GOBI

Global Ocean Biodiversity Initiative

Newsletter

Summer 2020

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GOBI: Alive and kicking in a virtual world

California sea lion, courtesy H. Klostermann / Coral Reef Image Bank

EBSAs: The state of play in 2020

By David Johnson, GOBI Coordinator

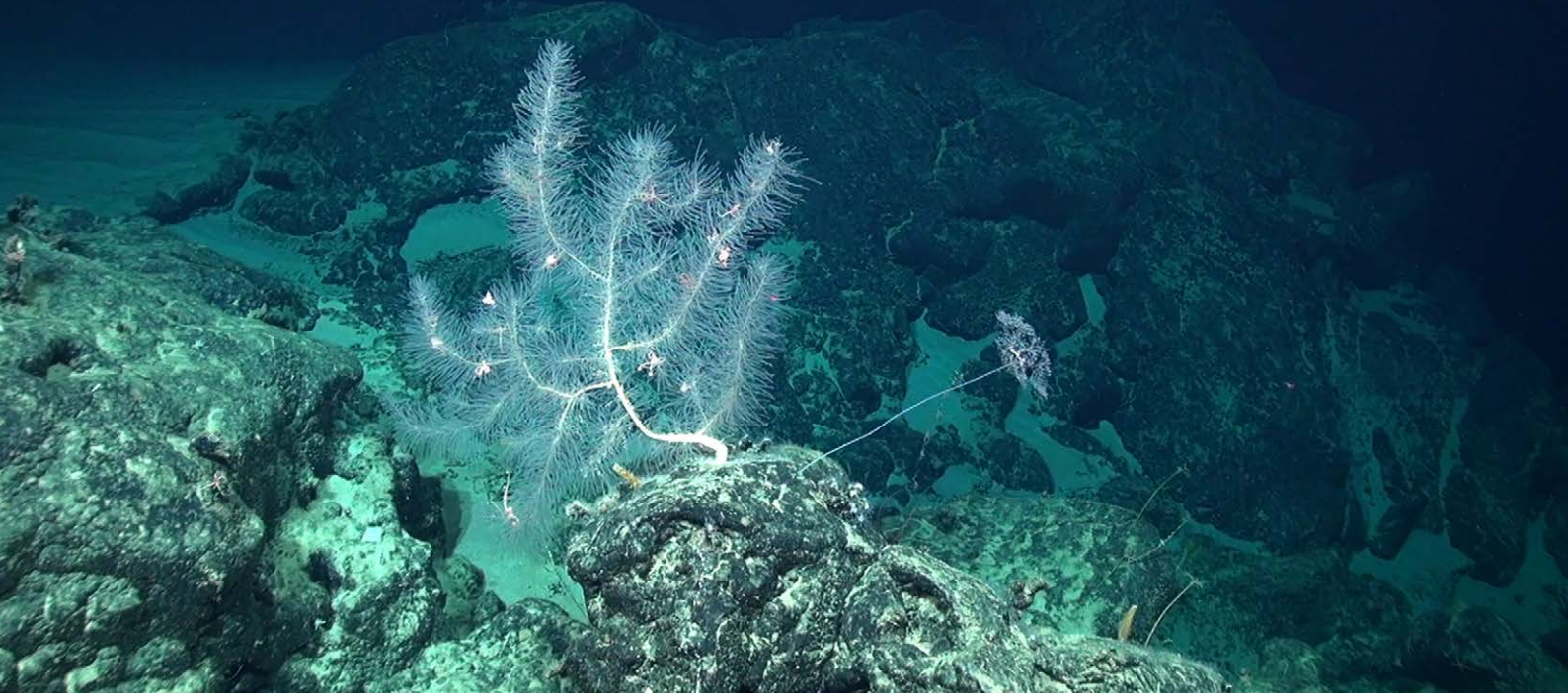
With financial support from the Governments of Sweden, France, Germany and Denmark, the Secretariat of the Convention on Biological Diversity convened a regional EBSA workshop for the North-East Atlantic Ocean in Stockholm on 23-27 September 2019, preceded by a training session on EBSAs on 22 September 2019.

