPARATION OF THIS DOCUMENT

This is the report of the sessions on Vulnerable Marine Ecosystems and Marine Protected Areas organized by the FAO Fisheries and Aquaculture Department and the IUCN Fisheries Expert Group at the Fourth International Marine Protected Areas Congress (IMPAC4), La Serena, Chile, from 5 to 8 September 2017.

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*Report of the sessions organized by the FAO Fisheries and Aquaculture Department and the IUCN Fisheries Expert Group at the Fourth International Marine Protected Areas Congress (IMPAC4), La Serena, Chile, 5–8 September 2017.*

FAO Fisheries and Aquaculture Report No.1219 Rome, Italy.

### ABSTRACT

The Fourth International Congress on Marine Protected Areas (IMPAC4) was organized by the Government of Chile and the International Union for Conservation of Nature (IUCN) and took place on 5–8 September 2017 in La Serena, Chile, bringing together over 1 000 representatives of governments, inter-governmental organizations, non-governmental organizations (NGOs), civil society and local communities. The FAO Regional Office for Latin America and the Caribbean (FAO-RLC) located in Chile, supported the Government of Chile in the organization of the congress. The FAO Fisheries and Aquaculture Department (FAO-FIA), based on its longstanding engagement in work on livelihoods, sustainable fisheries and marine protected areas (MPAs), collaborated with the IUCN Fisheries Expert Group (IUCN-CEM-FEG) and hosted two plenary symposia: (i) *Protecting vulnerable marine ecosystems (VMEs) in the high seas from bottom fishing impacts*, and (ii) *MPAs and food security*, and a side event on *Marine protected areas: Interactions with fishery livelihoods and food security*. FAO also had an important presence at the congress through the Latin American Technical Cooperation Network on National Parks, other Protected Areas and Wildlife (REDPARQUES) for which FAO assumes the technical secretariat. The sessions jointly organized by FAO-FIA and the IUCN-CEM-FEG provided opportunities to discuss the important role of regional fisheries management organizations or arrangements (RFMO/As) and scientific research in the spatial management of sustainable fisheries and protection of VMEs in the high seas, and the complexity surrounding the impact of MPAs on food security. Participatory approaches that involve fishers and local communities are fundamental to ensure positive benefits of MPAs to the environment and the fishing communities.



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## ABBREVIATIONS AND ACRONYMS

CBD	Convention on Biological Diversity
CONAPACH	Confederación Nacional de Pescadores Artesanales de Chile
COP	Conference of the Parties (CBD)
DSF	Deep-sea fisheries (FAO Guidelines)
EAF	Ecosystem approach to fisheries
EBCD	European Bureau for Conservation and Development
EBSA	Ecologically or biologically significant marine area
EEZ	Exclusive economic zone
FIA	Fisheries and Aquaculture Department (FAO)
FS	Food security
ha	hectare
IFOP	Fishery Research Division, Instituto de Fomento Pesquero (Chile)
IMPAC4	Fourth International Congress on Marine Protected Areas
IUCN	International Union for Conservation of Nature
IUCN-CEM-FEG	The Fisheries Expert Group of the IUCN Commission on Ecosystem Management
IUU fishing	Illegal, unreported and unregulated fishing
MPA	Marine protected area
NGO	Non-governmental organization
nm	Nautical mile
REDPARQUES	Latin American Technical Cooperation Network on National Parks, other Protected Areas and Wildlife
RFMO/As	Regional fisheries management organizations or arrangements
RLC	Regional Office for Latin America and the Caribbean (FAO)
RTF	Right to food
SAI	Significant adverse impact
SDG	Sustainable development goal
SPRFMO	South Pacific Regional Fisheries Management Organization
SSF Guidelines	Voluntary guidelines for securing small-scale fisheries in the context of food security and poverty eradication
UNCLOS	United Nations Convention on the Law of the Sea
UNGA	United Nations General Assembly
UNFSA	United Nations Fish Stocks Agreement
VME	Vulnerable marine ecosystem
VMS	Vessel monitoring system
WPC	IUCN World Parks Congress

## BACKGROUND

The Fourth International Congress on Marine Protected Areas (IMPAC4) was organized by the Government of Chile and the International Union for Conservation of Nature (IUCN) and took place from 5 to 8 September 2017 in La Serena – Coquimbo, Chile. These congresses occur every four years, enabling managers of marine protected areas (MPAs) and others concerned with MPAs to meet and exchange experiences. IMPAC4, with the theme of '*Marine protected areas (MPAs): Bringing the people and ocean together*', brought together over 1 000 representatives of governments, inter-governmental organizations, non-governmental organizations (NGOs), civil society and local communities. In addition to the congress itself, a high-level event on 9 September 2017 in Valparaiso, Chile, was attended by invited participants.

The FAO Fisheries and Aquaculture Department (FAO-FIA) has been engaged in work on MPAs and fisheries, realizing that the effects on fisheries, fishing communities and food security are not well understood nor always considered when designating protected areas. This work has included the publication of technical guidelines on MPAs and fisheries in 2011<sup>1</sup> and participation in relevant events and meetings. Accordingly, FAO participated in IMPAC3, which took place in Marseille, France, in 2013, by organizing two workshops<sup>2</sup>.

For IMPAC4, FAO, through its Regional Office for Latin America and the Caribbean (FAO-RLC) located in Chile, supported the Government of Chile in the organization of the congress and was represented at the high-level event. FAO also had an important presence through the Latin American Technical Cooperation Network on National Parks, other Protected Areas and Wildlife (REDPARQUES) for which FAO assumes the technical secretariat.

FAO-FIA organized two plenary symposia and one event at the REDPARQUES pavilion:

- Protecting vulnerable marine ecosystems (VMEs) in the high seas from bottom fishing impacts
- MPAs and food security
- Marine protected areas (MPAs): Interactions with fishery livelihoods and food security

These sessions were organized in collaboration with the IUCN Fisheries Expert Group (IUCN-CEM-FEG) under the coordination of Ms Lena Westlund, FAO-FIA, and Ms Despina Symons, IUCN-CEM-FEG coordinator. The support of colleagues in FAO-RLC in the organization of the sessions is gratefully acknowledged.

This document reports on the FAO-FIA events with particular emphasis on the two plenary symposia.

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1 FAO. 2011. *Fisheries management. 4. Marine protected areas and fisheries*. FAO Technical Guidelines for Responsible Fisheries No. 4, Suppl. 4. Rome. 198 pp. (available [here](#)).

