

Report of the

**REGIONAL WORKSHOP ON VULNERABLE MARINE ECOSYSTEMS
(VMEs) IN THE INDIAN OCEAN**

Flic en Flac, Mauritius, 25–27 July 2012



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PREPARATION OF THIS DOCUMENT

This is the report of the FAO Regional Workshop on Vulnerable Marine Ecosystems (VMEs) in the Indian Ocean, which took place in Flic en Flac, Mauritius, on 25–27 July 2012. It was jointly organized by FAO and the Indian Ocean Commission (IOC) through its SmartFish Programme. The workshop was attended by 38 participants, including representatives from government fisheries departments, environmental agencies, research institutes, industry, non-governmental organizations, regional organizations, projects, and the organizers from FAO and IOC/SmartFish.

The workshop was organized as part of the FAO Deep-sea Fisheries Programme to promote the use of the International Guidelines for the Management of Deep-Sea Fisheries on the High Seas (2008), which provide guidance to States and regional fisheries management organizations or arrangements (RFMO/As) to ensure the long-term conservation and sustainable use of marine living resources in the deep seas, including by preventing significant adverse impacts on vulnerable marine ecosystems (VMEs). This workshop on the Indian Ocean was funded by the FAO project GCP/GLO/323/NOR: “Support to the Implementation of the International Guidelines on the Management of Deep-sea Fisheries in the High Seas”, with support from projects GCP/INT/253/JPN “Fisheries Management and Marine Conservation within a Changing Ecosystem Context-deep-sea fisheries component projects” and GCP/GLO/309/FRA “the VME database project” and the IOC Smartfish project. FAO is grateful to the workshop participants for their contributions to this report. The final report editing was done by Tony Thompson, Jessica Sanders and Merete Tandstad.

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ABSTRACT

A regional Workshop on Vulnerable Marine Ecosystems (VMEs) in the Indian Ocean took place in Flic en Flac, Mauritius, on 25–27 July 2012. The workshop aimed to raise awareness and build capacity on vulnerable marine ecosystems (VMEs) and associated management issues in the Indian Ocean region. The Workshop discussed the VME concept within the framework of the FAO Deep-sea Guidelines and looked at examples of different management methodologies and options for VMEs and how these processes can be facilitated. The global VME database, currently under development by FAO, was introduced, including how it can support the VME process in the Indian Ocean region. Furthermore, the workshop identified relevant existing sources of information on deep-sea fisheries and benthic ecosystems, and discussed confidentiality and data sharing issues. Finally, the future requirements and support mechanisms, including network of experts to support the VME process and collaborative arrangements for data sharing, were discussed; as was how the upcoming FAO/Areas Beyond National Jurisdiction (ABNJ) Deep-sea project could assist with this by working with States, other stakeholders and projects. This was particularly timely with the recent establishment of the South Indian Ocean Fisheries Agreement.

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1. INTRODUCTION

1.1 General background

The importance of sustainably managing deep-sea fisheries has long been a focus of States and Regional Fisheries Management Organizations/Arrangements (RFMO/As). In the 1990s, it was realized that deep-sea stocks, especially those around seamounts and other underwater features, were being increasingly exploited, invariably lacking stock assessment and management, and often having characteristics that rendered them susceptible to overfishing. Interest in deep-sea habitats and ecosystems was also increasing during this period, especially with regards to species that were slow-growing and structure forming comprising sponges and corals. Around this time, there was increasing concern that some of these fisheries, especially those conducted with bottom contact fishing gear and trawls in particular, were negatively affecting deep water corals and sponges in benthic habitats that are unique to the deep-seas. There were concerns that this would lead to a general reduction in biodiversity and fish stocks through a gradual degradation of ecosystem health.

The importance of these realizations was highlighted in the United Nations General Assembly (UNGA) Resolutions dealing with sustainable fisheries, and in 2006 UNGA Res. 61/105 (mainly paragraph 83) requesting RFMO/As and States to regulate deep-sea bottom fisheries and take measures to address significant adverse impacts (SAIs) on vulnerable marine ecosystems (VMEs) by 31 December 2008. To assist RFMO/As and States, the International Guidelines for the Management of Deep-Sea Fisheries in the High Seas (the FAO Deep-sea Guidelines; FAO, 2008)¹ were developed to provide guidance on the long-term conservation and sustainable use of marine living resources in the high seas. These greatly assist with the implementation of paragraph 83 (and more generally paragraphs 80–86) of UNGA Res. 61/105 (2006)² as well as the more recent Resolutions 64/72, 65/38 and 66/68. FAO has developed a full programme to support the implementation of the FAO Deep-sea Guidelines consistent with the ecosystem approach to fisheries (EAF)³. This includes a VME database that will raise awareness on VMEs to fishery policy-makers, managers and scientists, conservationists, the fishing industry, and the public at large.

RFMO/As in the high seas are in different stages of development and have different responsibilities with respect to their fisheries management functions. Some have responded very quickly in protecting VMEs, whereas others need support to achieve results. FAO has been asked to provide this support and to facilitate the process by which this may be effective. A component of this is the development by FAO of a VME database.

In May 2010, a workshop⁴ to analyse the challenges and propose ways forward for the implementation of the FAO Deep-sea Guidelines was held in Busan, the Republic of Korea. This workshop identified specific programmes of work and activities that will be needed to advance implementation of the FAO Deep-sea Guidelines, including further guidance on the use of the VME criteria and associated measures. The proposed VME database was introduced and its attributes discussed.

In December 2011, a workshop was held to discuss stakeholder needs and to develop a strategy for information sharing mechanisms for the VME database. Various RFMOs have already indicated their willingness to provide information to the database. The workshop noted the need for regional approaches, and a selection of case study areas were identified to assist in the development of the database.

¹ www.fao.org/docrep/011/i0816t/i0816t00.htm

² <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N06/500/73/PDF/N0650073.pdf?OpenElement>

³ <ftp://ftp.fao.org/docrep/fao/006/y4773e/y4773e00.pdf>

⁴ www.fao.org/docrep/014/i2135e/i2135e00.htm

At the same time, the Convention on Biological Diversity (CBD), principally through Conference of the Parties (COP) decision IX/20⁵ adopted in 2008, has also embarked upon regional workshops to facilitate the description of ecologically or biologically significant areas (EBSAs) in the oceans. These scientific criteria help define important ocean areas. COP at its 11th meeting in Hyderabad, India, described areas that meet the EBSA criteria in the western south Pacific region, the wider Caribbean, western mid-Atlantic region, and areas that could meet the criteria in the Mediterranean region (COP Decision XI/17)⁶.

FAO is organizing a series of regional workshops, with this VME workshop in Mauritius being the first, that aims to facilitate information-sharing and discussion on issues related to VMEs, including on relevant fisheries management and conservation measures among stakeholders. The knowledge gained at the workshops will also feed into the VME database development. To further coordination between the VME and EBSA processes, FAO and the CBD Secretariat are holding these two workshops back-to-back to facilitate collaboration and sharing of information, and to contribute to a more sustainable future in the Indian Ocean region.

1.2 Regional background

The Indian Ocean is the third largest ocean in the world and is formed from three crustal plates that meet at Rodrigues Triple Point a little east of centre and give rise to three main ridge systems: the Mid-Indian Ridge (comprising the Central Indian Ridge and Southeast Indian Ridge), the Southwest Indian Ridge and the Ninetyeast Ridge. This divides the Indian Ocean into three main basins. There are numerous features along the ridges, including deep trenches and seamount chains.

There are two main FAO Major Fishing Areas in the Indian Ocean, Area 51 on the western side and Area 57 on the eastern side. The southern Indian Ocean (SIO) includes some of Area 58 although most of this area lies in the Antarctic Ocean. The high-seas fishery is dominated by the pelagic species, especially tunas, but also includes smaller pelagic species including sardines and mackerels. There are also deep-sea fisheries that started in the 1960-1970 period and showed separate peaks in the 1980s and 1990s. There were more than 40 vessels involved in deep-sea fisheries in 2000, but this number quickly fell and there have been five vessels or fewer since 2004.

The South Indian Ocean Fishery Agreement (SIOFA) was formed in 2006 as the international regulatory body for deep-sea fisheries in the areas beyond national jurisdiction in the South Indian Ocean, and went into force in 2012. Prior to this, there was no multi-lateral body in the ABNJ for the management of deep-sea fisheries of the South Indian Ocean. At the time of publication of this report, SIOFA was in the process of establishing its working protocols and committees.

Since 2006, the industry has played a significant and important role in the organization of the deep-sea fisheries of the SIO through the Southern Indian Ocean Deepsea Fishers Association (SIODFA). This association comprises five industry members representing the major fishing interests in the area with objectives that “included the promotion of responsible management of the deepwater fishery resources of the SIO to ensure sustained harvests to the benefit of mankind while conserving biodiversity, especially deepwater benthos in the area of the fishery and associated and dependent species”. SIODFA, through the cooperation of its industry members, is actively involved in increasing understanding of deep-sea species and has established a number of benthic protected areas (BPAs) in the SIO that are respected by its industry members.

This regional workshop on VMEs in the Indian Ocean is the first of a series to present and discuss regional issues dealing with VMEs in the context of data needs, data sharing, and the coordination necessary to provide these areas with protection. To support the preparation of the workshop a

⁵ www.cbd.int/doc/decisions/cop-09/cop-09-dec-20-en.pdf

⁶ www.cbd.int/cop/cop-11/doc/2012-10-24-advanced-unedited-cop-11-decisions-en.pdf

Dgroups⁷ Web discussion forum was created. Membership included all the participants at the meeting as well as other relevant people who were contacted prior to the meeting in connection with possible participation and organization.

2. WORKSHOP ARRANGEMENTS AND OPENING SESSION

2.1 Venue and participation

The workshop took place at the Pearl Beach Hotel in Flic en Flac, Mauritius, on 25–27 July 2012. The workshop attracted 33 participants including representatives from government departments, environmental agencies, research institutes, non-governmental organizations (NGOs), regional organizations and projects, and the organizers, FAO and Indian Ocean Commission (IOC)/SmartFish.

The workshop was held in English and French. Simultaneous translation was provided in the plenary sessions.

2.2 Welcoming remarks

Welcoming remarks were kindly provided by Mr Léon Razaka, Chargé de Mission, IOC, Mauritius; Mr Denis Reiss, Attaché, Delegation of the European Union to the Republic of Mauritius; Mr Braulio Ferreira de Souza Dias, Executive Secretary, CBD (delivered by Ms Jihyun Lee, Marine and Coastal Biodiversity, Scientific, Technical and Technological Matters, CBD); and Mr Árni M. Mathiesen, Assistant Director-General of the Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (delivered by Ms Merete Tandstad, FAO).

The role of the Indian Ocean Commission (IOC) in promoting sustainable fisheries through regional cooperation during its 27 years of work on the development of conservation and protection of coastal environments was highlighted. The recent support provided by the IOC-SmartFish project in the region was acknowledged, and it was noted that the SmartFish project had received approval by the European Union (Member Organization) for a second phase to work in the Indian Ocean together with FAO.

The welcoming statements reiterated that the goal of the workshop was to develop instruments for management tools for the Indian Ocean region required to assist current, new and developing Indian Ocean fisheries and to develop processes that would assist in providing increased protection to VMEs from any significant adverse impacts of bottom fishing in the high seas.

The value of holding this VME workshop back-to-back with the following week's EBSA workshop was stressed and it was hoped that a clearer understanding of both processes would lead to improved measures to manage both sustainable deep-sea fisheries and biodiversity conservation under the EAF. It was expected that the VME database being developed by FAO would both raise awareness on VMEs and provide a valuable and up-to-date tool for managers and scientists working with VMEs and fisheries management.

2.3 Welcoming address

The welcoming address of the Honorable Minister Nicholas Von-Mally, Minister of Fisheries, Mauritius, was delivered by Mr Mauree Dormalingum, Director of Fisheries, Mauritius. The Hon. Minister welcomed everyone to the Island State of Mauritius and emphasized the importance of the ocean to all those who live on and visit Mauritius. He noted that Mauritius followed the international regulations governing the use of the seas in the Indian Ocean and was a member of the regional bodies that manage the marine resources. The Hon. Minister noted that the sustainable

⁷ <http://dgroups.org/>

development of the ocean economy and the management of fish stocks and the marine environment were of the utmost importance. He hoped that the workshop would facilitate this process.

2.4 Appointment of Chair and Rapporteur

Ms Ellen Kenchington was proposed to act as Chair for the meeting and Mr Tony Thompson was proposed to act as Rapporteur. This was unanimously agreed by the participants.

2.5 Adoption of agenda

The Chair presented the provisional agenda as circulated to participants prior to the meeting. The agenda was adopted with the inclusion of a short introductory presentation by SmartFish, the cosponsors of the workshop, to describe the role of SmartFish in the region.

The workshop agenda, prospectus and list of participants can be found in Appendixes 1, 2 and 5, respectively.

2.6 Overview of workshop objectives and expected outputs

FAO and SmartFish held a three-day workshop to support and develop mechanisms for the identification of VMEs and to address potential associated management implications in the Indian Ocean and to add to the global knowledge on VMEs. The workshop:

- discussed the VME concept in the framework of the guidelines, including examples of different management methodologies and options for VMEs and how these processes could be facilitated;
- identified relevant existing sources of information on deep-sea fisheries and benthic ecosystems, confidentiality and data-sharing issues;
- introduced the VME database and how it could support the VME process in the region;
- built capacity on VMEs and related management issues in the region;
- identified future requirements and support mechanisms including network of experts to support the VME process and collaborative arrangements for data sharing;
- introduced other international initiatives describing areas in the high seas, for example, the CBD/EBSA classification.