In addition to an overview of the EBSA process under the Convention on Biological Diversity, presentations were made on:

- Scientific guidance on the application of the EBSA criteria;
- An overview of relevant scientific programmes on a regional scale;
- A regional overview of biogeographic information on open-ocean water and deep-sea habitats and a proposed geographic scope for the workshop.

This regional workshop built on an earlier event convened by the OSPAR Commission and North-East Atlantic Fisheries Commission and hosted by the Government of France in 2011. Furthermore, it recognised advice on the 2011 workshop provided by the International Council for Exploration of the Sea (ICES). However, experts were also able to draw on new and updated information. For example, the EU-funded ATLAS project (www.eu-atlas.org) provided detailed new knowledge on the Tropic Seamount located in the subtropical North Atlantic Ocean (23°55′ N, 20°45′ W, 1,000-4,200 m depth), with high-density octocoral gardens, *Solenosmilia variabilis* patch reefs, Xenophyophores, crinoid fields, and deep-sea sponge grounds.

The EBSA description submitted by ATLAS highlighted a recent study offering the first biological insight to ground-truth the occurrence of potential Vulnerable Marine Ecosystems (as defined by FAO) on Tropic Seamount (15 cold-water coral species), alongside predictive models to increase the spatial coverage beyond ROV and AUV surveys. Predicted habitat for the glass sponge *Poliopogon amadou*, a



Unidentified black coral at the Tropic Seamount. Image courtesy Ramiro-Sanchez et al. 2019 (DOI: 10.3389/fmars.2019.00278) and the Marine E-Tech project, James Cook Cruise 142

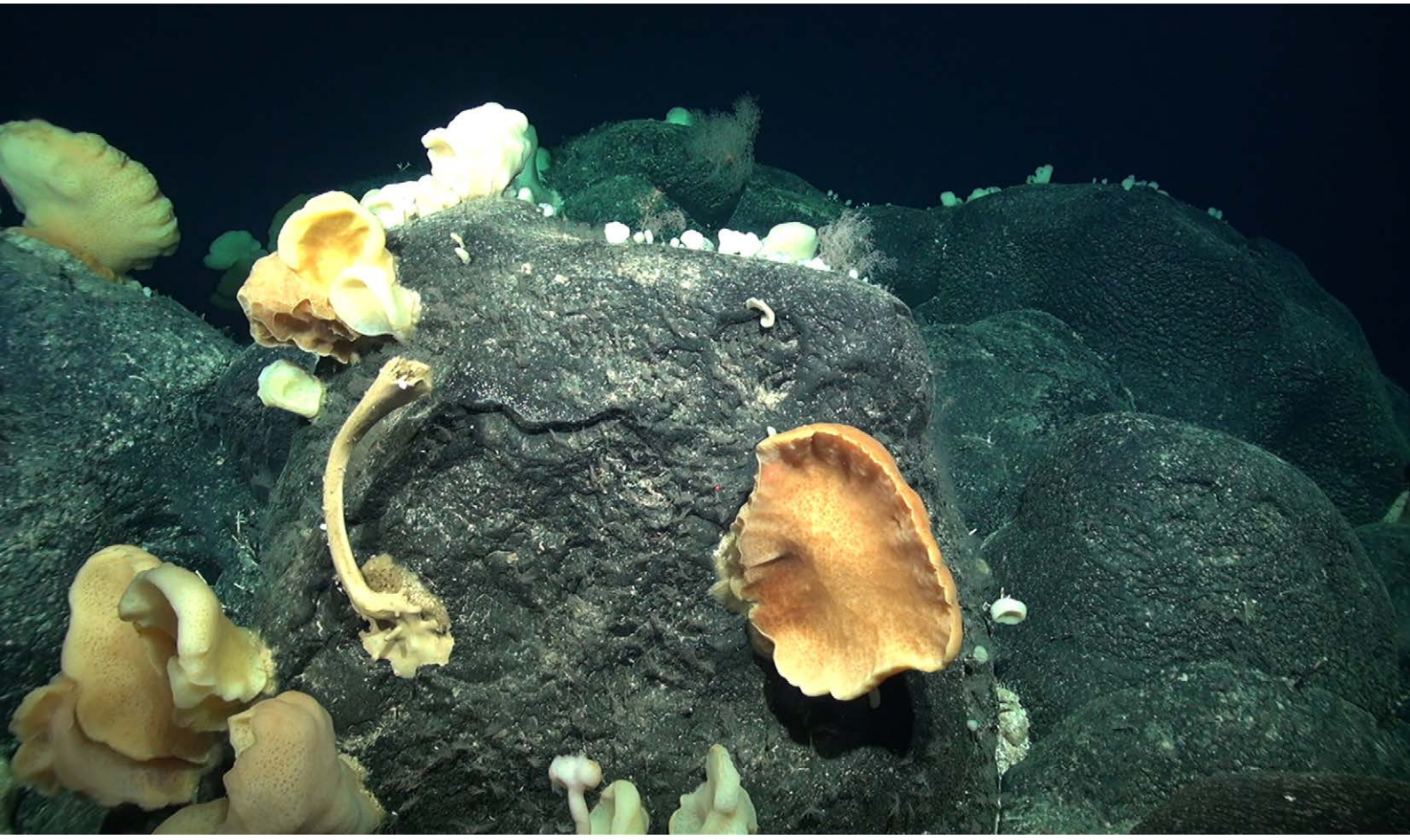
biogeographically restricted hexactinellid forming extensive near-monospecific grounds, was found to favour the deep seamount flanks within a very narrow environmental regime.