2 See report available [here](#).

## PROTECTING VULNERABLE MARINE ECOSYSTEMS (VMEs) IN THE HIGH SEAS FROM BOTTOM FISHING IMPACTS

*The symposium on ‘Protecting VMEs in the high seas from bottom fishing impacts’ took place on Wednesday 6 September 2017 from 11:30 to 13:00 hrs in Salon Bahía 3. It was structured around four presentations and a panel discussion including comments and questions from the audience.*

*Mr Alessandro Lovatelli, FAO-RLC, opened the symposium and Mr Serge Garcia, IUCN-CEM-FEG, facilitated the session. The speakers were:*

- **Ms Jessica Sanders**, FAO, FAO Subregional Office for the Pacific Islands
- **Mr Tony Thompson**, FAO-FIA
- **Mr Mauricio Galvez**, South Pacific Regional Fisheries Management Organization (SPRFMO) / Instituto de Fomento Pesquero (IFOP), Chile
- **Mr Michel Kaiser**, IUCN-CEM-FEG

*In addition, Mr Joe Appiott, Marine Programme, Convention on Biological Diversity (CBD), was part of the panel (see also APPENDIX 1).*

### Introduction

United Nations General Assembly (UNGA) Resolution 61/105 in 2006, and subsequent supporting resolutions, stimulated many States and regional fisheries management organizations or arrangements (RFMO/As) to develop processes to identify vulnerable marine ecosystems (VMEs) and adopt management measures to protect them from significant adverse impacts (SAI) of bottom fishing in the high seas. This symposium presented a general overview of the range of integrated, area-based management measures that have been developed to protect vulnerable ecosystems in the high seas. More specific details were provided for certain measures in the South Pacific Ocean. Most of the measures are based on scientific analysis and an example was provided to illustrate this. Important background documents for the symposium included:

- FAO. 2009. *International guidelines for the management of deep-sea fisheries in the high seas*. Directives internationales sur la gestion de la pêche profonde en haute mer. Directrices Internacionales para la Ordenación de las Pesquerías de Aguas Profundas en Alta Mar. Rome/Roma, FAO. 73 pp. (available [here](#)).
- FAO. 2016. *Vulnerable marine ecosystems: Processes and practices in the high seas*. Anthony Thompson, Jessica Sanders, Merete Tandstad, Fabio Carocci and Jessica Fuller, eds. FAO Fisheries and Aquaculture Technical Paper No. 595. Rome, Italy (available [here](#)).
- FAO. 2017. *Vulnerable marine ecosystems database* (available [here](#)).

### Presentations

Ms Jessica Sanders presented “**Legal and policy frameworks for vulnerable marine ecosystems**”, noting the general legal framework for the oceans provided by the United Nations Convention on the Law of the Sea (UNCLOS) and the United Nations Fish Stocks Agreement (UNFSA), assisted by the Compliance Agreement and Port State Measures Agreement as well as other binding and non-binding instruments. VMEs were first identified as a case for concern in 2002 by the UN General Assembly, with uptake by fisheries management bodies occurring after 2006 when time-bound targets were set in UNGA Res.61/105. This resolution called for States and RFMO/As to conduct impact assessments and to cease bottom fishing where VMEs were known or likely to occur. The implementation of the recommended actions to protect VMEs from significant adverse impacts from fisheries using gear that

contacted the sea floor during normal use was greatly informed by the FAO Deep-sea fisheries guidelines that were adopted in 2008. RFMO/As, governed by regional conventions and, where relevant, States, were responsible for adopting and implementing the necessary measures to protect VMEs. There were five RFMO/As with the competence to manage bottom fisheries in the high seas in 2006, covering the Northwest, Northeast and Southeast Atlantic, the Mediterranean and the Southern Ocean. RFMO/As for the North and South Pacific, and Indian Ocean, started in an interim phase and came into force between 2012 and 2015. RFMO/As have the mandate to develop and adopt fisheries measures that are legally binding on their members. There are two fisheries advisory bodies but no RFMO/As covering the central Atlantic, though no significant bottom fisheries occur there.

Mr Tony Thompson presented the types of measures adopted by RFMO/As for **“Protecting vulnerable marine ecosystems (VMEs) in the high seas from deep-sea bottom fishing impacts”**. The basis for this was a clear understanding of VMEs as benthic habitats displaying the following characteristics:

- Uniqueness or rarity
- Functional significance of the habitat
- Fragility
- Life-history traits that make recovery difficult
- Structural complexity.

There was also an appreciation of the level of impacts that were deemed unacceptable and known as significant adverse impacts. These significant adverse impacts compromise ecosystem integrity by:

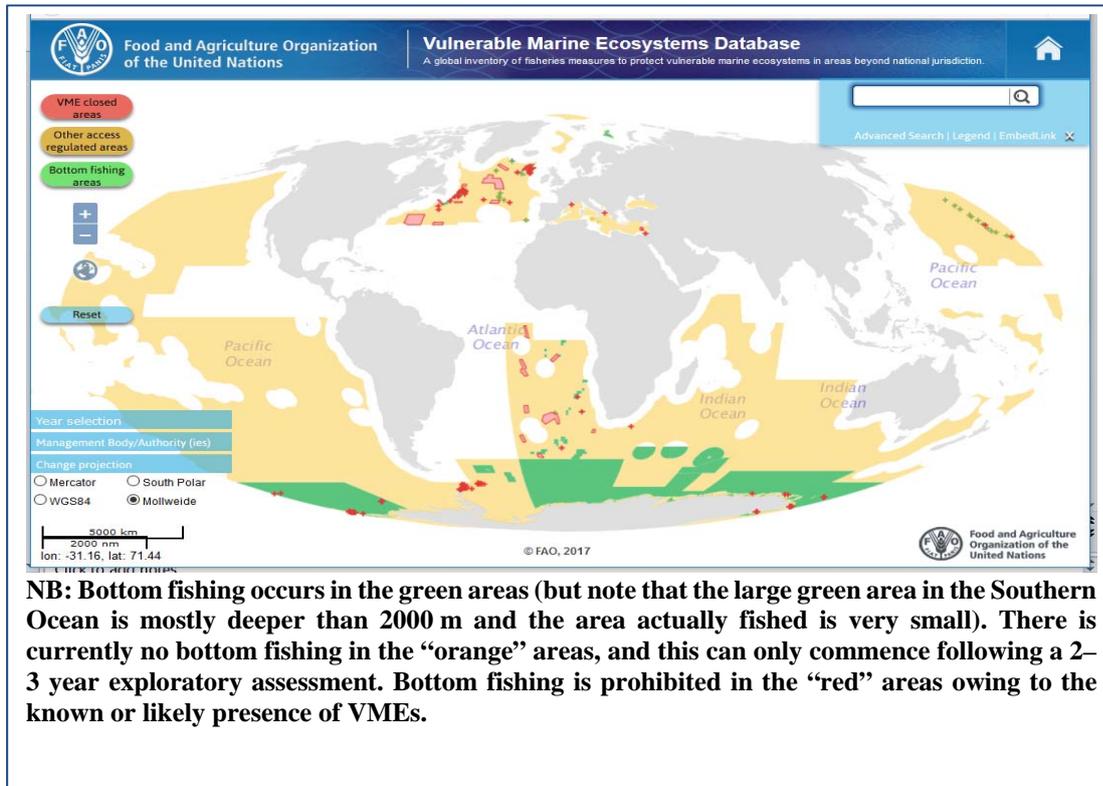
- impairing the ability of affected populations to replace themselves,
- degrading the long-term natural productivity of habitats, or
- causing, on more than a temporary basis, significant loss of species richness, habitat or community types.