The workshop was technical in nature and intended to stimulate informal discussion. The participants at this workshop were attending in their personal capacity and not as representatives of their Government or organization. It was recognized that many of the scientific and management discussions regarding VMEs in the Indian Ocean would occur within the newly constituted SIOFA. It was hoped that the support provided to States as a result of the workshop would contribute to the process within SIOFA.

Participants included scientists and managers from involved or concerned States, representatives from NGO/intergovernmental organizations (IGOs) and scientific institutes in the region working on issues related to VMEs, and other relevant stakeholders working on or contributing to initiatives complementary to the VME database (e.g. the CBD/EBSA process). Representatives from the fishing industry were planning to attend this meeting but last-minute circumstances prevented this. The output of the meeting included:

- a list of data sets that can be useful to facilitate VME identification;
- development of regional networks for VMEs;
- a workshop report.

3. INTRODUCTION TO THE SMARTFISH PROJECT

Mr Dominique Greboval, the Team Leader of Implementation of a Regional Fisheries Strategy (IOC) (IRFS)/SmartFish, explained that the project was implemented by IOC partially in collaboration with FAO and was funded by the European Union (Member Organization). The project partners include the Comoros, Kenya, Madagascar, Mauritius, Seychelles, Somalia, and the United Republic of Tanzania, which were participating in this workshop. The project area is the coastal waters of the southwest Indian Ocean and extended inland to include the Great Lakes and the surrounding States. The first phase of the programme was from March 2011 to September 2012. A five-year extension for a second phase is under discussion. The project has five main areas of interest: (1) fisheries management; (2) fisheries governance; (3) monitoring, control and surveillance; (4) trade; and (5) food security. Further details can be found on the SmartFish programme Web site at www.fao.org/fishery/smartfish/en.

4. OVERVIEW OF THE FAO DEEP-SEAS PROGRAMME

Ms Merete Tandstad (FAO) introduced the FAO programme and projects on Deep-sea Fisheries in the High Seas. She explained the history of the development of the process to prevent significant adverse impacts (SAIs) to VMEs and its roots in the United Nations General Assembly Resolution (UNGA Res.) 61/105 published in 2007, and also the development of the International Guidelines for the Management of Deep-sea Fisheries in the High Seas through a multi stakeholder consultative process to help RFMO/As and States implement UNGA Res. 61/105 to protect VMEs using a set of agreed and defined criteria. These guidelines were adopted in August 2008 by 69 States, the EC and Faroe Islands. The contents of the guidelines, including the descriptive elements, governance, management and conservation steps, and special assistance for developing countries, were explained.

Ms Tandstad explained the current FAO Deep-sea programme that encompass three projects including two in support to the implementation of the deep-sea fisheries guidelines, funded by Norway and Japan, and the VME database project funded by France. Areas of work include, among others, the development of species identification guides specific to deep-water species (e.g.: sharks, corals, sponges), data collection programmes and collaboration with industry and scientists, the development of a VME database, and a series of regional workshops to improve the knowledge on VMEs in major deep-sea fishing areas (e.g. this workshop in the Indian Ocean [July 2012] and a future workshop in the Southeast Atlantic [2013] as well as support to reviews of specific management topics (e.g.: environmental impact assessment and encounter protocols).

Particular emphasis was given to explaining the new five-year ABNJ programme that is currently under development. The ABNJ programme consists of four projects: 1) The Sustainable Management of Tuna Fisheries and Biodiversity Conservation in the ABNJ; 2) The Sustainable Fisheries Management and Biodiversity Conservation of Deep-Sea Ecosystems in the ABNJ; 3) The Ocean Partnership Facility (OPF); and 4) The Strengthening of Global Capacity to Effectively Manage ABNJ. Project 2, the Deep-sea Project, which is most relevant to this workshop, was explained in detail. The concept note has been prepared and stakeholder consultations are expected to occur from July 2012 to 2013. Capacity needs for global and pilot areas will be identified and project institutional and implementation arrangements finalized. It is expected that pilot areas will include the Southern and Western Indian Ocean.

5. FAO DEEP-SEA GUIDELINES

Ms Jessica Sanders (FAO) presented the FAO International Guidelines for the Management of Deep-seas Fisheries in the High Seas adopted by FAO in August 2008, and focused particularly on the VME and fishing area aspects most relevant to this workshop. The background and general principles embedded in the FAO Deep-sea Guidelines originate from the 1982 UNCLOS, the 1995 UN Fish Stock Agreement (FSA), and the 1995 FAO Code of Conduct for Responsible Fisheries. However, it was not until the passing of UNGA Res. 61/105, and the direction provided at the Twenty-seventh

Session of the FAO Committee on Fisheries (COFI) in 2006, that the work on the guidelines started. These guidelines were developed through a series of expert consultations and workshops followed by two technical consultations for adoption. The guidelines were important, especially for RFMO/As, and aided the interpretation and implementation of UNGA Res. 61/105. The challenges facing the implementation of the guidelines was discussed at a workshop in Busan, the Republic of Korea, in 2010.

The guidelines are designed for areas beyond national jurisdiction and where catch includes species that can only sustain low exploitation rates, and where fishing gear may come into contact with the sea floor. The objective of the guidelines is to provide guidance for the management of these fisheries, and to facilitate and encourage the efforts of States and RFMO/As towards:

- sustainable use of marine living resources;
- prevention of significant adverse impacts on VMEs;
- protection of the marine biodiversity that these ecosystems contain.

The guidelines identify five VME criteria:

- uniqueness or rarity;
- functional significance of the habitat;
- fragility;
- life-history traits of component species that make recovery difficult;
- structural complexity.

The VME criteria should be adapted according to local or regional needs, and they can also apply to areas expected to contain VMEs when and where detailed site-specific information is lacking. The VME characteristics should be weighted according to their relative contribution to the ecosystem's vulnerability to significant adverse impact.

Any SAIs should be identified according to the types of fishing conducted or contemplated, the best scientific information available, mapping of the VME, risk assessments, and mitigation and management measures. The guidelines note that the deep-sea fisheries should be managed through all stages of their development – starting with areas subject to experimental and exploratory fisheries through to areas with established fisheries. During mapping it is often necessary to identify areas as containing established (existing) fisheries, and areas outside of these where there would be no history of fishing, or the possibility of an experimental or exploratory fishery.

The guidelines emphasize the need to develop impact assessments and have measures relating to encounter protocols when vessels acquire new evidence of possible and un-notified VME areas by catching VME indicator species or taxa. The guidelines also note that the fishing and VME areas should be regularly reviewed and measures modified and updated as appropriate.

In the following discussions it was explained that “High Seas”, as used in the guidelines, refers to ABNJ, but that coastal States may apply the guidelines to areas within their national jurisdiction. Clarifications on the “legal” status of the guidelines in the high seas was sought and it was emphasized that the application of the guidelines is voluntary and should be used in conjunction with other international instruments such as UNCLOS (1982), FSA (1995), the FAO Compliance Agreement (1993), the FAO Port State Measures Agreement (2009) and other voluntary instruments such as the FAO Code of Conduct for Responsible Fisheries (1995) and the various supporting technical guidelines and international plans of action.

The application of the guidelines was also discussed in relation to the status of the fishery resource. It was emphasized that the guidelines are consistent with the EAF relating to the general principals and concepts of deep-sea fisheries that should be applied to all fisheries where the gear is likely to come

into contact with the bottom during normal use. The guidelines particularly relate to low-productivities areas, but they can also be applied to bottom-contact fisheries in other areas.

It was also explained that the current workshop did not follow on directly from the “FAO Workshop on the Implementation of the International Guidelines for the Management of Deep-sea Fisheries in the High Seas – Challenges and Ways Forward” held in Busan, the Republic of Korea, in May 2010⁸. However, many of the discussions at the Busan workshop were relevant and of interest to participants at this meeting.

Following on from the above, there was a discussion on “who” would promote and apply the guidelines to the high seas. In other words, who would identify VME areas and set management regulations on those areas. It was noted that, in general, the RFMO/As were the responsible body for the application of the guidelines, and in the absence of any competent deep sea high-seas body, States could apply them⁹ (typically then, the management regulations would apply to vessels flagged to that State or possibly to vessels landing fish in the ports of that state if port state measures are applied). The newly constituted SIOFA would be the appropriate competent body in the high seas of the Southern Indian Ocean for species other than tuna and tuna-like species. There was concern that there was no RFMO/A for non-tuna species in the Indian Ocean to the north of SIOFA, but it was noted that this area currently had no significant deep-sea fisheries and so this should not affect fish stocks or fishing in the SIOFA area. It was also noted that, in the Indian Ocean, the fishing industry through the Southern Indian Ocean Deepsea Fishers Association (SIODFA) had established Benthic Protected Areas (BPAs) that were closed to all fishing, and that all industry members of SIODFA respected these voluntary closures. The South West Indian Ocean Fisheries Commission (SWIOFC) would be the appropriate body to provide advice on VMEs within the exclusive economic zones (EEZs) of the Western Indian Ocean and the coastal States would be responsible for the associated management measures. The Indian Ocean Tuna Commission (IOTC) is concerned with tuna and the other tuna-like species where the gear does not come into contact with the sea floor, and so there is no direct impact on benthic ecosystems. It was explained that it was common to have more than one RFMO/A in a region, but that the scientific and management responsibilities were usually applied to specific species or groups (e.g.: marine mammals, large pelagic fisheries, other pelagic and demersal fisheries) and so their duties and responsibilities rarely overlapped.

Issues of compliance to agreed management regulations and their relevance to the particular situation in the Indian Ocean were also discussed. It was specifically mentioned that some of the vessels fishing in the high seas of the Indian Ocean were flagged to States that were not members of SIOFA. In general, and also in the SIOFA Agreement¹⁰, there is information on how such non-contracting parties can cooperate with the RFMO/A contracting party members. There are also other measures that support compliance and these include the various certification schemes that may or may not be related to import restrictions, Port State Measures, and IUU lists.

6. VME IDENTIFICATION PROCESSES

6.1 Examples from NAFO, NEAFC, and CCAMLR

This session commenced with a presentation by Mr Tony Thompson detailing the processes used by three international management bodies, Northwest Atlantic Fisheries Organization (NAFO), Northeast Atlantic Fisheries Commission (NEAFC) and Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), to establish VME areas in the Northwest Atlantic, Northeast Atlantic and Antarctic, respectively. The purpose was to introduce the full scope of the VME process through examples and to introduce the various aspects and terminology. The VME process in the high seas

⁸ www.fao.org/docrep/014/i2135e/i2135e00.pdf

⁹ Art 117 UNCLOS: “All States have the duty to take, or to cooperate with other States in taking, such measures for their respective nationals as may be necessary for the conservation of the living resources of the high seas.”

¹⁰ www.fao.org/fileadmin/user_upload/legal/docs/035t-e.pdf

primarily commenced with UNGA Res. 61/105, particularly as outlined in paragraph 83, published in 2007, which called for RFMO/As to identify and protect VMEs that were subject to significant adverse impacts from bottom fishing activities by the end of 2008. This was supported by the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas (the “Guidelines”) that allowed for the implementation of UNGA Res. 61/105. The two principal actions required were the identification of benthic areas that contained fauna, principally but not limited to sponges and corals, that could be impacted by bottom fishing, and to map areas currently exploited by commercial fishing. Management measures were then developed to protect these areas, typically by closures to bottom fishing. This was a complex procedure that required new expertise and the establishment of subsidiary committees and working groups within the RFMO/As. This allowed for the identification of VME areas that were closed to bottom fishing and the delineation of existing fishing areas. Areas outside of this were subject to exploratory fishing protocols. All areas were also subject to encounter protocols whereby new potential VME areas could be identified and if appropriate established.

The following is a list of actions that are needed for the VME process:

- update or amend Convention and mandate;
- establish regulations;
- establish a VME working group;
- define existing/new fishing areas;
- complete habitat surveys;
- develop VME indicators;
- develop encounter thresholds;
- develop requirements for impact assessments;
- develop exploratory fishing protocols;
- propose “VME” areas;
- develop identification guides for potentially vulnerable species.

The RFMOs in the case studies found it impossible to have all the above in place by the tight deadlines imposed by UNGA Res. 61/105, and so early VME closures were precautionary and based on limited evidence. These closures were subject to review after 2–3 years and by this time the appropriate rigorous scientific advice had been formulated and the full range of management measures were in place. The CCAMLR, with its more conservation oriented mandate, was better placed to respond to the requirements of UNGA Res. 61/105 and had existing measure already in place prior to 2007.

The discussions relating to this presentation picked up some of the topics discussed in the session on “FAO Deep-sea Guidelines”, but discussions also focused on the identification of fishing areas, VME indicator species, threshold levels, and move-on rules. It was explained that, in general, there was a need to identify and delimit the various fisheries within the area of competence in addition to identifying the VME areas. This is undertaken as part of the process to understand likely impacts caused by the various fisheries deploying different types of bottom contact gear within the area of competence. Further, it was explained that typically different “VME-type” management measures (e.g.: encounters, the move-on rule, and temporary closures) apply to fisheries that are conducted in the defined existing fishing areas, and in those areas outside of the existing fishing area. Typically, a change in fishing methods, or the expansion into previously unfished areas, is subject to an exploratory fishing protocol and an associated impact assessment. If it can be shown that there is no significant impact on VMEs in a new fishing area, then fishing is allowed to proceed and the area is likely to be re-designated as an existing fishing area. There are encounter protocols that apply throughout the area of competence whereby certain rules apply if there is evidence of a VME, usually because of a catch of VME indicator species by the fishing gear. Such rules are usually specific to the competent body, but can include a move-on rule, a temporary closure, a scientific assessment of the area, and a decision as to the future designation of the area.