A summary report of the workshop, containing 17 EBSA descriptions (including the Tropic Seamount), was presented to the 23rd meeting of the CBD Subsidiary Body for Science, Technical and Technological Advice (SBSTTA 23) in November 2019, and will go forward to CBD COP15. This workshop is the final 'piece of the jigsaw' for the global coverage of EBSA workshops – the only regions now not covered are the SW Atlantic and Southern Ocean – with a total of 338 areas described as EBSAs. Given this critical moment, the CBD Secretariat has commissioned GOBI Secretariat to produce an EBSA impact study setting out what has been achieved, and a series of reflections from all 15 EBSA regional workshops.

Going forward, it is still incumbent on Parties to decide modalities for modifying EBSA descriptions held in the CBD EBSA Repository and for describing new EBSAs and/or convening future regional workshops. Studies so far have highlighted a variety of potential gaps in the current EBSA coverage and suggested ways in which the current suite of descriptions might be updated and enhanced. Despite an expert workshop to develop options for modifying EBSA descriptions, describing new areas and strengthening the scientific credibility and transparency of this process (Berlin, December 2017), Parties were unable to agree a way forward at CBD COP14. Consequently, in February 2020, another expert workshop was convened in Brussels, with financial support from the Governments of Belgium and Germany. GOBI Coordinator David Johnson facilitated this workshop, leading participants through a document drawn up by the CBD Secretariat as a basis for discussion. The workshop sought to establish expert consensus on reasons for modification of EBSA descriptions, actors involved and different jurisdiction situations where this might take place. A report of the workshop will be considered at CBD COP15, and GOBI is particularly interested in the outcome of deliberations on this topic.

The GOBI Secretariat will submit a document to CBD Secretariat providing examples of selected EBSA descriptions that might benefit from updates based on new information available on migratory species, seabird tracking and Important Marine Mammal Areas. The ocean basin-scale biogeography studies led by CSIRO and work on hydrothermal vent ecosystems by Duke University, both with support from GOBI, may also highlight areas and features previously overlooked where new EBSA descriptions could be appropriate.