Mr Thompson provided examples that outlined the range of integrated spatial measures adopted by RFMO/As, such as:

- existing bottom fishing areas delineated,
- exploratory fishing protocols (with impact assessments) for new fisheries,
- VME encounter protocols (move-on and/or temporary closures) in all areas, and
- VMEs, known or likely, closed to bottom fishing.

These measures cover the entire high-seas convention areas of the RFMOs, and typically only allow bottom fishing to continue in the places where it has historically occurred. This results in most of the high seas being effectively closed to bottom fishing. It was noted that these measures started around 2006 and are adaptive and subject to regular review. In general, the number and areas of VME closures have expanded over time, with some regions being further advanced in this process than others. It was felt that these measures offer real protection to VMEs and should be taken into consideration when assessing progress towards meeting Sustainable Development Goal (SDG) 14 and Aichi Target 11.

**Figure 1: Map of the global ocean showing the extent of bottom-fisheries measures for 2016**



Source: FAO VME database

Mauricio Galvez described some of the work presented to the South Pacific Regional Fisheries Management Organization (SPRFMO) by Australia and New Zealand on the **“Utility of move-on rules in conservation and management measures to prevent significant adverse impacts of bottom fisheries on VMEs in the SPRFMO area”**<sup>3</sup> and noted that this was one of several bottom-fisheries measures being developed by SPRFMO in response to UNGA Resolutions 61/105 and 64/72 ([SPRFMO CMM 03-2017](#)). This work dealt with bottom trawling, which can cause significant disturbance to the sea floor and impact the integrity of habitats, communities and species. SPRFMO, in its interim phase from 2006–2012, adopted a range of measures including limiting effort and catch to 2002–2006 average annual levels and not expanding bottom fishing to new areas; use of scientific observers and 100% VMS coverage; a ban on deep-water gillnetting; and a 5 nm move-on rule (encounter protocol).

Mr Galvez’ presentation focused on the bottom trawl footprints by Australia and New Zealand along the seamounts of the Louisville Ridge some 500 km east of New Zealand:

- The Australian footprint identified areas where trawling was permitted, and contained an encounter protocol whereby catches of VME indicator species above threshold resulted in the vessel being required to move 5 nm away for the duration of the trip and closing of the area to all Australian vessels using the same gear type.
- The New Zealand footprint applies to New Zealand vessels and is more spatially complicated.

<sup>3</sup> Cryer, M. & Nicol, S. 2017. The utility of move on rules in Conservation and Management Measures to prevent Significant Adverse Impacts of bottom fisheries on VMEs in the SPRFMO Area. SPRFMO Scientific Committee working paper SC5-DW08 (available [here](#)).

It is divided into (a) areas that can be trawled, (b) areas that can be trawled subject to a move-on rule upon an encounter above threshold, and (c) areas closed to bottom trawling.

The presentation discussed the implications of the different approaches and concluded that move-on rules provide a rapid response to evidence of VMEs in bottom fisheries and can be used to develop protective measures for VMEs in the early stages of a fishery when information is scarce. However, once objectively designed spatial management measures have been implemented to prevent significant adverse impacts on VMEs, move-on rules provide little additional benefit for VMEs and have significant costs in terms of monitoring requirements and operational uncertainty for fishers. Finally, he remarked that the potential information-gathering benefits of move-on rules can be better met using structured and mandatory collection and review of benthic bycatch in bottom fisheries.

Michel Kaiser presented a global scientific meta-analysis on “**Evaluating trawl impacts**”. The study focused on areas within exclusive economic zones (EEZs), where greater information is available, and utilized maps of fishing intensity based on vessel monitoring systems (VMS) that identified where vessels fished. The study was divided into continental shelf (0–200 m) and upper-slope (200–1000 m) depth bands. A statistical model based on records in the published literature correlated the percentage depletion of organisms with the penetration depth of the trawl and substrate type. In general, depletion was greatest for trawls rigged to penetrate deeper into the substrate. However, the recovery of benthic organisms following impacts from bottom trawling was dependent on the longevity of the benthic species impacted, which in turn varied according to the substrate type. Longevity tended to increase with the particle size of the seabed substratum. Recovery on coarse gravel substrates would therefore take longer than recovery on fine muddy substrates. The model presented could be applied to a wide range of ecosystems, but it was noted that the application to VMEs in very deep waters, where much of the biota rise above the sea floor, would require further study and model parameterization, particularly in relation to understanding the longevity of the deep-sea species of concern in relation to VMEs.