6.2 Example from SEAFO

The presentation by Mr Ben Van Zyl focused on the step-by-step approach taken by the Southeast Atlantic Fisheries Organization (SEAFO) Scientific Committee in 2011 to review the existing closed areas in order to make the most up-to-date recommendation to the Commission on the protection of VMEs in the SEAFO Convention Area. Seven steps were described:

1. The existing closed/open areas were reviewed to determine if they were fit for purpose in relation to the new and improved information available on the distribution of seamounts.
2. Any changes necessary to the existing closed/open areas were identified.
3. The available information and the distribution of VME indicator species was considered.
4. Any revisions to the existing closed/open areas were made using the modified criteria from the report by the National Oceanography Centre (NOC), Southampton, containing bathymetric maps and GIS of the South Atlantic Ocean and a review of available biologically relevant South Atlantic seamount data.
5. Potential new seamount areas were identified on the basis of the modified NOC criteria.
6. Existing closed/open areas (including those proposed to be modified) and proposed new areas were reviewed, taking into account the available information on the historical spatial distribution of fishing.
7. Suggested closed areas for inclusion in a revised Regulation 06/06 were identified.

Revisions to the existing closed and open VME areas were made using the National Oceanography Centre, Southampton, bathymetric map including GIS of the South Atlantic Ocean oceanography data, available biologically data and marine species data relevant to the Southeast Atlantic seamounts. Furthermore, existing closed and open VME areas, (including those proposed to be modified) and proposed new areas were reviewed, taking into account the available information on the historical spatial distribution of fishing. Following the above approach, 11 potential new seamount areas were identified for closure to protect VMEs, which included revisions to existing closures and five new closures along the Mid-Atlantic Ridge (MAR).

It was explained that in SEAFO the identification of VMEs included both sponges and corals and particularly those that were structure forming. A benthic coral and sponge identification guide was developed and used for the benthic surveys and on board commercial fishing vessels. This process was facilitated by trained observers. Encounters with VME indicator species had been reported but these were not above the threshold limits.

The fishing “footprint” concept was further discussed and, as it is common with other RFMO/As that have identified VMEs and established bottom fishing closures, the fishing footprint and VME closed areas were developed simultaneously. However, this does not imply that VMEs cannot be within a fished area, although it was mentioned that heavy historical fishing may have significantly affected an area such that live corals and sponges may no longer be present. It was also emphasized that commercial fisheries tried to avoid areas that contain corals and sponges as fishing in these habitats often resulted in damage to or loss of fishing gear and a reduced value of the catch.

7. INTRODUCTION TO THE GLOBAL VME DATABASE

Mr Fabio Carocci introduced the FAO VME global database. The presentation focused on the principles and scoping of the VME database with references to the VME database workshop held in Rome in December 2011 and the expected benefits in developing the VME database articulated by the three main groups participating the workshop, namely the RFMO/As, the scientific community, and the fishing industry. The presentation then introduced participants to some of the key elements of the development process of the VME database such as: (a) the importance of creating and supporting a network of contributing partners to be identified among the competent authorities; (b) the responsibility for data and information disseminated through the database; (c) the need to create a secured data-sharing mechanism; (d) the need to ensure data confidentiality; (e) the modularity

approach in developing the database; and (f) the main components for the dissemination of the contents. Finally, a snapshot of the envisaged system architecture was demonstrated. It was highlighted that there were still some open issues or questions related to which areas and type are entitled to be collated and disseminated by the VME database.

One of the discussion points related to the confidentiality of the data and the level of aggregation that this may entail to ensure confidentiality. The VME database would be designed to house spatial data relating to the fishery and to surveys of the benthos. The confidentiality relates to both the use of survey data prior to scientific publication and to commercially sensitive information on fishing locations and catch. In addition, there is information sent by fishing vessels to RFMO/As, sometimes on a haul-by-haul basis, on for example encounters with VME indicator species. Assuming that permission is given by the data holders to provide this sort of information for the VME database, then its use by those accessing the database needs to be controlled. This can be ensured by the use of password-protected areas or by the displaying of the information in an aggregated form. Once the aggregation level of the data is agreed at the geographic level, the exact locations are masked through a reallocation mechanism to a defined spatial grid.

It was stated that coordinates of any publicly available data (e.g.: VME areas, footprints) would be provided at their original resolution. Details of this would need to be worked out individually with each data owner. It was noted that much of the information on the database would be from published sources and therefore free from most of the confidentiality issues. The concept of confidentiality is also associated to data security. Copyright issues may however need to be addressed.

The VME database should facilitate links to other relevant database or repositories such as the database currently under development for the EBSAs.

Another discussion point centred on how the process used to identify a VME compared with the EBSA process, and on how this may relate to the VME database. It was noted that EBSAs have an open application process whereby an EBSA site is proposed by way of an application form that provides details of the site and the reason for it to be identified as an EBSA. It was mentioned that the use of a pro-forma would assist in the entering of data into a database. It was explained that, in general, there was no pro forma or application process used by RFMO/As in identifying potential VME sites. Typically, areas known or likely to contain VMEs are identified based on commercial or scientific survey information, and these are discussed by the relevant scientific committee in relation to the knowledge known about the area and the potential threat of SAIs from fisheries. A boundary to delimit the VME is then proposed and recommendations are made to the appropriate management committee for any mitigation measures that need to be applied to protect the VME. It was stressed that VMEs, as described by UNGA Res. 61/105 and the guidelines, refer to benthic ecosystems (usually structure-forming corals and sponges) or animals directly associated with the particular VME benthic ecosystem (some fish species can fit into this category). It was also noted that single encounters with indicator species, even when above threshold limits, do not necessarily constitute a VME, which is designed for the protection of area-delimited ecosystems having significant concentrations of mainly structure-forming benthic organisms. However, it was reported that all regional bodies with encounter protocols required commercial (and often scientific) vessels fishing in their area of competence to report to their secretariat encounters with VME indicator species, usually above a threshold limit, for further investigation. Such reports of encounters are initially confidential, but may be made public when member States are informed of potential VMEs in the area of the encounter. As far as is known, all notified VMEs are published in the appropriate fisheries regulations and will be included in the VME database at this stage.

8. CBD'S PROCESS ON ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT AREA (EBSAs)

Ms Jihyun Lee, Environmental Affairs Officer at the CBD Secretariat, briefed the meeting on the process for describing ecologically or biologically significant marine areas (EBSAs) under the CBD,

through which COP 10 called for the organization of a series of regional EBSA workshops, with the specific scientific purpose of describing areas meeting EBSA criteria. She also explained the process through the Subsidiary Body on Scientific, Technical and Technological Advice (CBD) (SBSTTA) 16 and COP 11 to which the outcomes of the workshops will be submitted for their consideration and endorsement. She gave an overview of previous regional workshops on EBSAs and explained the scale of data compilation undertaken. She noted the challenges of the diverse, large-scale data, but reiterated the importance of the process in relation to the Aichi Biodiversity Targets, in particular Target 11. She then highlighted the potential benefits of the EBSA process in further strengthening the region's efforts toward marine biodiversity conservation goals, by facilitating scientific collaboration, increasing awareness, and encouraging countries to apply necessary conservation measures related to EBSAs within their territorial waters.

Subsequently, Mr Jeff Ardron outlined the background and processes for developing the CBD scientific criteria for EBSAs, adopted by COP 9 in decision IX/20, and briefed on the development of the prototype CBD EBSA repository, as called for by COP 10 in decision X/29. The development of the EBSA criteria began in 2005 with an expert workshop in Ottawa (Canada), followed by a CBD expert workshop in the Azores (Portugal) in 2007. In developing the seven criteria, more than 30 other criteria systems were considered, with the intention of identifying elements common to many of them. The seven scientific criteria for EBSAs, as adopted by COP 9, include: uniqueness/rarity; special importance for life history of species; importance for threatened, endangered or declining species/habitats; vulnerability, fragility, sensitivity, or slow recovery; biological productivity; biological diversity; naturalness¹¹. These seven EBSA criteria capture all the FAO VME criteria but one: structural complexity. He explained that COP 9 also adopted five marine protected area (MPA) network criteria: ecologically or biologically significant areas (site criteria); representativity; connectivity; replication; and adequacy/viability, in light of WSSD 2012 commitments to developing representative networks of MPAs. The CBD EBSA repository is currently in the prototype stage and has been tested using data from the Oslo and Paris Convention (OSPAR) of the Northeast Atlantic. It is based on open standards allowing for linkages with other databases, as desired (for example, the FAO VME database). It can map proposed areas meeting EBSA criteria, and allows for the upload of supporting information in any digital format, including GIS and video files as well as supporting papers, etc. Upon the consideration by COP 11 on the results of EBSA regional workshops, the EBSA repository and information-sharing mechanism will be populated with the scientific information produced by regional workshops.

Finally, Mr Nic Bax provided an overview of the three regional workshops that have already taken place to describe areas that meet the EBSA criteria as well as a parallel scientific process that took place in the Mediterranean. The CBD collaborated with OSPAR/NEAFC on the regional workshop for the Northeast Atlantic (September 2011, France) and with UNEP/MAP Secretariat on its scientific work relevant to EBSAs in the Mediterranean and convened two regional workshops for the Western South Pacific (November 2011, Fiji), and Wider Caribbean and Western Mid-Atlantic (March 2012, Brazil). These workshops and scientific work cover 104 million km² or 29 percent of the world ocean area, covering the description of 148 areas meeting EBSA criteria. The CBD was in the process of convening two further workshops for the Southern Indian Ocean (August 2012, Mauritius) and the Eastern Tropical and Temperate Pacific (August 2012, Galapagos, Ecuador). Mr Bax noted that these workshops are leading to increased regional collaboration – one immediately tangible result being the development of 40–50 regional data layers of physical and biological variables for many of the areas, which are being made publically available. The data were used at the workshops to assist the experts nominated by parties in their collaborative work to describe areas meeting EBSA criteria. All description of areas meeting EBSA criteria were agreed to by the workshop plenary and documented in a consistent manner against the criteria for review by SBSTTA. Mr Bax concluded that the progress made in convening these workshops in collaboration with parties and various international and regional partners in the last 12 months had been quite remarkable.

¹¹ Note that the processes for the development of the EBSA and VME criteria emerged from the origins and thus are very similar.

The Chair thanked the three speakers for presenting a very complete and clear account of the CBD EBSA process and opened the floor for questions.

The process for identifying EBSAs has been undertaken at regional workshops where proposals and assessments are initially submitted by parties as well as the nominated/selected experts to the workshop according to EBSA criteria. These are discussed by the experts present at the workshop and only those agreed by the workshop plenary are included in the report of the workshop. Areas that may be important, but do not currently satisfy the EBSA criteria in the opinion of the experts present at the workshop (typically because of lack of data), are placed in a separate annex for future consideration. The report is reviewed by the subsequent SBSTTA, which will prepare a summary report drawing upon these workshop reports for the consideration by COP. COP will then decide regarding the inclusion of this summary report in the EBSA repository and its submission to UNGA and other relevant organizations.

There was much discussion on the use and meaning of EBSAs, arising in part because of previous discussions in this current workshop on the management measures applied to VMEs. It was noted, and as described in the three presentations, that EBSAs are currently a scientific exercise to provide an inventory of important (significant) marine areas. The use of scientific information on areas meeting EBSA criteria in representative networks, as described in Annex II and Annex III of COP IX/20, has not yet commenced. EBSAs can be within EEZs and even near to the coast but should have a connection or link to the open ocean. Description of areas meeting EBSA criteria within EEZs was undertaken through the full support of the experts nominated by parties, in particular the party having jurisdiction over that EEZ.

It was noted that the description of areas meeting EBSA criteria could be undertaken on a wide range of levels that can include physical (e.g.: seamounts and canyons) and oceanographic features (e.g.: upwelling areas of high productivity), as well as biological features applied at the ecological/habitat level (e.g.: extensive coral areas or productive areas with many predator-prey links) or the individual species or species group level (e.g.: tuna feeding/spawning areas, whales, coelacanths). EBSAs can be based on the presence of top predators, marine mammals, or sea bird feeding sites. Highly productive areas, typically caused by upwelling, are primary candidates for EBSAs and often support a rich and abundant associated flora and fauna. EBSAs, like many area classifications, require a strong basis in science and hence require information. It is realized that it will be difficult to describe areas poor in biological data as EBSAs, although other supporting features that are known, for example bathymetry and satellite observations, can be used to develop further data layers to support an area as meeting EBSA criteria. EBSAs are based on the current state of knowledge on an area as reflected by the information available at the time of the assessment.

It was pointed out that EBSAs are not ranked as being more or less critical. There are several reasons for this, with the main reason being that EBSAs are selected to identify important sites in the world's oceans where they satisfy a set of criteria. Ranking EBSAs would require additional guidelines that are likely to depend also on threats and management implications, and this is not currently part of the rationale for describing areas meeting EBSA criteria.

The role of the Global Oceans Biodiversity Initiative (GOBI) and other information sources was discussed. GOBI was established in 2008 to support the CBD EBSA process to: (1) establish and support an international scientific collaboration to assist States and relevant regional and global organizations to identify ecologically significant areas using the best available scientific data, tools, and methods; (2) provide guidance on how the CBD's scientific criteria can be interpreted and applied towards the description of areas meeting EBSA criteria at the regional workshops convened by CBD Secretariat or other competent regional organizations; and (3) assist in developing regional analyses with relevant organizations and experts.