Below: Fauna colonising hard substrate at Tropic Seamount, including specimens of Poliopogon amadou. *Image courtesy of the Marine E-Tech project, James Cook Cruise 142.*



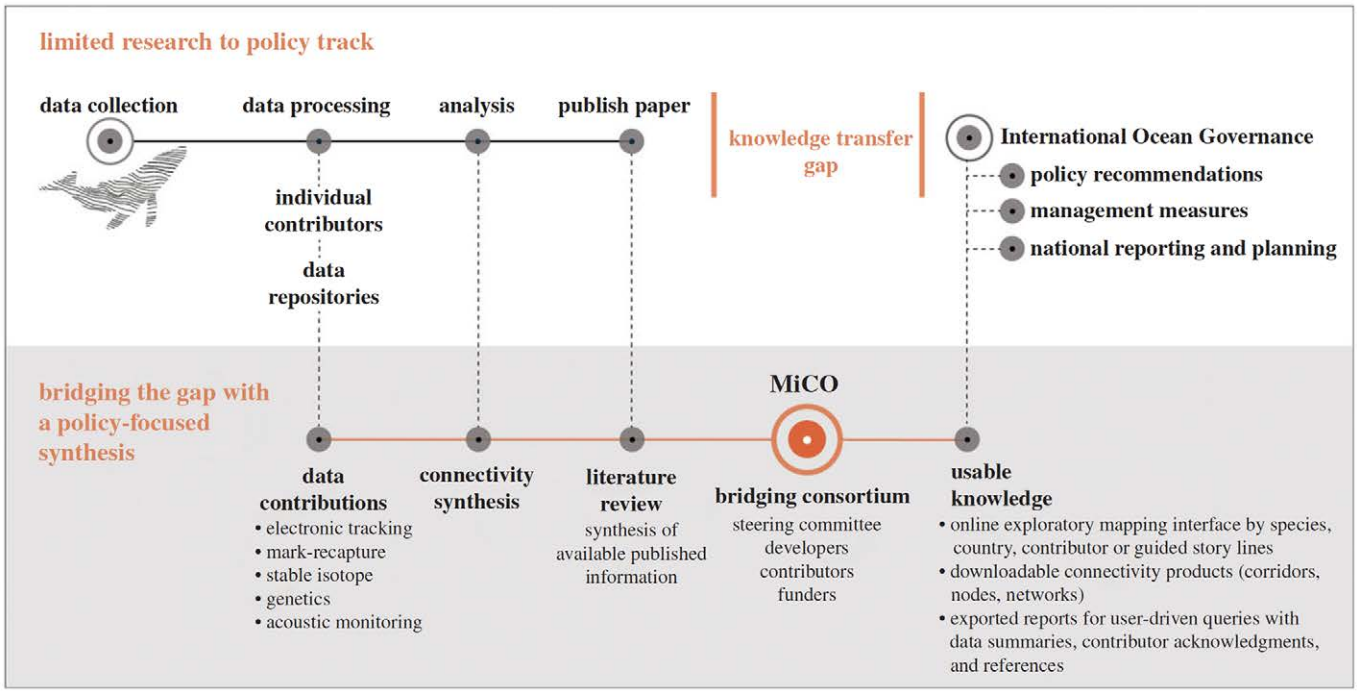
Congratulations to MiCO: worthy winner of the Innovation Award at the 2020 Ocean Awards

The Migratory Connectivity in the Ocean system (MiCO), developed with support from GOBI's grant from the International Climate Initiative, has won the prestigious Innovation category at the 2020 Ocean Awards organised by the Blue Marine Foundation and BOAT International. The Innovation Award recognises the individual or group that has introduced innovative technologies and practices that help aid ocean conservation.