## Discussions

The panel discussion started with a short introduction by **Mr Joe Appiott** of the recent work of the Convention on Biological Diversity (CBD). CBD coordinates work on mapping ecologically or biologically significant marine areas (EBSAs). He said that RFMOs provide much useful information for areas in the high seas. Further, RFMOs are increasingly using the information provided by the EBSA process to develop spatial measures to reduce impacts from fishing. Mr Appiott noted that the EBSA and VME criteria are similar. However, VMEs are restricted to certain types only of benthic habitats and have a direct fisheries management consequence. EBSAs themselves are not management measures, though often the biotic components making up the EBSA can be subject to such measures, e.g. many seabird and turtle populations are subject to fisheries management measures. He said that the most recent CBD Conference of the Parties (COP) meeting mainstreamed biodiversity in fisheries, forestry and agriculture, and noted a number of key areas for collaboration in biodiversity and fisheries. There was also a wish to further support the regional seas programmes and increase global dialogue with RFMOs, and continue the work on developing indicators for Aichi Target 6.

The panel then addressed a number of questions from the floor on a wide range of issues:

- *What data are collected by RFMOs and how can this be shared among the research community?* Data are collected by commercial fishing vessels and government research vessels. The data is often compiled by RFMOs and metadata descriptions can be found on their websites. Processed data is frequently included in research documents that are often available on RFMO websites. Raw data may be confidential and it is recommended that RFMOs are contacted for further details. In most cases, the data is “owned” by the States that collect it.
- *How are infringements monitored and recorded?* Infringements are becoming less common as VMSs, logbook reporting, observer coverage, and inspections at sea and upon landing improve.

Infringements, including Illegal, Unreported and Unregulated (IUU) fishing, are usually recorded on the RFMO websites and in the annual Compliance Reports. The RFMO helps States to enforce the regulations, and the flag States of IUU vessels are ultimately responsible for convictions and setting of penalties. Examples were given of actions that led to vessels being sent back to port and not fishing for several years.

- *What happens to areas outside of the VME closures?* VME closures are part of a comprehensive suite of spatially based management measures for protecting VMEs. Others include the identification of existing bottom fishing areas, exploratory fishing protocols and impact assessments, and encounter protocols and scientific surveys to identify new VME areas.
- *Will further and more detailed “FAO Deep-sea fisheries (DSF) guidelines on VMEs” be developed as there are currently many ambiguities in the existing guidelines?* The FAO DSF Guidelines are designed to provide general guidance so that regions can adopt measures specific to their own circumstances. FAO helps each region to understand what other regions do, and plans to develop best practice examples so experiences can be more easily shared. FAO responds to requests for assistance, for example, for species identification.
- *How do the measures adopted by RFMOs respond to changes in fishing patterns or climate?* The measures adopted by RFMOs are reviewed regularly and are subject to amendment; they are not designed to be static and fixed. In general, this has resulted in more areas being closed to protect VMEs over time as knowledge of their distribution improves.
- *In the Mediterranean, can VMEs in the deep seas be affected by fishing on the continental shelf?* The VME measures are designed to prevent SAIs to VMEs. If the cause of these impacts arises from adjacent fisheries, then these adjacent fisheries would be subject to restrictions under the DSF guidelines. However, in this case, there may be a greater requirement to demonstrate that the impact comes from bottom fisheries and can be classified as an SAI.
- *What is the role of new technologies and the potential for science and data to improve knowledge?* Technologies are not necessarily the most significant problem. The organization of data collection is important. We need to first decide what data and programmes are needed and then identify the technologies needed. However, it must be acknowledged that the use of VMSs and electronic logbook reporting has greatly assisted in enforcement and in understanding the behaviour of the fishery in relation to stocks and VMEs.

## Conclusions

The symposium identified a number of key issues, which may be summarized as follows:

- UNCLOS and UNFSA provide for the management of high-seas fisheries.
- UNGA Res.61/105 (2006) guides RFMOs and States to protect VMEs from the impacts of bottom fisheries.
- RFMOs that manage deep-sea fisheries have adopted spatial management measures throughout the high seas to conserve fisheries and protect VMEs. These integrated spatial measures define bottom-fishing areas, impact assessments and closures.
- FAO supports the process through providing guidelines and best practices to share knowledge among regions.
- As scientific research continues to progress, we are better able to understand the impacts that bottom-fishing gear is likely to have on the sea floor, which in turn should enable improved decision-making processes.

## MPAs AND FOOD SECURITY

*The symposium on ‘MPAs and food security’ took place on Wednesday, 6 September 2017 from 15:00 to 16:00 hrs in Salon Bahía 1. It was structured around a keynote presentation and a panel, with shorter interventions by panellists and a discussion including comments and questions from the audience. Mr Serge Garcia, IUCN-CEM-FEG, opened the symposium and Mr Michel Kaiser, IUCN-CEM-FEG, facilitated the session. The keynote speaker was Mr Serge Garcia, IUCN-CEM-FEG.*

*The panellists included:*

- **Mr Miguel Avalos**, Confederación Nacional de Pescadores Artesanales de Chile (CONAPACH)
- **Ms Angélica Mendéz**, Red de Pescadores del Atlántico, Guatemala
- **Mr Stefan Gelcich**, Center for Marine Conservation, Pontificia Universidad Católica de Chile

*At the end of the session, a video was screened on small-scale fisheries and food security in the Pacific, courtesy of the FAO Samoa Subregional office (see also APPENDIX 2).*

### Introduction

In marine social-ecological systems, the interaction between MPAs and food security touches on a critical connection between natural and human subsystems, and more specifically between biodiversity conservation and sustainable fisheries, which are closely interdependent in terms of their effectiveness. The potential role of MPAs in contributing to food security for coastal and neighboring communities is gaining more attention, but because of the scarcity of robust scientific information on the subject, it is also a controversial issue. While the role of MPAs for livelihoods has been discussed – for example, in sessions organized by FAO at IMPAC3 (see footnote 2) – there is still a lack of understanding of how MPAs impact on both livelihoods and food security.

### Keynote presentation

Mr Serge Garcia’s keynote presentation, “**MPAs and food security – What do we know?**” reviewed some of the elements of the MPA-food security nexus with a view to looking for a way forward. Mr Garcia provided background on the issue, recalling the concept of the right to food and food security, and showed how MPAs relate to food security, including briefly referring to small-scale fisheries. While protected areas (for marine conservation) and food security (for human survival) are obviously important policy concerns, there is controversy regarding the way they are connected and a very limited number of policy frameworks refer simultaneously to MPAs and food security.

Mr Garcia started his presentation by highlighting some facts to illustrate the nature and scale of the food security issue. Marine capture fisheries produce some 60 million tonnes of human food annually plus 20 million tonnes that are used for feed, representing over 8.2 kg/capita in 2014. Fishing also generates 10 million to 14 million jobs (full-time equivalent), mainly in highly dependent communities, and 40 million to 58 million jobs altogether when fishery-related activities are considered (in the pre- and post-harvest sub-sectors). About 160 million to 230 million people depend on marine capture fisheries for their livelihoods.