The EBSA repository and the information-sharing mechanism are being developed by the CBD Secretariat and will provide a useful inventory. An example was presented whereby modelling of climate change could help describe certain areas that may become important in the future. For example, global warming is likely to affect the distribution of deep-water corals and their currently fairly widespread distribution is predicted, under certain model conditions and assumption, to be reduced to only a few sites. Therefore, this modelling can provide additional reasons to describe sites that may be more sustainable in the longer term. Further, predictive modelling can be used to describe sites likely to contain EBSAs. However, at present, the predictive model results need verification to identify the finer resolution required, but it does help to increase the efficiency of sampling and survey work.

Much of the discussion focused on the similarities and differences between the VME and EBSA processes. It was noted by the speakers that the EBSA process is a scientific exercise to identify important areas that are, as the name suggests, ecologically or biologically significant. In the EBSA identification process, there is no attempt to link this to current human activities occurring within the area or to apply management measures to the area. Hence, EBSA's are not MPA's, unless coincidentally another designation is placed on the same geographical area.

VMEs, are embedded in fisheries management and are those linked to human impact and threats. VMEs, because of their link to low-productivity fisheries and to fishing gear that may come into contact with the sea floor, have a different focus and rationale to EBSAs.

Again, as VMEs invariably have a management indication, their boundaries are typically subject to lengthy debates. At present, the boundary issues are less critical for EBSAs. This often means that higher-resolution surveys and mapping are required for VMEs than is found for EBSAs.

9. RECENT DEVELOPMENTS IN NAFO TO IMPROVE ADVICE ON VME

Ms Ellen Kenchington presented and discussed the recent developments that have improved the quality of scientific advice that assists in the management of VMEs in the Northeast Atlantic. These advances remove much of the subjectivity in defining VME boundaries and encounter thresholds.

Within NAFO, data is collected by the contracting parties, which are the member States of NAFO, and shared among members of the two scientific working groups NAFO SC Working Group on Ecosystem Approach to Fisheries Management (WGEAFM) or ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC) according to various data-sharing agreements and restrictions. The data, many of which come from research vessel surveys undertaken for stock assessment within the fishing footprint area, are analyzed and new international multidisciplinary research initiatives are funded by contracting parties. The information within the fished footprint of the NAFO area is considered data rich, whereas dedicated research cruises have been required and recently undertaken to provide information in the unfished areas outside of the fishing footprint where most of the VMEs are located. The presentation focused on four aspects that relate to science and fishing:

- What constitutes a VME?
- What constitutes a significant concentration of a VME?
- Scientifically based encounter protocols.
- Impact assessment approaches.
- Requests for scientific advice are drafted by the Fisheries Commission and sent to the Scientific Council for a response. In 2010, four requests pertaining to VMEs were made:
 - detailed list of VME indicator species and other VME elements;
 - development of a comprehensive map of VME indicator species and other elements;
 - refinement of the GIS-model and update of encounter thresholds and move-on rules;
 - What constitutes a significant concentration of a VME?

The presentation focused on explaining the scientific basis for addressing these four requests for advice, with each being backed by an internally reviewed and openly available research document¹². This work represents an important advance in the provision of advice on VMEs as it now has a sound and transparent basis in science. The techniques and methods developed are available for others to use and refine, and this helps to guide both data collection protocols and develop better measures to avoid SAIs to VMEs.

The presentation concluded with three general comments applicable to VMEs:

- Encounter thresholds are a very useful tool to identify VMEs in areas where there is little survey information and commercial fishing activity is the main source of data.
- The Scientific Council considers management through the closing of areas with significant concentrations of VME is the most effective measure for protecting VMEs in the NAFO Regulatory Area as it would avoid issues associated with the implementation of complex move-on rules.
- As VMEs are protected through closures, the need for encounter provisions diminishes.

This presentation highlighted some important aspects of the VME process. The methods described firmly underpin the requirement to provide objective and transparent scientific advice to managers that can be independently reviewed. This contrasts with the situation that transpired at the beginning of the VME identification process in 2006–2007, when boundaries and encounter thresholds were chosen subjectively and against criteria that were less well understood at that time. The improved understanding of the spatial distribution and aggregation of sponges and corals, achieved through modelling extensive habitat mapping surveys, has also provided a tool that allows a better understanding of the likely impacts of fishing on VMEs, and can be used to better define move-on rules.

Discussions also occurred on the proportions of a VME habitat that could be lost without destroying its ecosystem function and the catchability of various indicator species by commercial fishing gear types such as sea pens. Such questions are difficult to answer with the current state of scientific knowledge, although it is known that commercial sampling gear is poor at catching and retaining some of the benthic invertebrates. It was stressed that there is a need for independent surveys using multi beam sonar and underwater remotely operated vehicle (ROV) video to improve the identification and delineation of VMEs, and with this knowledge comes the accurate identification of the most critical VME areas.

Further discussions centred on the management of fish stocks within VME areas, as typically fishing in VMEs is only closed to bottom contact gear. It was noted that the management measures applied to VMEs were fundamentally in place to protect the bottom habitat from potentially damaging fishing operations. The measures applied to VMEs are therefore not well designed for the management of deep-water fish stocks, and this should be undertaken using the more traditional fisheries management measures.

10. VMEs: SHARING EXPERIENCE FROM SOUTH AFRICA

South Africa initiated work on identifying and mapping potential VMEs as a component of a project aimed at developing a network of offshore spatial management measures (from the 30 m depth contour to the EEZ boundary of mainland South Africa). Protection of potential VMEs was one of several key objectives for the network of spatial management measures, developed at the project outset through a collaborative workshop held in 2007. The draft FAO deep-sea guidelines were used to support the development of a national map of potential VMEs in 2009. This map was compiled using bathymetric data, demersal fisheries research data, sea-bed imagery and museum records. Deep-water images were acquired from research and industry collaborators including petroleum and diamond

¹² See NAFO SCR Doc. 11/72, 11/73, and 11/75 on www.nafo.int

mining industries. The map includes features that may support VMEs (such as deep reefs, canyons, seamounts and other hard ground habitats), sponge dominated habitats (*Suberites* sp.) and reef-building cold-water coral records (*Lophelia pertusa*, *Goniochorella dumosa* and *Solenosmilia variabilis*). Targets were set for these features in a systematic biodiversity plan to identify a set of focus areas for offshore protection. This work also fed into an emerging national ecosystem classification that was developed to report on ecosystem threat status and protection levels as a component of South Africa's National Biodiversity Assessment 2011. The assessment inputs and results have recently been applied in reviewing the potential impacts of a demersal trawl fishery on benthic habitats. The South African hake fishery holds ecocertification through the Marine Stewardship Council and the trawl industry commissioned a study to examine the fishery's interaction with marine habitats. This study identified priority habitats for management based on examination of four criteria. These include: (1) vulnerability and resilience of each habitat type to otter trawling; (2) total habitat extent within South Africa's EEZ; (3) the proportion of each habitat type's total extent that occurs within the trawl footprint; and (4) relative trawling effort across each habitat type within the footprint. Recommendations to support further development of potential management and mitigation measures for potential habitats of concern were developed. Other industry collaborations include initiatives to build the offshore biodiversity knowledge base in collaboration with the petroleum and diamond mining sectors. The first map of potential VMEs in South Africa should be updated to include emerging new bathymetric, fisheries and biodiversity datasets. This includes data from a developing collaborative invertebrate monitoring programme that is a component of South Africa's demersal research trawl surveys.

11. REGIONAL FISHERIES BODIES

The Chair felt that it would be useful for FAO to clarify the role of the regional bodies in the region and outline some of the fisheries. Ms Jessica Sanders presented the background information on the regional fisheries bodies (RFBs) in the Indian Ocean and noted that full details are available for all the bodies worldwide on the FAO Web site at www.fao.org/fishery/rfb/search/en. There are two RFMO/As in the Indian Ocean that are relevant to this workshop on VMEs:

- The Southwest Indian Ocean Fisheries Commission (SWIOFC) was established in 2004¹³ and the current membership is the Comoros, France, Kenya, Madagascar, Maldives, Mauritius, Mozambique, Seychelles, Somalia, South Africa, United Republic of Tanzania, and Yemen. The main objective of the Commission is to promote the sustainable utilization of the living marine resources of the South West Indian Ocean region, by the proper management and development of the living marine resources, without prejudice to the sovereign rights of coastal States and to address common problems of fisheries management and development faced by the members of the Commission. The area of coverage is principally within the EEZs of the member States.
- The South Indian Ocean Fisheries Agreement (SIOFA)¹⁴ was adopted on 7 July 2006 and entered into force on 21 June 2012. There are currently five contracting parties to the Agreement: Australia, the Cook Islands, the European Union (Member Organization), Mauritius, and Seychelles. Signatories to the Agreement are: Australia, the Comoros, the European Union (Member Organization), France, Kenya, Madagascar, Mauritius, Mozambique, New Zealand and Seychelles. The objective of the Agreement is to ensure long-term conservation and sustainable use of fishery resources including molluscs, crustaceans and other sedentary species other than tuna and tuna-like species occurring on the high seas and on the sea bed beyond national jurisdiction of the Indian Ocean.

There is also an industry associate that has been very active in the Indian Ocean:

¹³ www.fao.org/fishery/rfb/swiofc/en

¹⁴ www.fao.org/fileadmin/user_upload/legal/docs/035t-e.pdf

- The Southern Indian Ocean Deepsea Fishers Association (SIODFA)¹⁵ formed in 2006 when four fishing companies formed the association to support various projects, promote data collection and established several areas, referred to as benthic protected areas (BPAs) (Figure 1) that were closed to the members for all types of fishing.

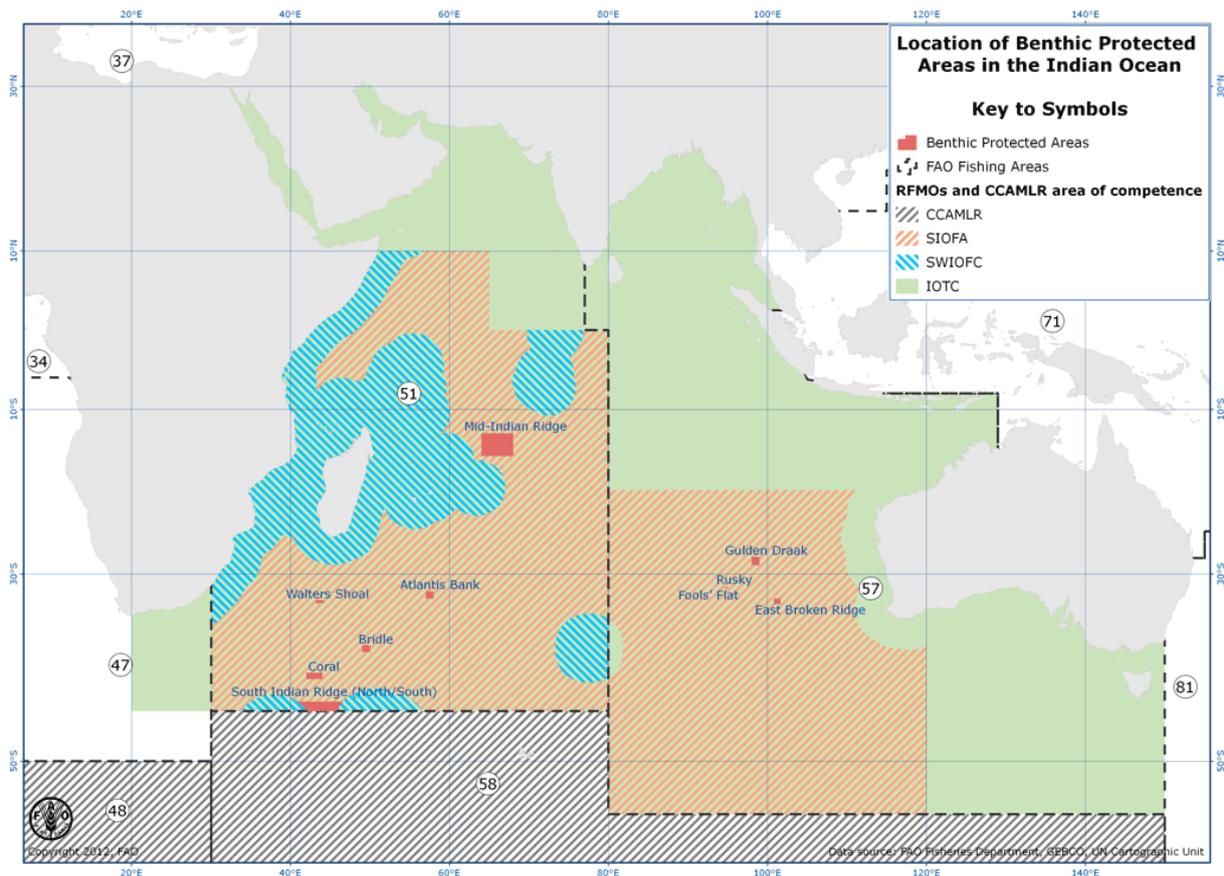


Figure 1. Regional fishery bodies and industry declared benthic protected areas in the Indian Ocean

The recent history of the deep-sea fisheries in the Indian Ocean was outlined. There were surveys and exploratory fishing by the then Soviet Union in the 1970s–1990s, and potential fishing from New Zealand, Australia and others in 1990–99. An orange roughy fishery was identified in 1999–2000 and there was a boom of vessels possibly reaching 50 in total. By 2001, there were only eight vessels in the fishery, and by 2011 there were only five vessels. The Mascarene Plateau has had demersal fisheries since 1970s in the EEZs and a small portion in the ABNJ that targets sky emperor (*Lethrinus mahsena*). The orange roughy bottom trawl fishery is generally from 750–1500 m where the fish form large aggregations in association with underwater features. There is a minimal bycatch that includes oreos and deepwater sharks. There is also an alfonsino mid-water trawl fishery generally from 300 to 900 m with a bycatch that includes pelagic armourhead, black cardinal fish, butterfish and bluenose warehou.