Worldwide, 10 billion humans will be looking for food by 2050 (with at least 7 billion of them in coastal areas) and 75 million tonnes more fish will be needed. This demand may be difficult to meet and is likely to be further exacerbated by climate change and predicted challenges for future terrestrial food production. It should be noted that shifting 20 percent of the world’s calorie consumption in 2010 from terrestrial meat to fish would save about 60 million to 80 million ha of terrestrial cropland. Conversely, an attempt to replace marine food sources with terrestrial ones would produce an environmental disaster on land (through ecosystem conversion to agriculture) of global dimensions.

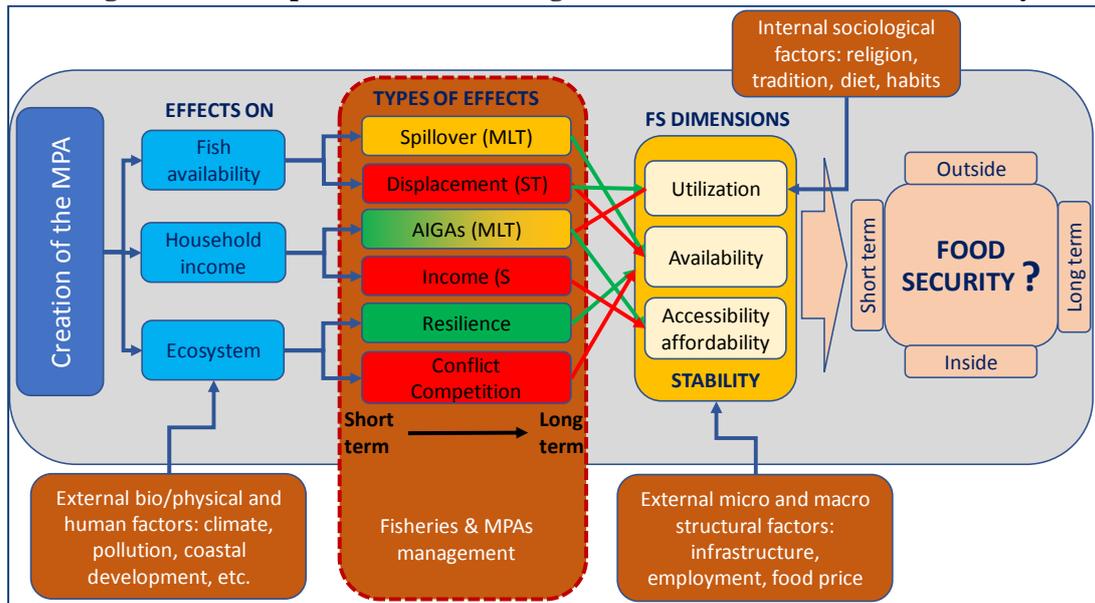
The controversy about the role of MPAs in food security is just another aspect of the controversy about the role of MPAs in livelihoods. On the one hand, the objective of MPAs is the long-term preservation of natural resources and the ecosystem services provided to populations, including presumably food security. On the other hand, MPAs and no-take zones tend to restrict or prohibit access by fishing communities to resources on which they are strongly dependent for their livelihoods and food security. This dual reality creates tensions with regard to the costs and benefits of MPAs for food security, and their distribution across time, space and among stakeholders.

The output of the 2014 IUCN World Parks Congress (WPC) – the Promise of Sydney – suggested: (a) increasing the coverage of no-take zones to 30 percent in all habitats; (b) designing and managing MPAs for both human and ecological objectives, through partnerships with coastal communities and human rights organizations; and (c) scaling up innovative solutions developed by coastal communities. The recommendations recognize the need to generate human and ecological benefits and to respect human rights but do not refer explicitly to food security except as a necessary component of SDG 14. Also, the subsequent IUCN Call for Action on SDG 14 presented at UNGA in June 2017 only refers to food security in the context of indigenous peoples.

The Right to Food (RTF) is enshrined in the Universal Declaration of Human Rights. It is defined as *the right to have regular, permanent and **unrestricted access** to adequate and sufficient food and a dignified life free of fear*. The RTF is a right to a decent life. *Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*. Between the 1970s and 1990s, famines have been seen successively as resulting from: (a) a natural accident causing a deficit in the food supply; (b) a distributional failure leading to inadequate access to the food supply; (c) a wicked problem related to the complex dynamics of food production, with chronic structural aspects and contextual crises; and finally, (d) a failure of governance to achieve stability in the availability of, access to, and utilization of food supplies. In brief, there has been a shift from expected natural outcomes to an unacceptable social and political construct.

Achieving food security requires the availability of food and incomes. Producing food requires resources, a value chain, efficient markets, affordable prices and quality products. Generating incomes requires employment and fair wages, assets, access to credit, resources, technology and markets, as well as enabling legislation. Food security requires that these components be stable over time and space, but these same components are affected by political stability and support, climate, technology, demography, environmental quality, the global economy and governance. This implies that food security is a systemic issue of which fisheries or MPAs are only components. Fisheries and MPAs are contributors to the complex system of global food security and their impact on food security depends on the context in which they are introduced and on how they impact the different parameters of the equation (Figure 2).

**Figure 2: The impact chain connecting MPAs to their effect on food security**



NB: FS = food security.

Source: Modified from Béné, 2017 (in Marine protected areas: Interactions with fishery livelihoods and food security - see APPENDIX 3)

Food security has been used as an argument in favour of MPAs, as a secondary objective (or collateral benefit). The claim is that MPAs, including no-take zones, increase food security. Inside no-take zones, this increase is expected to occur through recovery of the integrity of resources and improving their stability and resilience. For surrounding fishing grounds, the effects are expected to occur through spillover of biomass and larvae from no-take zones to the fishing grounds. The emerging caveats about that relation are that (a) the rebuilding process takes time and generates transition costs for vulnerable communities that should be mitigated; and (b) that quantitative scientific analyses of the impacts of MPAs on food security are extremely limited and need to be seriously reinforced if the argument is to be used. MPAs may have a positive outcome for resources. They may also have a negative impact on access to resources, employment, revenues, access to fishing technology, etc. These impacts will be influenced by the external drivers identified in Figure 2.

The dynamic process of this complex set of impacts may be represented as an impact chain. The MPA modifies fish availability, household incomes and ecosystem services. The effects occur in terms of spillover, displacement of fishing effort, incomes, ecological resilience, conflict, and congestion outside the MPA because of fishers' displacement (if the excess fishing capacity is not eliminated). The outcomes affect the various dimensions of food security, i.e. availability, utilization, accessibility, affordability and stability, which in turn determine the final food security outcome inside and outside the MPA in both the short and long term. In this multiple pathway system, referring to one causal relation only (e.g. biomass) does not make sense. Obviously, the rules imposed on access to the MPA area, and the food extraction activities tolerated within and around it, affect food security. Fishing in MPAs is limited to subsistence fisheries except for the IUCN Type VI MPAs for which very few studies exist.

Accordingly, **in the short term**, a no-take zone may reduce food security in proportion to its relative size and the level of the communities' dependency on the area. **In the long term**, its contribution depends on the relative contribution of the spillover, the no-take zone's impact on income and other non-food assets, and the quality of management of the surrounding fishery. **At the ecosystem level**, however, it is the interaction and coherence between the whole set of MPAs and food production areas that will determine the overall food security impact. The parameters of that coherence will be different

in coastal areas and the high seas because of the large differences in ecology and people's dependency. MPAs affect fishing communities in terms of their fishing activities, catches and fishing operations. They also affect their well-being, at the level of individuals, households and the community in a positive or negative way depending on context. They may modify governance arrangements (introducing or cancelling tenure systems; shifting top-down imposition to co-management), and the level of participation and its role (from pure non-binding consultation, to co-management, to full responsibility). They may also modify the immediate environment, abundance of target resources, biodiversity and key habitats.

The overall effect depends on the type of MPA, the local ecology, the fishery characteristics and the socio-economic environment. The [Voluntary guidelines for securing small-scale fisheries in the context of food security and poverty eradication](#) (SSF Guidelines) contain useful guidance on ways and means to involve fishing communities in the creation and management of MPAs, particularly with the view to maintaining or improving food security.

Summing up, Mr Garcia noted that food security depends on sustainable livelihoods with stable entitlements to enough food and continuous access to that food. The food security of fishing households and of the broader community are interconnected and interdependent, and the link between them increases in importance with the relative size of the fishers' component of the community. On the one hand, the positive effects of some MPAs on some dimensions of food security have supported advocacy and adoption of MPAs. On the other hand, the feared or real negative effects of MPAs on livelihoods, incomes, entitlements, food security and human rights have generated resistance to their top-down introduction. Rigorous and robust evidence is still lacking on the exact nature of the relation between conservation and development. MPAs in densely populated and poor areas are resisted and they are likely to fail if they do not also clearly and immediately provide for, or explicitly account for, food security and livelihoods. The ongoing evolution towards participatory EAF (ecosystem approach to fisheries) could lead to more systematic and objective assessment of both fisheries management measures and MPAs. The four keys to the success of MPAs in relation to food security are: (1) explicit and balanced goals, including food security; (2) a reliable community-based tenure system; (3) participative governance; and (4) a systemic vision of the relation between MPAs and food security.

### **Panellist interventions and discussion**

Mr Miguel Avalos, speaking on behalf of CONAPACH, emphasized the need for participatory governance of MPAs and a need to strengthen co-management arrangements and take the SSF Guidelines into consideration. He noted the potential value of having systems for certification of origin of fishery products to promote the sustainability of both small-scale fishing communities and the environment. However, to make a real difference for the future, he said it is important to engage children and that education is the true legacy for coming generations.

Angélica Méndez, Red de Pescadores del Atlántico, Guatemala, described increasing awareness of the value of MPAs. She highlighted the historic role of fishers as biodiversity guardians but said that current challenges now include overfishing and climate change. Like the previous speaker, she stressed the need for participatory approaches and co-management as well as working with youth and children.

Stefan Gelcich, Pontifical Catholic University of Chile, re-confirmed the need to work closely with coastal fishers and their communities in designing and managing MPAs to achieve conservation and other outcomes. Moreover, he suggested that small-scale fishers should be compensated when giving up part of their fishing ground for no-take areas as a way to ensure short- and long-term food security. No-take areas constitute an opportunity cost for fishers. Consideration could be given to developing a programme that uses market premiums through which a supplementary revenue stream is created in exchange for management actions that produce verified and enforced biodiversity benefits.

New thinking is needed for marine conservation based on sharing of benefits with coastal communities. In the discussion that followed, the panel addressed two main questions:

- *What responsibilities do small-scale fishers have and how can they be incentivized to promote conservation?* Small-scale fishers have a strong sense of responsibility for the sustainable use of resources, but they need to be allowed to be part of management and decision-making processes. Support is needed for education and awareness-raising for fishers to assist them in taking on professional roles. It is also important to strengthen organizations and support networks of fishers and fisher organizations as part of fisheries management.
- *Should fisheries be managed through MPAs or conventional fisheries management measures?* MPAs and no-take zones are only some of the many management tools available and they should be used as and when appropriate and within a broader framework of marine management. For successful fisheries management, a suite of measures is generally needed and MPAs/no-take zones are not always the preferred ones. Participatory approaches and co-management are key – both for MPAs and when using other management arrangements.

### Conclusions

The following key conclusions were drawn from the symposium presentation, panellist interventions and discussion:

- Food security is often mentioned as an assumed outcome of MPAs, but it is generally more a policy ‘watermark’ than an explicit core objective with performance measures, etc. Scientific analyses of the impact of MPAs on food security are extremely limited and in fact little is known about their impact and whether and under what conditions it may be positive or negative for fishing communities. However, generally it would appear that:
  - in the **short term**, vulnerable or marginalized human populations dependent on aquatic resources for food and income are adversely impacted by no-take zones if they are excluded from their traditional fishing territories. The point is that generating expected benefits in the future has immediate direct effects and opportunity costs to be accounted for and mitigated;
  - in the **long term**, properly designed and implemented no-take zones may foster communities’ livelihood and food security if the MPA and fisheries are properly managed.
- However, the MPA food security impact chain is complex and many different factors need to be taken into consideration, i.e. not only the biomass status, but also human (social and economic) and governance factors.
- Participatory approaches that effectively involve local communities and give them a real say are fundamental for a positive impact of MPAs on fishing communities in general and on their food security. To enable this, fishers, fish workers and communities need to have well-functioning representative organizations participating in decision-making, enforcement, etc.
- To avoid destabilizing the food security and livelihoods of coastal fishing communities as a result of no-take zones, new thinking is needed on ways of compensating the impacted fishing communities during the transition period.