In the discussions, it was noted that there had been a range of fishing methods used on seamounts in the Indian Ocean in addition to the better-known bottom and mid-water trawl fisheries. It is likely that there have been gillnets set to catch deepwater sharks and also pots and traps used for deepwater lobster fisheries. At times, gear is lost and reports from ROV video have seen abandoned gear on the sea floor. However, it is not possible to recover them.

A number of points were raised on the role of the concerned States and the fisheries bodies in managing both the fisheries and biodiversity conservation. This was of interest as some of the vessels fishing in the Indian Ocean are not flagged to the Indian Ocean coastal States and may not be members

¹⁵ www.siodfa.org/

of SIOFA. It was noted that most States were responsible for the sustainable utilization of the fishery resource by being signatories to various international instruments. It was further noted that FAO, and a number of other organizations and/or projects, could assist States in achieving this goal. Of particular note is a new FAO ABNJ programme that is being developed to assist and support many aspects of high seas management and the ABNJ deep-sea project that will have both an ocean-wide remit and a candidate pilot area in the Western Indian Ocean.

Another important point discussed concerned the mechanisms required for scientific and commercial data sharing within the Indian Ocean. It was noted that the details of data sharing were specific to member States and to RFMO/As and that this needed to be addressed either bilaterally or with the appropriate fisheries body. However, typically data are owned by the State and often housed on international databases that may or may not be governed by access restrictions. Furthermore, the State's access to commercial information depends upon its own regulations. It was noted that the FAO VME database would address many of these issues and that this might help guide member States.

12. DATA SETS FROM SOUTHERN INDIAN OCEAN TO FACILITATE THE DESCRIPTION OF EBSAs

Mr Piers Dunstan presented work undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), in conjunction with international partners, that has identified and mapped a large number of data sets and analyses for consideration by the Southern Indian Ocean Regional Workshop to facilitate the description of EBSAs. The data sets obtained cover both biological and physical data sets. The data are intended to be used by the expert regional workshop convened by the Secretariat of the Convention on Biological Diversity (SCBD) to aid in identifying EBSAs through application of scientific criteria in Annex I of decision IX/20 as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria. Each data set may be used to meet one or more of the EBSA criteria. The data collected will be made available for download at the Australian Ocean Data Network Portal¹⁶ and can be found by searching for the key word "EBSA". The layers are available as shape files and geotiffs.

The full report "Data to inform the CBD Southern Indian Ocean Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas" by Piers Dunstan and Mike Fuller can be downloaded from the CBD website¹⁷.

The Chair thanked the presenter for a very comprehensive talk on mechanisms to collect, collate, analyse and store large amounts of spatial data. Of particular note was the fact that much if not all of the data described would be open-source and could be downloaded via the Internet. It was noted that there were still more data available in the Indian Ocean region but that these were either not identified in time or not made available owing to data-sharing restrictions.

It was mentioned that the bathymetric data sets available through the General Bathymetric Chart of the Oceans (GEBCO) often need to be supplemented by high-resolution multibeam surveys that have a much finer spatial resolution that can potentially be used to identify different habitat types. Another aspect of this data set is its use for predictive modelling for coral distributions, etc. However, at present there is not enough supporting biological information available to fine-tune the models in the Indian Ocean and so ground validation is still necessary, although the predictions are considered useful for directing sampling programmes.

13. DATA SOURCES FOR THE INDIAN OCEAN

Ms Merete Tandstad presented an overview of the type of information that could be useful and important in identifying potential VME sites. This includes both fisheries data and habitat survey data. The participants then formed two groups to discuss the sources of information that their

¹⁶ <http://portal.aodn.org.au/webportal/>

¹⁷ www.cbd.int/doc/meetings/mar/ebsa-sio-01/official/ebsa-sio-01-02-en.pdf

institutes or projects may hold. No attempt was made to verify or validate these data sources, or to see if they could be made available. The participants were able to provide an extensive list that provides a valuable starting point for any users interested in existing Indian Ocean data sets. The two lists on existing information and data sources of potential interest to a VME process (Table A3.1), and existing and emerging processes and institutions/projects that could support VME identification in the Indian Ocean region and the possibility for use of local knowledge (Table A3.2), are provided in Appendix 3.

14. GLOBAL VME DATABASE

14.1 VME case studies

Mr Tony Thompson presented an overview of the information provided by selected VME case studies identified from the CCAMLR, NAFO, and NEAFC. These were specific and selected to illustrate various aspects that need to be identified during the development of the VME database. The development of the database builds on the FAO Workshop for the Development of a Global Database for Vulnerable Marine Ecosystems (VMEs) held in Rome, 7–9 December 2011, and the meeting report lists many of the requirements of the VME database. These requirements need to be prioritized and systematically incorporated into the database by developing the most important modules first. The December 2011 meeting identified likely users as RFMO/As, government, NGOs, universities and schools, media, and those members of the public with an interest in the high seas from a fisheries or conservation perspective. In addition, the VME database needs to house a wide range of data that can essentially be divided into: (1) open-source published and publically available data that can be incorporated in to the database with the minimal of permissions; and (2) unpublished data that invariably take the form of raw (or processed) survey and sampling data collected from research or commercial cruises that may deal with scientific assessment (for example, benthic distribution data to identify VME areas) or compliance (for example, encounters of VME indicators species) that invariably require specific data agreements. The use of information transmitted by vessel monitoring systems (VMS) is likely to have additional restrictions. The housing of scientific data is important for RFMO/As that do not have a good secure database and to act as a long-term data repository. In addition, many of the mapping functions would be enhanced with the availability of scientific data, even though such data often carry access restrictions that could be for periods ranging from 3 to 5 years or longer.

The following is a list of “general thoughts”, mainly focussing on input and output considerations that have been useful in guiding the development of the database:

Search page: Two types of search functions – text search and map search.

Visually exciting: If this database is successful, it could be used as an educational resource and accessed by a wide range of groups (including universities, schools, media and conservation bodies). It needs a high-profile look. This means including maps, pictures, videos, etc., within a simple expandable layout.

Informative and referenced: All statements should have source citations (and this may mean to a page number in a report).

Year stamps: Information should be presented by year with suitable filters. This would facilitate input and provide a means of tracing history.

Useful for RFBs: The presentation of information from the different RFBs in a searchable and standardized format and available through a single access point. This would provide a platform for wider distribution of information in meeting reports and other RFB publications. The database should also provide additional functionalities that may be missing from the RFBs’ own sites.

Scientifically useful and serving as a data repository: This is a challenge and would not be one of the immediate objectives of the VME database. In general, data from research cruises/surveys are collected within a framework that is designed to address specific questions. They are also often studied independently and not always together with other data collection programmes. It could be very useful to have a common data repository with access rights to different types of data on the long-term, and when there is no existing data centre, the VME database could be used as a secure data location that could be made available to working groups, etc. Restricted access is likely to be required.

Confidentiality and security: The database as represented here is mostly based on publically available information. However, raw survey data (in the repository), unpublished meeting documents (working papers, proposals, etc.), and information submitted via VMS (that could include encounters) can be restricted if it is decided to include these at a later stage.

When is a VME a VME? The current intention is to include areas that have management regulations designed to protect benthic ecosystems from SAIs. This would include both designated VME areas and designated VME-like areas (even if the term “VME” has not actually been used in the designation), focusing on the ABNJ. It needs to be decided if areas under consideration, or temporary closures that are subject to scientific review, should be included.

Amount and type of information: Ideally, the VME database should be as comprehensive as possible and contain (or link to) all available information (subject to acquisition and restrictions). However, it is very important that the output, whether it be on-screen display, or printed, should contain only the information required to satisfy the needs of the user. The basic VME description should be clear, simple and attractive. It should allow for data-mining and data-exploration to provide more information according to the needs of the user. This could produce attractive underwater photographs and videos, or it could produce pages of detailed text from meeting reports.

Outlined in Figure 2 is an idea of the type of information that could be included in the VME database. There is one main page (which gives the VME details) and several additional pages divided up by “subject” area. Note that “page” is used loosely here and represents information of a similar type. The design of the functionality would mean that a user could access the required pages through appropriate links and filters. Most of the pages (those in the green boxes) would contain publically available data and be open to all users. The “Data and repository” page in the red box would be subject to access permissions as this area would contain information not in the public domain. The “Research projects and surveys” and “Contacts and addresses” pages would ideally be user editable to inform about past, current and future projects.

Schematic

database divided into linked pages

Key: Open source page, wiki style user editable page, secure pw protected page

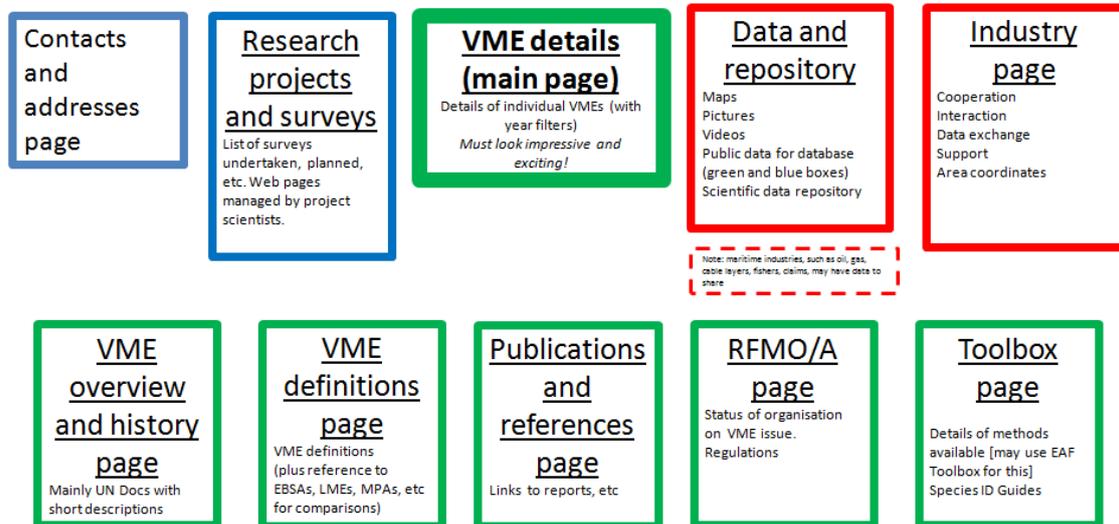


Figure 2. Schematic of important elements or “pages” of the VME Database

14.2 VME-DB Data Workflow

Mr Aureliano Gentile presented a summary of the VME-DB Inventory and fact sheet mock-ups. In this regard, a possible scenario for data submission {Excel-based VME inventory, iMarine online form (Virtual Research Environments [VRE])} and for data dissemination through the web (fact sheets and maps) of the VME database was presented. A possible production workflow was also proposed.

Inventorying VME areas implies the identification of the most relevant and appropriate information and standards for submissions. Standards include editorial guidelines for data submission and a list of controlled terms for specific fields (e.g. type of area, status). An Excel-based inventory was presented with a set of fields aiming to collect the main data for an exhaustive description of the VME areas. Some fields are mandatory while others can be filled according to data availability. Each row corresponds to a record, and fields fall under main sections, including:

- identity of VME and status;
- geographic description of the VME area;
- VME criteria;
- VME indicators and supporting information;
- habitat characteristics;
- fishing footprint;
- fisheries;
- management measures;
- media;
- references;
- ownership.

The Excel inventory is utilized also for storing changes in time of VME information.

The fact sheet format was introduced as a scenario for data dissemination. The fact sheet has a modular design to present information in a concise and easily printable format. Information contained

in the database is transformed into a user-friendly easy-to-read format, with an intuitive, minimalist and visually explicit layout. The Fisheries and Aquaculture Department makes wide use of this format, which is developed and maintained by the Fisheries Global Information System (FIGIS). The fact sheets are Extensible Markup Language (XML) based with meta-data descriptions.

A VME fact sheet reflects in its layout the proposed VME data structure described in the Excel inventory template. Fact sheets will also combine information from various sources dynamically and will embed maps and video. The embedded maps come from the geospatial database that contains the geospatial explicit data. A map viewer (which was introduced in a separate presentation) is foreseen and will include a search interface. The search tool will combine the possibility to look for a given area through the map repository or by key-word searches. Finally, fact sheets can be printed, or transformed into other formats, or be re-utilized in other websites.

Concerning the workflow, FIGIS provides a Word/Excel-to-XML converter for the production of fact sheets or web pages. This allows for data entry and submissions to be undertaken by the RFMO/As following agreed standards with the data being dynamically integrated into the database. Support is also provided for uploading and editing of user's georeferenced data.

The iMarine platform was also presented as an additional facility for data input, sharing and production workflow. iMarine (Data e-Infrastructure Initiative for Fisheries Management and Conservation of Marine Living Resources) is a project cofunded by the European Commission under Framework Programme 7. This platform supports the setting up of Virtual Research Environments (VREs). Virtual Research Environments are collaborative environments that enable scientists and practitioners to store scientific data and any other relevant information and generate and exchange data in a cost-efficient manner. It was stated that the VME database was under the FIGIS system and that it had interoperable facilities with the iMarine e-infrastructure and other data bases.

A prototype of a VRE for the VME database and its data sharing facilities was presented. The VRE allows also for the use of online forms for entering and storing VME information used for the generation of the fact sheets.