## **REDPARQUES PAVILION SESSION – MARINE PROTECTED AREAS: INTERACTIONS WITH FISHERY LIVELIHOODS AND FOOD SECURITY**

*The session on ‘Marine protected areas (MPAs): Interactions with fishery livelihoods and food security’ was organized in the REDPARQUES pavilion on Thursday, 7 September 2017, 16–17 hrs. The session was opened by Mr Roberto de Andrade, FAO-RLC, who also acted as facilitator. Ms Lena Westlund, FAO-FIA, presented the FAO Technical Fisheries and Aquaculture Paper on ‘Marine protected areas (MPAs): Interactions with fishery livelihoods and food security’ jointly published by FAO and IUCN-CEM-FEG, and Mr Serge Garcia, IUCN-CEM-FEG, spoke about the connection between MPAs and food security (see also APPENDIX 3).*

### **Introduction**

Building on work presented at the IUCN World Parks Congress (WPC) held in Sydney, Australia, from 12 to 19 November 2014, the FAO Fisheries and Aquaculture Department and IUCN-CEM-FEG prepared a technical paper on [Marine protected areas: Interactions with fishery livelihoods and food security](#). This paper contains a number of case studies and discusses MPAs in the context of food security.

### **Presentation of the technical paper**

Ms Lena Westlund presented the technical paper, which includes: (i) ten papers reporting on the interface of MPA/protected areas with livelihoods and food security, based on case studies in Africa, Asia, Latin America and Oceania; (ii) an eleventh contribution providing a more general overview of MPAs and food security and how to assess their impact; and (iii) a final paper synthesizing the conclusions of the papers and discussing the observed outcomes of aquatic PAs, together with problems and solutions. In this last chapter, a number of conclusions are drawn with regard to the key requirements for successful MPAs in a food security context:

- Adequate policies: where relevant, food security and poverty alleviation need to be seen as integral and complementary to conservation objectives.
- Clear objectives: planning of MPAs should integrate both ecological and human well-being objectives.
- Participation: communities – and other stakeholders – need to be engaged in MPA planning, implementation, monitoring and enforcement.
- Capacity building: the capacities required to participate should be developed. Management measures: management of MPAs and fisheries need to be combined.
- Traditional knowledge: fishers’ and communities’ knowledge should be considered and used.
- Communication and knowledge: improved knowledge needs to be generated and applied, and communication channels established.
- Compensation: the need for financial compensation and/or alternative livelihoods and income-generating activities should be considered.

### **MPAs and food security connections**

Drawing on his presentation in the ‘MPAs and food security’ symposium, Mr Serge Garcia talked about the food security equation and the MPA impact chain. He noted that fisheries and MPAs are contributors to the complex food security equation and that their impact depends on the context in which they are introduced and on how they affect the different parameters of the equation. Food security combines **producing food**, which requires resources, a value chain, efficient markets, affordable prices and

quality products; and **generating incomes**, which implies employment and fair wages, assets, access to credit, resources, technology and markets, and enabling legislation. There are often tensions about the costs and benefits of MPAs in relation to food security, and their distribution across time, space, and among stakeholders. However, in the multiple pathway system that links MPAs and food security, it is difficult to refer to one causal relation only, and it is difficult to assess what the impacts of MPAs on food security are. It is important to understand these issues better as MPAs continue to be implemented in coastal areas where communities are dependent on fishery resources for their livelihoods and food security.



## APPENDIX 1: VME SYMPOSIUM CONCEPT NOTE AND PROGRAMME

### Protecting vulnerable marine ecosystems (VMEs) in the high seas from bottom-fishing impacts

#### Time and venue

Wednesday, 6 September 2017, 11:30–13:00 hrs in Salon Bahía 3.

#### Symposium organizers

The symposium is jointly organized by the FAO Fisheries and Aquaculture Department and the IUCN Fisheries Expert Group (CEM-FEG) and EBCD

#### Introduction

Following the adoption of United Nations General Assembly (UNGA) Resolution 61/105 in 2006 and subsequent supporting resolutions, many States and regional fisheries management organizations or arrangements (RFMO/As) have developed processes to identify vulnerable marine ecosystems (VMEs) and adopted management measures to protect them from significant adverse impacts of bottom fishing in the high seas. The “FAO international guidelines for the management of deep-sea fisheries in the high seas” ([FAO Deep-sea fisheries guidelines](#)) elaborate and provide guidance on key concepts such as what constitutes a VME or significant adverse impact. The guidelines are used by RFMO/As in the development of their measures to protect VMEs and sustainably manage bottom fisheries in support of relevant UNGA resolutions.

Further information on such regional measures can be found in the [FAO VME DataBase](#), which presents all the current and historical measures to protect VMEs adopted by RFMO/As, as well as maps and fact sheets. The 2016 publication [Vulnerable marine ecosystems: Processes and practices in the high seas](#) catalogues the processes and practices that have been developed by RFMO/As with a mandate to manage deep-sea fisheries in the high seas, and to adopt measures that reduce or eliminate the impact of bottom-fishing gear on VMEs.

This symposium on Protecting vulnerable marine ecosystems (VMEs) in the high seas from bottom-fishing impacts will present a general overview of how VMEs are used as an area-based management measure to protect vulnerable ecosystems in the high seas. It will discuss the challenges and opportunities faced by RFMO/As in designating and managing VMEs.

#### Symposium format

The symposium will take the form of a panel and include presentations and panellist and open discussions. It will draw on the contents of the recently published FAO work on fisheries and VMEs, in particular the technical paper [Vulnerable marine ecosystems: Processes and practices in the high seas](#), and experiences from RFMOs responsible for the management of bottom fisheries in the high seas.

#### Programme

Time	Agenda	Responsible
11:30-11:35	Welcome	FAO, Alessandro Lovatelli, FAO-RLC Facilitator: Serge Garcia, IUCN-CEM-FEG
11:35-11:45	Background and introduction to VMEs	Jessica Sanders, FAO-Samoa Sub-regional office

11:45-11:55	Deep sea fisheries and VMEs	Tony Thompson, FAO-FIA
11:55-12:05	VMEs in the SPRFMO area	Mauricio Galvez, SPRFMO
12:05-12:15	Evaluating trawl impacts	Michel Kaiser, IUCN- CEM-FEG
12:15-12:55	Open and panellist discussion  Panel: Joe Appiott, CBD Mauricio Galvez, SPRFMO Michel Kaiser, IUCN-CEM-FEG Jessica Sanders, FAO Tony Thompson, FAO	Facilitator: Serge Garcia, IUCN-CEM-FEG
12:55-13:00	Closure	

## **APPENDIX 2: MPAs AND FOOD SECURITY SYMPOSIUM CONCEPT NOTE AND PROGRAMME**

### **MPAs and food security**

#### **Time and venue**

Wednesday, 6 September 2017, 15:00–16:00 hrs in Salon Bahía 1.

#### **Symposium organizers**

The symposium is jointly organized by the FAO Fisheries and Aquaculture Department and the IUCN Fisheries Expert Group (CEM-FEG) and EBCD.

#### **Introduction**

Aquatic resources form the basis of food security and livelihoods for many millions of people around the world, and responsible resource management is a prerequisite for sustaining their livelihoods, well-being and food security, now and in the future. Over-exploitation of resources, environmental degradation, social inequities, tenure insecurity and poverty are some of the interconnected threats to the lives of many coastal and rural communities.

The use of marine protected areas (MPAs) as a tool to protect aquatic ecosystems and reverse the degradation of habitats continues to receive increasing attention. MPAs are also increasingly being promoted as a measure for addressing overfishing and unsustainable resource utilization. Spatial-temporal fishing closures, including full closures, as a management tool have a long history in fisheries and predate the current concept of MPAs for biodiversity conservation. However, for fisheries management and the promotion of sustainable use of resources, while MPAs may have a particular role in protecting habitats and some non-target species, they are only one tool among many, and are not necessarily the most effective one. Moreover, while MPAs are often nested in the environment and livelihoods of fishing communities, their contribution to, and impact on these livelihoods and food security tend not to be well known.

This symposium on MPAs and food security will present a general overview of MPAs in relation to food security and what our current apparent knowledge is with regard to this topic. It will also provide the views of small-scale fishing communities on how they perceive the impact of MPAs on food security and livelihoods. Possible approaches and pathways for how to better ensure the contribution of MPAs to food security and sustainable livelihoods will be discussed as well as needs for improved knowledge and information in this respect.

#### **Symposium format**

The symposium will take the form of a panel and include presentations and panellist and open discussions. It will draw on the contents of the recently published FAO/IUCN-CEM-FEG technical paper [Marine protected areas: Interactions with fishery livelihoods and food security](#), which builds on work presented at the 2014 IUCN World Parks Congress.

**Programme**

Time	Agenda	Responsible
15:00-15:05	Welcome	Serge Garcia, IUCN-CEM-FEG Facilitator: Michel Kaiser, IUCN-CEM-FEG
15:05-15:20	MPAs and food security – What do we know?	Serge Garcia, IUCN-CEM-FEG
15:20-15:35	Panellist interventions (5–7 min each)  Miguel Avalos, CONAPACH Angélica Mendéz, Red de Pescadores del Atlántico, Guatemala Stefan Gelcich, Center for Marine Conservation, Pontificia Universidad Católica de Chile	Facilitated by Michel Kaiser, IUCN-CEM-FEG
15:40-15:50	Open and panellist discussion	Facilitator: Michel Kaiser, IUCN-CEM-FEG
15:50-15:55	Closure Pacific small-scale fisheries – video	FAO Samoa Subregional office

### APPENDIX 3: REDPARQUES PAVILION EVENT CONCEPT NOTE AND PROGRAMME

#### Marine protected areas (MPAs): Interactions with fishery livelihoods and food security

##### Time and venue

16:00–17:00 hrs on Thursday 7 September 2017 in the REDPARQUES pavilion.

##### Session organizers

Presentation of technical paper by FAO Fisheries and Aquaculture Department and the IUCN Fisheries Expert Group (CEM-FEG).

##### Background

Building on work presented at the IUCN World Parks Congress (WPC) held in Sydney, Australia from 12 to 19 November 2014, the FAO Fisheries and Aquaculture Department and the IUCN Fisheries Expert Group (CEM-FEG) prepared a technical paper on [Marine protected areas: Interactions with fishery livelihoods and food security](#). The document includes (i) ten papers reporting on the interface of MPA/protected areas with livelihoods and food security, based on case studies in Africa, Asia, Latin America and Oceania; (ii) an eleventh contribution providing a more general overview of MPAs and food security and how to assess their impact; and (iii) a final paper synthesizing the conclusions of the papers and discussing the observed outcomes of aquatic PAs, together with problems and solutions.

##### Purpose of session

The purpose of the session is to present the main contents and conclusions of the FAO/IUCN-CEM-FEG technical paper and raise awareness of MPAs and their relation to fishery livelihoods and food security.

##### Programme

Time	Agenda	Responsible
16:00-16:05	Welcome	Roberto DeAndrade, FAO
16:05-16:20	Technical paper: Marine protected areas: interactions with fishery livelihoods and food security – contents and key conclusions	Lena Westlund, FAO
16:20-16:40	What do we know about MPAs and food security?	Serge Garcia, IUCN-CEM-FEG
16:40-17:00	Open discussion	
17:00	Closure	

Based on its longstanding engagement in work on livelihoods, sustainable fisheries and marine protected areas (MPAs), the FAO Fisheries and Aquaculture Department collaborated with the IUCN Fisheries Expert Group at the Fourth International Congress on Marine Protected Areas (IMPAC4) held in La Serena, Chile on 5–8 September 2017, hosting plenary symposia on (i) protecting vulnerable marine ecosystems (VMEs) in the high seas from bottom fishing impacts and (ii) MPAs and food security, and a side event on Marine protected areas: Interactions with fishery livelihoods and food security. These sessions provided opportunities to discuss the important role of regional fisheries management organizations or arrangements (RFMO/As) and scientific research with regard to spatial management measures to conserve fisheries and protect VMEs in the high seas, the complexity surrounding the impact of MPAs on food security and how participatory approaches that effectively involve local communities and give them a real say are fundamental for positive effects of MPAs on fishing communities.

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