14.3 Mapping and search interface mock-up

Mr Fabio Carocci presented a mock-up of the overall mapping and search interface that is currently under development. The main elements of the interface were presented as well as some key functionalities. In more detail, the mock-up focused on: (1) the main mapping interface where locations of all reported VMEs are displayed; (2) the layer switcher, that allows the user to add or remove additional layers to the map interface, including a footprint layer; (3) the linkage between the geographic extension of the VME areas and the underlying data and information available for that VME in the VME database, with a live link to the relevant factsheets; (4) the protected environment made available by means of login facilities to access additional and confidential data, such as locations of encounters and scientific data as examples; (5) the possibility of preserving confidentiality requirements by providing an aggregation or generalization method of the locations of data; (6) the navigation along time of both the geographic dimension and the data dimension by means of the time slider part of the interface; and (7) the functionalities offered by the integrated conventional search interface by means of controlled terms or free text search and the link with the mapping component of the interface.

As part of the VME database mock-up assessment, a questionnaire was given to each participant. This, along with the answers contributed, is given in Appendix 4. Discussion points with regard to the questionnaire are included in the text below.

14.4 Discussion

The Chair was very impressed with the progress made since the December 2011 VME database workshop. In particular, she highlighted the benefit to access all VME records through a single access point, or portal.

There was a comment as to the bias towards corals and sponges in the VME discussions and thus in the VME database, and it was noted that in SEAFO many scientists were considering fish species, and therefore a link with FishBase would be useful. It was explained that, as a matter of priority, only VMEs or VME type areas (i.e. areas not designated as VMEs but having management measures to protect benthic features) in the ABNJ would be included in the VME database.

Other comments asked for clarification on target audience, noting that scientists needed details whereas policy-makers, RFMO managers and politicians required only the most relevant information. It was clarified that the XML technology allowed for the production of different types of fact sheets (or reports) according to needs. The suggested application can be customized in order that selected content could be shrunk, collapsed, hidden or totally removed upon user request. The input of additional metadata for referencing other sources of information should be envisaged.

There were various requests for clarification on workflow for entering the data and geospatial information, including who would be responsible for the content of the fact sheets. As a reply, it was pointed out that data-owners would be ultimately responsible for their data and reports, and that they could manage the entire workflow on their own, including publishing the fact sheets in internet.

Questions were raised regarding the amount of information displayed in the mock-ups and that initial search results should only display the barest essential pieces of information. This point was well taken and it was stated that the final database would have improved filters to allow for this. It was also noted that the Excel data input format, or XML format, might need to be simplified so that data contributors could add data in a more manageable and timely fashion. It was felt that further consideration needed to be given to the work flow for the data input process and on how the submission/entry of metadata, spatial data and raw or processed data would be achieved. Also highlighted was the need to ensure that corrections to the database of errors in the input data could be easily undertaken.

14.5 NAFO VME Database

The VME database meeting held in Rome in December 2011 identified areas to serve as initial case studies for the database, and participants encouraged selected RFMO/As to also develop mock-ups. Ms Ellen Kenchington presented information from NAFO for the VME database. The design of the NAFO mock-up was targeted to include the public and wider audience, in addition to fisheries scientists and managers, and, to achieve this, considerable thought was given to producing an attractive appearance to advertise the inherent beauty of the VME environment and the wonders that lie deep beneath the ocean surface. The output included instructions for use, zoomable maps programmed with Google Earth, a clearly displayed fishing footprint area together with links going to the documents that explain development and adoption, and a variety of photographs of identified species obtained from underwater Remotely Operated Vehicle (ROV) explorations.

15. FUTURE MECHANISMS

15.1 Potential support and the FAO ABNJ programme

Ms Merete Tandstad presented in greater detail the FAO ABNJ programme and the suit of projects to be developed under this programme, focusing the presentation on the project “Sustainable fisheries management and biodiversity conservation of deep-sea living marine resources and ecosystems in the Areas Beyond National Jurisdiction (ABNJ)” or more commonly referred to as the “ABNJ deep-sea project”. The project has four main components:

- policy and legal frameworks for sustainable fisheries and biodiversity conservation in the ABNJ deep seas;
- reducing adverse impact on VMEs and EBSAs;
- improved planning and adaptive management for ABNJ deep-sea fisheries; and
- development and testing of a methodology for area-based planning (under the responsibility of the United Nations Environment Programme [UNEP]).

The project itself is global in scope. However, three priority project regions have been identified to carry out specific pilot activities based on regional needs: the Indian Ocean, the Southeast Atlantic, and the South Pacific. The primary project focus is on capacity development and facilitating implementation of existing agreements and adaptive management to ensure sustainable deep-sea fisheries and to safeguard the ecosystem in the ABNJ. The project addresses both VME and EBSA related issues, and focuses on management related aspects.

The project is currently in the development phase. The concept note has been approved by the GEF Council and the project document will start to be drafted soon. This will require, among other things, consultation with and input from stakeholders in the Indian Ocean region. The Indian Ocean has been chosen because it is realized that progress towards meeting the various international targets by States and RFMO/As in this area needs further support and would provide useful lessons that could be applied elsewhere.

The project is set up under co-funding arrangements whereby funded inputs need to be matched by co-funding arrangements (which can also be in-kind). This provides opportunities for projects and States to enter the project through this type of arrangement. Many of the participants felt that their States and projects would be interested in joining the project and looked forward to being contacted when the project document and stakeholder meetings were further developed.

15.2 Group discussions

The participants split into two groups to discuss the proposed project and identify key issues in the Indian Ocean and identify potential partners. The working groups were chaired by Tim Andrew from WIOMSA (Group 1) and Nic Bax from CSIRO (Group 2).

Group 1

The first group highlighted the need to identify information gaps and the importance of research that addresses deep-sea ecosystems or species that is relevant both to areas beyond and within national jurisdiction. Participants noted that the project was rather timely in that it could specifically seek to build capacity in the Indian Ocean region for effective participation in new regional arrangements such as SIOFA.

There are currently many initiatives that are ongoing that could provide support or synergies with the proposed GEF Deep Seas Project. Examples of related initiatives include:

- the SmartFish project (particularly in regard to the work on monitoring, control and surveillance [MCS] for the Indian Ocean region);
- existing observer programmes in the region;
- the South West Indian Ocean Fisheries Project (SWIOFP) and the Agulhas and the Somali Currents Large Marine Ecosystem (ASCLME) both include activities related to governance and extend to some extent into the ABNJ;
- building on national initiatives to create the regional focuses.

Participants also noted that it could be important to examine why some instruments were in force and well-used while others were not adhered to or in force. Identification of associated issues and gaps

could be important. It will be important to build interest at the national level and also ensure appropriate consultations with countries at the national level to ensure the project is meeting national needs and supports national decisions.

An appropriate way to engage the region might be through existing and emerging regional bodies or initiatives. Participants also highlighted the importance of extensive and early consultation and engagement with stakeholders as late consultations often result in stakeholders only being able to react to existing input rather than constructively contribute to the project design process.

Other related ideas that might enhance the existing framework of the project would be to examine:

- current import requirements for fish and related capacity;
- current use of catch documentation scheme/ecolabelling schemes;
- build on port state measures, other related MCS measures in the region;
- potential for cross-regional cooperation or sharing of best practices, e.g. current initiatives in the Pacific;
- memorando of understanding (MOUs) and agreements could be used to examine some issues that are transboundary or outside EEZs;
- it will be important to track vessels as they are moving into and out of EEZs and the high seas;
- ensuring good integration between fisheries scientists, benthic ecologists and the organizations they represent including those researchers in government and university;
- promotion of the involvement of industry in the assessment process.

Group 2

The following is a list of the issues raised during the Group 2 discussion for consideration during the formulation of the ABNJ project, provided under the headings used in the project matrix.

Component 1: Policy and legal frameworks

There was interest in improving the understanding of the policy and legal frameworks for deep-sea fisheries in ABNJ, and on how it would affect coastal States. This would allow coastal States to know their rights and obligations in these areas. Many of the participants noted that their States were signatories to SIOFA and that a clear understanding of the benefits to the coastal States of high-seas management was required for active support of these states. It was noted that the SIOFA Agreement and the resolutions concerning interim arrangements and data collection described the responsibilities of SIOFA and this indicated where states needed to review their national duties and legislation so that they could influence regional policy. The need to integrate international and regional commitments in national legislation in many countries in the region was also noted.

There followed a discussion on the various measures currently available to ensure compliance with any agreed measures, including port States and flag state agreements and certification schemes. It was noted that there was insufficient capacity to enforce and monitor fishing in this region, and that the “Action plan for adoption of best MCS practices, adapted to the specific conditions of ABNJ-DSF, is formulated and adopted in one of the selected pilot areas” under component 3 below was hence of interest. It was further noted that global and regional networks were important in the context of setting of a new policy as weaker parties could be strengthened as well as to enhance collaboration between different institutions on specific issues.

Component 2: VMEs and EBSAs

It was explained that this was a specific project component that is linked to ongoing work on VMEs and EBSAs at the international and regional level. One key issue for VMEs is the selection of appropriate indicators and setting of thresholds and, in this respect, the related pilot activities proposed within the project could be of interest to the region. It was noted that it could be of interest to look at the cumulative long-term impact of different management measures.

The following questions on clarification with regard to the establishment of VMEs and/or EBSA and what this would mean were raised. Should the designation focus on productive areas? Is there equally a need to protect areas not exposed to fishing? In order to address these questions, there could be a need to identify the different threats and the range of impacts and what these could be (e.g.: bottom contact fishing, mining, ballast water) in the Indian Ocean.

Within the ABNJ project, it was noted that some activities were global and some regional, and that there could be several openings for cross-collaboration between regions.

Component 3: Ecosystem Approach to Fisheries (EAF)

Discussions on the EAF were initially focussed on the sharing of experiences from other regions such as in Australia and SEAFO, highlighting how the approach can facilitate the understanding of fishing practices, and the benefits of different management regulations in different context and between different stakeholders. The need to address data-poor situations and to carry out cost-benefit analysis was also highlighted. Discussions also focused on the need to carry out assessments to determine annual catch levels and on how this needed to be monitored to avoid overexploitation. Questions with regard to possible linkages to SIOFA were raised. The discussions also raised the issue funding of data collection, assessment, monitoring and control. It was noticed that extensive analysis could be expensive for these fisheries. Solutions to these questions seemed to indicate that extra funding was

needed, but that good networking, collaboration and data sharing among the coastal States and fishing operators would address at least some of these issues.

15.3 Regional network for VMEs

The use of regional networks to provide a forum for information exchange was discussed and it was agreed that this VME workshop was an important start to regional networking for VME initiatives. It was realized that there are many existing regional networks through the many projects operating in the region (see list in Appendix 3), but that these did not focus on VMEs although several were concerned with the identification and promotion of EBSAs. It was mentioned that the existing networks would be further strengthened when SIOFA started to meet regularly.

The Dgroups site for this meeting will be fully functional in the near future and this can be used to promote regional networking in the Indian Ocean. There are currently 44 active members. The forum contains copies of the presentations made during the three-day meeting that are for use by the participants for information purposes only.

16. CONCLUSIONS

The workshop was successful in raising awareness of VMEs and associated management options, and in explaining the various instruments and pathways necessary to achieve appropriate processes and management decisions. In addition, the workshop was a first step in developing regional networks to support this process and all participants now have a better understanding of the many stakeholder groups operating in the Indian Ocean.

The workshop, through the active participation of its members, identified areas of support required for appropriately developing VME processes and making associated management decisions in the Indian Ocean and on how the upcoming FAO ABNJ deep-sea project could assist with this by working with States, other stakeholders and projects. This was particularly timely with the recent establishment of the South Indian Ocean Fisheries Agreement (SIOFA).

The Chair summarized the three-day meeting and felt that the meeting objectives had been fulfilled. The Chair further commented that many complex issues had been discussed and that was very challenging to gain a full understanding of the VME process in such a short time. The Chair noted that many of the issues would be re-visited when SIOFA became active and that FAO was willing to provide assistance and guidance should it be required. The Chair noted that the groundwork had now been undertaken and that the Dgroups discussion forum could be used in the future to address any further questions that participants might have.

The Chair also highlighted the VME database and thanked those concerned for their presentations and resulting discussions. All participants looked forward to seeing the fully functional VME database and felt that it would be a useful tool and information resource for the Indian Ocean region.

APPENDIX 1: WORKSHOP AGENDA**FAO Indian Ocean Regional Workshop on Vulnerable Marine Ecosystems**

Pearl Beach Hotel

Flic en Flac, Mauritius, 25–27 July 2012

Agenda

Day 1: Wednesday 25 July 2012

- 08:30 Registration
- 09:00 Opening session
 Welcome addresses
 Appointment of Chair and Rapporteurs Adoption of Agenda
 Introductions of participants
 Overview of workshop objectives and expected outputs
 Overview of the FAO Deep Seas Programme and the ABNJ Programme
- 10:30 Group photo and Coffee break
- 11:00 Presentations on the FAO Deep-sea Guidelines and concepts
 VME Concept
 Fishing Area
 Discussion
- 12:00 Presentation on VME identification processes used by other RFMO/As
- 13:00 Lunch
- 14:00 VME identification processes used by other RFMO/As continued
 Discussion
- 15:00 Introduction to global VME database
 Discussion
- 15:30 Coffee break
- 16:00 Presentation on Ecologically or Biologically Significant Areas (EBSAs)
- 16:30 Summary and discussion
- 18:00 Day closure

Day 2: Thursday 26 July 2012

- 09:00 Regional issues in the Indian Ocean
 Current knowledge of and initiatives that may provide information on:
 - fisheries management
 - resource and the fisheries
 - associated biodiversity
 - bathymetry, oceanographic and physical features

Existing or emerging processes or institutions that could support VME identification in the region

What lessons learned or best practices from other RFMOs could be used in this region?
 How could networks or synergies with other regions be utilized? What type of management processes might be envisioned?

- 10:30 Coffee break
- 11:00 Regional issues in the Indian Ocean (ctd)
- 12:30 Lunch
- 13:30 Regional issues in the Indian Ocean (ctd)
- 15:30 Coffee break
- 16:00 Summary and discussion

17:00 Report and conclusions
Review of meeting report and conclusions for Day 1 and 2
17:30 Day closure

Day 3: Friday 27 July 2012

09:00 Global VME database
Presentation of the global VME database, including:
- VME Case studies
- VME-db data workflow
- VME-db data dissemination – mock-ups
- VME-db Portal

How could this database support or be useful to the future management processes in the Indian Ocean region?

10:30 Coffee break
11:00 Future mechanisms
Regional Network for VMEs
Potential FAO support
12:30 Lunch
14:00 Other matters
15:30 Coffee break
16:00 Report and conclusions
Review of meeting report and conclusions for Day 2
Summary of meeting report and conclusions for Day 3
17:15 Adjournment
17:30 Workshop closure

APPENDIX 2: WORKSHOP PROSPECTUS

FAO Regional Workshop on Vulnerable Marine Ecosystems (VMEs) in the Indian Ocean FAO and SmartFish Flic en Flac, Mauritius, 25–27 July 2012

Prospectus

Background

The *International Guidelines for the Management of Deep-Sea Fisheries on the High Seas* (the FAO Deep-sea Guidelines; FAO 2008)¹⁸ provides guidance to states and regional fisheries management organizations or arrangements (RFMOs/As) to ensure the long-term conservation and sustainable use of marine living resources in the deep seas by preventing significant adverse impacts (SAIs) on vulnerable marine ecosystems (VMEs). This is an important aspect of the United Nations General Assembly (UNGA) Resolution 61/105¹⁹ and consistent with the Ecosystem Approach to Fisheries (EAF)²⁰. FAO has developed a full programme to support the implementation of the FAO Deep-sea Guidelines. This includes a VME database that will raise awareness on VMEs to fishery policy makers, managers and scientists, conservationists, the fishing industry, and the public at large.

In May 2010, a Workshop²¹ to analyze the challenges and propose ways forward for the implementation of the the FAO Deep-sea Guidelines was held in Busan, Republic of Korea. This Workshop identified specific programmes of work and activities that will be needed to advance implementation of the FAO Deep-sea Guidelines, including further guidance on the use of the VME criteria and associated measures. The proposed VME database was introduced and its attributes discussed.

The VME database will contain information on VMEs and related areas, (e.g. documents, maps, and data), that will be compiled in collaboration with states, RFMO/As, and other relevant stakeholders. It will be developed to facilitate multi-stakeholder data input, information sharing, and informed decision-making. This system will also promote partnerships and create networks among community users, information contributors and those working on sustainable fisheries and the protection of VMEs in the high seas.

In December 2011, a workshop was held to discuss stakeholder needs and to develop a strategy for information sharing mechanisms for the VME database. Various RFMOs have already indicated their willingness to provide information to the database. The workshop noted the need for regional approaches and a selection of case study areas were identified to assist in the development of the database. A prototype database is expected to be available in December 2012.

Objectives

In July 2012, it is proposed to hold a three-day workshop to support and develop mechanisms for the identification of VMEs and address potential associated management implications in the Indian Ocean and to add to the global knowledge on VMEs. More specifically, the workshop will:

- discuss the VME concept in the framework of the FAO Deep-sea Guidelines, including examples of different management methodologies and options for VMEs and how these processes can be facilitated;
- identify and assess relevant existing information, including confidentiality issues and identify future requirements;

¹⁸ <http://www.fao.org/docrep/011/i0816t/i0816t00.htm>

¹⁹ <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N06/500/73/PDF/N0650073.pdf?OpenElement>

²⁰ <ftp://ftp.fao.org/docrep/fao/006/y4773e/y4773e00.pdf>

²¹ <http://www.fao.org/docrep/014/i2135e/i2135e00.htm>

- build capacity on VMEs and related management issues in the region; and
- identify future requirements and support mechanisms including network of experts to support the VME process and collaborative arrangements for data sharing.

Approach

The workshop is designed to increase the understanding of the VME concept and VME-related information available in the region, including examining the relevance of management approaches from other RFMO/As. Participants will examine and/or present current information/data from the Indian Ocean region and outline the additional information and appropriate mechanisms required to identify or manage VMEs. The sharing of data sets and the use of the VME database will be discussed. The development of regional/global networks and discussion forums is seen as an important tool that will assist all stakeholders. The proposed workshop will be technical in nature and intended to stimulate informal discussion. It is recognized that many of the scientific and management discussions regarding VMEs in the Indian Ocean will occur within the newly constituted South Indian Ocean Fisheries Agreement (SIOFA). The support provided to states as a result of this workshop will hopefully contribute to the process within SIOFA.

Participants

A small group of stakeholders will be invited, including: (1) scientists or managers from involved or concerned states (including signatory States of SIOFA, coastal/port states or flag states of vessels fishing in the region); (2) representatives of the fishing industry in the region; (3) representatives from NGO/IGOs or scientific institutes in the region working on issues related to VMEs; and (3) other relevant stakeholders working on or contributing to initiatives complementary to the VME database (e.g., the CBD/EBSA process).

Outputs

- List of data sets that can be useful to facilitate VME identification, addressing of ownership and confidentiality issues, the VME database for the region;
- Regional network for VMEs;
- Facilitated workflow and mechanisms for VME management, including identification of the role of various stakeholders; and
- Workshop report

Tentative location and date

Flic en Flac, Mauritius; 25–27 July 2012.

Further information

Further information on the Workshop can be obtained from Tony Thompson (tony.thompson@fao.org).

Workshop organizers

The workshop will be jointly organized and funded by FAO through a suite of projects in support of the implementation of the deep-sea guidelines, and by the SmartFish Programme (<http://www.smartfish-ioc.org/>).

FAO Webpage for Deep-sea Fisheries in the High Seas
<http://www.fao.org/fishery/topic/4440/en>

APPENDIX 3: CURRENT KNOWLEDGE AND INITIATIVES RELATED TO VME IDENTIFICATION IN THE INDIAN OCEAN

The table below is a summary from group discussion on data that may be available and helpful in any VME identification process. Individual users are requested to contact the appropriate authorities to see if the data is available and can be released. In addition, inclusion in the list below does not imply that the data has been verified and validated in any way, and this is to be decided between the data provider and user.

Table A3.1. Existing information and source

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
REGIONAL				
AFROBOS		<ul style="list-style-type: none"> - Looked at state of biodiversity in different marine collections across Africa - Workshop in South Africa, includes country reports (2004 or 2005) 		
ASCLME R/V Dr Fridtjof Nansen surveys EAF Nansen	Mauritius and Seychelles including Mascarene Plateau	<ul style="list-style-type: none"> - Surveyed the whole plateau (deepwater and pelagic trawls). - Collected/identified sponges and corals 		See www.eaf-nansen.org or www.asclme.org
ASCLME/SWIOFP- Other surveys Surveys using South African Vessel			- Environmental and servicing of moorings (CTD/XBT/ADCP)	
Bioregional study/classification by Russian Researcher Zezina	Deep-seas (1000-3000 m depth)	Biogeography of benthic bathyl organisms		
Census of Marine Life CenSeam	2005–2010	http://censeam.niwa.co.nz/ Determine the role of seamounts in the biogeography, biodiversity, productivity, and evolution of marine	Sea bed mapping	Contact: Malcolm Clarke

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
NIWA, New Zealand		organisms, and to evaluate the effects of human exploitation on seamounts.		
Museum Victoria, Melbourne	Indian Ocean (2010–2013)	Mapping the fauna of the sea floor (brittle stars, squat lobster). Location, species composition and distribution, largely from museum collections.		See also: http://www.indeep-project.org/news/indeep-wg2-lead-tim-ohara-awarded-funds-map-deep Contact: Tim O’Hara and his team
CSIRO	Southern hemisphere High-seas-specific data	<ul style="list-style-type: none"> - Shark collection- deepwater sharks - Working with CBD as part of the EBSA workshop for the Indian Ocean (the data compiled is not always relevant to VMEs, but some data is useful to the process (includes whole water column)) - Information includes bathymetry, seamount locations, some of the side-scan sonar information from industry, etc. - All above information is/will be publically available - Australia has conducted benthic impact assessments for all high seas vessels for SIOFA and SPRFMO (only high seas) (footprint, gear type, catch, bycatch, etc.) 		
Extended shelf programme (GRID Arendal)	Shelf outside current EEZs South Africa, United Republic of Tanzania,	- Implications for governance of fisheries on the high seas	Bathymetric information	Information not yet publicly available

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
	Madagascar, Mauritius, Seychelles, Australia, Maldives, Kenya, Mozambique			
IO-GOOS (IOC-UNESCO)	19 countries in the Indian Ocean	<ul style="list-style-type: none"> - 5 lines of moorings in the Indian Ocean - Standard transects by ships, Argo project 	Temperature, salinity, current, tide; RAMA array-1500 Argo floats; Tide gauges and surface drifters; underwater temperature recorders; put into ocean models; Aghulas Return current (ARC) mooring	Collaboration with ASCLME
IUCN/GEF Seamounts Project/EAF-Nansen/ASCLME Pelagic survey (R/V Dr Fridtjof Nansen)	6 seamounts; 5 South West Indian Ocean Ridge including, Atlantis Bank (BPA), Sapmer Seamount, Middle of What Seamount, Melville Bank and Coral Seamount (BPA). 1 seamount on the Madagascar Ridge, north of Walter's Shoal	<ul style="list-style-type: none"> - Pelagic resources: Catch Acoustic Sampling; catch composition, biological information pelagic fish - Seabird and cetacean observations 	<ul style="list-style-type: none"> - Multibeam bathymetry of the investigated seamounts - Physical oceanography (CTD, ADCP) - Biological oceanography: (Species composition, distribution and abundance) - Phytoplankton, nutrients and POM - Meso-zooplankton and micronekton 	
IUCN/GEF Seamounts Project/ASCLME Demersal Biodiversity surveys (R/V James Cook)	Covered the same 6 seamounts as above survey	<ul style="list-style-type: none"> - Biodiversity surveys: - ROV 	Bathymetry (multibeam echosounder)	May release some data soon
Marine Conservation		<ul style="list-style-type: none"> - Predictive habitat mapping: collected environmental data to 		

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
Institute (With Zoological Society of London, Dalhousie University, University of East Anglia)		predict abundance of VME indicator species (does not guarantee that species are there) - May help focus research agendas, guide survey work, etc. - Now refining regional maps, but not yet available in Indian Ocean Region - Have done SPRFMO region and others (still unpublished work)		
Marine Protected Areas Project (2006-2010) WWF/ Madagascar IOC/(IRD Research vessels)	WWF-WIOMER ecoregion (5 high seas sites: including Plateau south of Madagascar)	- Location, species groups, corals, whales, sea turtles, sponges, fish species - Marine Biodiversity Strategy-marine biodiversity conservation and coastal fisheries management	This project used exhaustive data from other projects and partners including oceanography, bathymetry etc	CORDIO is also involved
Mauritius Institute of Oceanography (and Seychelles)	Seychelles to Mauritius	- Work associated with extended shelf claims - Associated surveys		
Surveys with the R/V Dr Fridtjof Nansen EAF-Nansen Southwest Indian Ocean Fisheries Project (SWIOFP)/ASCLME	Mainly in EEZ but also outside (e.g. East of Madagascar, seamounts and Mascarene)	- Geo-referenced Scientific survey data - Fisheries acoustic data - Demersal trawl - Catch: Species composition and distribution - Abundance and biomass - Biological data on certain species - Plankton (phytoplankton and zooplankton) - Information obtained from catch	- Bathymetry (Multibeam echosounder) - Oceanography (ADCP, CTD, underway data)	www.eaf-nansen.org www.asclme.org www.swiofp.org

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
		data- species composition		
<p>Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M.R., Haggan, N. & Santos, R.S. (eds.). 2007. <i>Seamounts: Ecology, Fisheries & Conservation</i>. Fish and Aquatic Resources: Series 12. Blackwell Publishing, Oxford, United Kingdom.</p>		<ul style="list-style-type: none"> - Historical seamounts fisheries data for region 		<p>see also http://censeam.niwa.co.nz/science/publications</p>
<p>SIODFA</p>	<p>Fished areas on the high seas</p>	<ul style="list-style-type: none"> - Vessel related information - Geo-referenced information from bottom-trawl and bottom- longline fisheries operations - Species composition - Target species information including: catch and effort (days fished, number of shots etc.) and biological data - Non target species: catch composition - Elasmobranchs- species, numbers, and biological samples - Acoustic research data - Related information—sharks, corals, sponges (Location, species groups and numbers) 	<p>Bathymetry (Sonar and multibeam)</p>	

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
		<ul style="list-style-type: none"> - Video footage of fished areas (limited) - Voluntary Benthic Protected Areas - Observer programme by industry in addition to national requirements (flag states) 		
SWIOFP	(offshore work – within EEZ) Mozambique (complete) Madagascar (in 2013)	<ul style="list-style-type: none"> - Deepwater trapping for lobster - Include other deepwater crustaceans (submitted to SWIOFC) - Using a South African vessel that has been working in the area since 2004 (may be a sampling tool for VME species) 		Surveys accessible through the cruise reports
SWIOFP	Shallow and deepwater	<ul style="list-style-type: none"> - Retrospective analysis of all crustaceans (with pots, traps and longlines) 60 pots per 200 m 		
SWIOFP	Mauritius/ Madagascar (complete) Kenya/United Republic of Tanzania/Mozambique (in future)	<ul style="list-style-type: none"> - Deepwater dropline surveys (including acoustics) - Exploratory survey to facilitate moving fisheries offshore 		
Soviet and Ukrainian data from historical fisheries (FAO report 1020)	High seas in the Indian Ocean (Historical data)	<ul style="list-style-type: none"> - Fisheries related: Catch composition, abundance, etc. - Includes table with overview of surveys in the Indian Ocean 	Bathymetry data; Oceanographic data	
SWIOFP and SWIOFC		<ul style="list-style-type: none"> - Joint assessment work. To compile all fisheries assessments for the 		

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
		region through working groups		
SWIOFC	Focus on EEZs of SWIOFC countries	<ul style="list-style-type: none"> - Scientific Working Groups – catch, effort, biological data, survey data etc. - Overview of past surveys - Working party on statistics - Scientific advice and management recommendations 		
UNESCO regional heritage work		<ul style="list-style-type: none"> - Looking at areas of ecological importance 		CORDIO involved in this work
WIOMSA		<ul style="list-style-type: none"> - Networking/coordinating body/training/identification of research needs/seeking research agenda 		
NATIONAL				
African Coelacanth Ecosystem Programme	(previously regional), now entirely national (South Africa)	<ul style="list-style-type: none"> - some benthic trawl surveys, etc in region (ASCLME) - Some research to be done on Walter’s Shoal and south of Madagascar 		
Australian Fisheries Management Authority	Fished areas in the high seas	<ul style="list-style-type: none"> - Impact assessments demersal trawl, midwater trawl and demersal longline - Location, effort, species compositions; Bycatch: coral, sponges 		Requires observers on all Australian vessels (100% coverage on demersal trawl and 10% mid-water trawl)
Cook Islands	Fished areas in the high seas of the Indian Ocean	<ul style="list-style-type: none"> - 10 years worth of catch/effort data for 2-3 vessels - 6 years of VMS data - Some observer data, now 		Species ID guides used from NIWA

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
		<ul style="list-style-type: none"> - implementing a full observer programme (under a new fishery management plan) which should cover also VME aspects 		
Mozambique IEO (Spain) (R/V Visconde d'Eza)	Central and south Mozambican EEZ	<ul style="list-style-type: none"> - Deep demersal crustaceans cruise on board - Used demersal trawl - Depth 200–800 m - 5 cruises between 2005 to 2010 	CTD	Cruise reports are available
Japan	Indian Ocean High seas	<ul style="list-style-type: none"> - Midwater trawling in high seas for Alfonsino - Data on size is with SIODFA - All other data with Ministry of Fisheries in Japan 		If data is needed request permission from Ministry of Fisheries
Kenya		<ul style="list-style-type: none"> - Deep-sea sampling and longline research has been conducted in collaboration with the Netherlands/ Belgium (mostly for plankton) - Korea/Kenya collaboration on tuna fishing a possible source of information - Some information available from Citizens Fishing Company - Some Kenyan exploratory fishing (Nansen: 1982/83) - Some surveys on deepsea crustacean and fish (commercial 		

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
		<ul style="list-style-type: none"> boat: 1979-81) - Survey on deepwater crustaceans (2012) - Information exists within the industry on deepwater crustaceans and crabs in the 1990s (but no data is available on this from the Fisheries Department). 		
Republic of Korea	Indian Ocean High seas	<ul style="list-style-type: none"> - Fishing in this area from 2009 - Data from both the vessels and observers (full range of fine-scale data/biological information from target, non-target species, etc.) - Midwater trawl/bottom longline commercial fisheries (data recorded on all catch). - 10 bottom longline vessels, 2 midwater trawls - Using ID guides from SEAFO, NZ, CCAMLR, NAFO, Australia, etc. 		Data is with NFRDI (National Fisheries and Development Institute of Korea)
	EEZ of countries with bi-lateral agreements	<ul style="list-style-type: none"> - From inside EEZ only - Catch data only 		Data is with NFRDI (National Fisheries and Development Institute of Korea)
Madagascar (Fisheries Administration and National Center of Oceanography)	Southern part of EEZ of Madagascar	<ul style="list-style-type: none"> - To collect abundance information on Alfonsino through acoustics - Request for new fishery on Alfonsino (SIODFA). - MoU for 6 months starting September 2010 for deepsea fisheries 	Bathymetry	

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
		<ul style="list-style-type: none"> - Madagascar will have observers onboard (National Center for Oceanography) 		
Mauritius	Salha de Maya Bank	<ul style="list-style-type: none"> - Russian vessel exploratory fishing for lobster (trawl survey) - Some information on bycatch species (~10 years ago) 		
	Salha de Maya Bank	<ul style="list-style-type: none"> - Exploratory fishery for mackerel (midwater trawl) by Russian vessel 		
	In the north of Mauritius	<ul style="list-style-type: none"> - Survey done in EEZ on deepwater shrimp in 1992 - 600-1000 m: traps 		
	Slopes of Mascarene Plateau	<ul style="list-style-type: none"> - Acoustics on bank slopes of Mascarene for viability of deepwater fishery 		(Nansen cruise report available)
Mozambique EAF Nansen project	EEZ	<ul style="list-style-type: none"> - Ecosystem survey of whole EEZ (2007) - Update information on abundance and distribution of species - Trawl nets, pelagic acoustic surveys, - Seamounts: included underwater filming (bottom trawls) - Recorded also some coral and sponge species when observed in catch, but not to taxonomic detail 	<ul style="list-style-type: none"> - Trawl nets, pelagic acoustic surveys, CTDs, bottom mapping in some locations 	Data is with CIPA, Mozambique
Reunion		<ul style="list-style-type: none"> - Some information could be with the Museum of Natural History 		
Seychelles-	EEZ of Seychelles	<ul style="list-style-type: none"> - Research on deepwater snapper on deepwater slopes and seamounts 		Cruise report is available

Data sources	Area covered	Resources and fisheries; Associated Biodiversity; Fisheries management	Oceanography, bathymetry and physical features	Other
Seychelles Fishing Authority (SFA)		<ul style="list-style-type: none"> (drop lines between 200-500 m) - This included several small cruises using baited hooks - recorded target and bycatch species - No record of anything tangled up in lines 		
	Mahe plateau	<ul style="list-style-type: none"> - 2006-2007 Vessels did research with longlines around plateau to investigate potential for commercial exploitation - Some deepwater species caught (Alfonsino, etc) 		
Seychelles IRD/Tuna Industry data (FAD) IOTC scientific chair			Oceanographic data	
South Africa	Mostly within the EEZ	<ul style="list-style-type: none"> - Demersal fisheries data - Museum records - ROV video 	- bathymetric and slope data	
South Africa EAF Nansen		<ul style="list-style-type: none"> - Some past survey work 		
South Africa Petroleum Agency		<ul style="list-style-type: none"> - Information on off shelf data 		
United Republic of Tanzania	Deep-sea fishing inside EEZ	<ul style="list-style-type: none"> - Catch information from foreign fleet 		

Table A3.2. Existing and emerging processes and institutions /projects that could support VME identification in the region and the possibility for use of local knowledge

Regional/National Institutions/Projects	Fisheries Management	Research (Fisheries and Biodiversity)	Economic groupings	Projects	Industry	Others incl. Universities/ Other networks
INTERNATIONAL						
Global		IRD, France		EAF-Nansen		IOC-UNESCO-GOOS
REGIONAL						
Indian Ocean Region	SIOFA SWIOFC		IOC IO-RIM (Indian Ocean rim association for regional cooperation) Wider than fisheries (trade, investment)	ASCLME ; SWIOFP; GEF/IUCN Seamounts project; Marine Protected Area Network WOMER Project; (COI) Smartfish. Upcoming : IOC Biodiversity Management project (funded by EU)	SIODFA	WIOMSA WWF – Regional Office
NATIONAL						
Australia	DAF (Department of Agriculture, Forestry and Fisheries): International Fisheries Policy; Australian Fishery Management Authority- Fisheries management	CSIRO (fisheries and oceanographic research) Geo-science Australia (bathymetry)				
Comores	DNRH (direction national des ressources	Centre nationales des documentations et des recherches scientifiques				

Regional/National Institutions/Projects	Fisheries Management	Research (Fisheries and Biodiversity)	Economic groupings	Projects	Industry	Others incl. Universities/ Other networks
	halieutiques)	(CNDRS)- includes Centre des donné océanographique				
Cook Islands						
Kenya					Citizens Fishing Company, etc.	
Madagascar	Department of Fisheries [Ministry of Fisheries]	Institut Halieutique des sciences marines et des recherches Centre nationales des recherches océanographique ; (observers) [Ministry of Education and Scientific Research]				WWF Madagascar
Maldives	Department of Fisheries [Ministry of Fisheries]	Marine research center (coral growth etc.; stock assessment)				
Mauritius	Fisheries department [Ministry of Fisheries]	Ministry of fisheries; Albion Fisheries Centre Mauritius Oceanography institute				
Mozambique	Directorate of Fisheries Administration (Ministry of Fisheries)	Instituto Nacional de Investigaçao Pesqueira				
Seychelles	Seychelles Fishing Authority	- Seychelles Fishing Authority - Seychelles National Parks				Marine related NGOs

Regional/National Institutions/Projects	Fisheries Management	Research (Fisheries and Biodiversity)	Economic groupings	Projects	Industry	Others incl. Universities/ Other networks
		Agency				
South Africa		<ul style="list-style-type: none"> - South African Institute for Aquatic Biodiversity (species identification) - Oceans and Coasts Dept. (Dept. of Environment) - SANBI (science based advice to government) - Council for Geo-Science - some work on marine areas; - Ocean Research Institute in Durban (crustaceans, other fisheries research) - South African Institute for Aquatic Biodiversity (IZIKO) 		African Coelacanth Ecosystem Programme		OBIS
Republic of Korea	NFRDI – National Fisheries and Development Institute of Korea	NFRDI – National Fisheries and Development Institute of Korea				
United Republic of Tanzania	Deep-sea fishing Authority	Tanzania Fisheries Research Institute				Faculty of Aquatic Sciences, Institute of Marine Sciences

APPENDIX 4: VME DATABASE MOCK-UP QUESTIONNAIRE

There were eight returns with some questions not answered by the respondents. Only the questions answered are included below.

Input

Question: Is the Excel template for submitting/collating data and information on VMEs comprehensive? Is there any improvement/change you may want to suggest?

Responses:

- At first reading, it seems very good
- Given my status of knowledge on VME which may be limited, is difficult to give a more precise answer. However, it seems the Excel sheet provide comprehensive information. This assessment may change in future
- The move from Excel to XML is fine but there is a lack of clarity in how the metadata will move for first submission to publishing, i.e., how is geospatial data attached, who approves submissions, can metadata be harvested by other servers?
- Addition of contact details?

Question: Do you suggest any change/improvement to the process of submitting your data and information on VME to the database?

Responses:

- It looks very good. Perhaps more comments will come after the prototype can be used for a period
- Current process seems OK. However, consider internet or web based options.
- Establish a simplified workflow for metadata and geospatial to remove possible roadblocks to data input
- (The) possibility to upload the file and become validated before publishing
- Need to add if the information is confidential and if the permission from the data owner (e.g., state) is needed.

Workflow

Question: Is the workflow and protocol presented capable of addressing the issue of confidentiality or protection of your data?

Responses:

- Two respondents answered: Yes
- The protocol seems to address appropriately the issue
- Not enough detail provided, but presumably OK

Content and functionality of the VME database

Question: Types of spatially managed areas in ABNJ: Is the list below acceptable/exhaustive?

- VME
- Closed areas to bottom fishing
- "Flagged" areas
- Other type of managed areas (e.g., protected seamounts, Mediterranean SPAMI, High-seas pockets)

Responses:

- Other (please specify)
- Potential VME (based on indicators)?
- It is not 100 percent clear who the database is targeted at
- Temporarily closed (but see below)
- MPA's, EBSA's, Marine parks

Question: Status of implementation of VME or other types of spatially managed areas: Is the list below acceptable/exhaustive?

- Declared (or established or designated)
- Potential/Candidate
- Voluntary
- Temporal

Responses:

- (The list looks acceptable/exhaustive)
- Under Review status: after the validity period of the VME, the VME goes through a review process to establish if the VME will remain as a VME. This info is important since it will decide on the future status of the VME. In (some) case it could appear that the VME is no longer seen as a VME.

Question: Do you suggest any further functionality within the Global VME database (e.g. aggregation mechanisms, proximity)?

Responses:

- It seems good. Wondering about photos, video, etc. as data ...(as they very useful)... for education/visualization
- Not now
- (It) depends on audience (as) management (is) also interested in effort, broad taxonomy (while) science audience will want much finer taxonomic detail and other biological and physical data.

Output from the database

Question: What do you like or dislike of the output (fact sheets) and search and browse module (map-viewer) currently under development?

Responses:

- I really liked the timeline threads as well as links to original documents. Perhaps generic information on enforcement measures could be linked to another level (of details) to remove clutter?(see Tony fact sheets)
- Appears to be fine, however more exposure may give different picture
- (It) depends on audience
- Necessity to have also the possibility to convert map from map viewer to Jpeg or Tiff so we can use it in report or other.
- I like fact sheets and the Map Viewer
- Half of the Pacific is not on the map viewer, please don't forget us. Also, would it be possible to scroll across the map to choose a specific location as centre of the map, e.g., Pacific centered view of VME's, BPA's etc.? Possibly use Google Earth application for browsing interface.

Question: Is there anything you would like to see as additional information to the VME Portal?

Responses:

- Perhaps links to biological information, Wikipedia, etc.
- No

Question: Is it important to have a linked and referenced thread through meeting reports?

Responses:

- Yes! Great for scientists and managers
- Yes, this may enable follow up of additional discussions
- (It depends on) how much time you have

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