MiCO, led by Duke University's Marine Geospatial Ecology Laboratory and University of Queensland, is a consortium of data repositories, national observing systems, museums, environmental NGOs, universities, individuals, intergovernmental organisations and UN bodies that is delivering a sea change in how we access information on marine migratory species. MiCO aims to provide actionable knowledge to improve the conservation of migratory species of the world's oceans through an open, online system to aggregate knowledge of how more than 900 species use and connect our oceans.

Ocean basin-scale migrations of sea turtles, marine mammals, seabirds and fish expose them to multiple stressors and fragmented governance regimes. Some 63% of assessed sea turtle subpopulations are listed as near threatened or threatened by the IUCN, as are 95% of albatross and 87% of assessed migratory shark species. Migratory fish, meanwhile, suffer twice the rate of overfishing if they cross jurisdictions.

Albatrosses in stormy seas in the SW Atlantic. Image courtesy Fer Nando-/ unsplash



Above: MiCO bridges a knowledge communications gap between researchers and policy fora. The typical flow of knowledge from data collection to scientific publication limits access to that knowledge and is dependent on participation by each individual researcher in all relevant policy processes. Initiatives like MiCO provide mechanisms to increase access to knowledge, ensure that it is provided in a usable format, and allow contributors to track the impact of their work. From Dunn & Harrison et al. (2019).

Lack of easily accessible knowledge on how migration connects areas of importance to these populations hinders the ability of managers and policymakers to conduct meaningful environmental impact assessments and strategic environmental assessments, and to develop effective and efficient spatial management measures.

The MiCO team has so far analysed the tagging data of nearly 400 animals, tracking their movements through 17 'corridors' in about 100,000 locations across 55 countries. An ongoing literature review has provided information on a further 133 connections between 109 nodes. When it is completed later this year, the review will make information on migratory connectivity from more than 1,200 publications freely available online.

The need for a step change in how we store and disseminate the knowledge derived from research on marine migratory species is the focus of a recent paper by the MiCO team. '*The Importance of Migratory Connectivity to Global Ocean Policy*', published in the Proceedings of the Royal Society in September 2019, lays bare the need for a new way of bridging the science–policy interface to improve outcomes for marine migratory species. To span that divide, MiCO focuses on standardising, storing and delivering knowledge rather than raw data. This approach both protects the currency of many researchers (i.e., the data) and decreases the capacity required to access and utilise research output.

While the amount of data describing migratory movements is growing exponentially, the results of these studies remain buried in the scientific literature and are only communicated via direct contact with the authors. This bottleneck in the delivery of critical ecological knowledge is a conservation tragedy, constraining efforts by managers, policy-makers and industry.

"Knowledge on migratory connectivity will be critical in informing conservation efforts of migratory species in areas beyond national jurisdiction," conclude the paper's lead authors Daniel Dunn and Autumn-Lynn Harrison. "MiCO represents a switch from aggregating raw data to aggregating knowledge – something that's essential to conserving our oceans."

Dunn, D.C. & Harrison, A.-L., et al. (2019) The importance of migratory connectivity to global ocean policy. Proceedings of The Royal Society B, DOI:10.1098/rspb.2019.1472

Convention on Migratory Species 13th Conference of the Parties

Gandhinagar, Gujarat, India, 16-22 February 2020

By David Johnson, GOBI Coordinator

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) is an intergovernmental treaty under the aegis of the United Nations Environment Programme. It brings together the States through which migratory animals pass, the Range States, and sets out internationally coordinated conservation measures throughout the range of aquatic, terrestrial and avian migratory species. Every 2-3 years, the CMS Conference of the Parties (COP) decides on priorities for future work.

Like any of these major intergovernmental meetings, the 13th CMS COP was a huge logistical exercise, complicated by concerns over COVID-19. It developed its own rhythm of plenaries, working groups, sideshows and briefings. In the margins were coordination meetings and other events trying to capture interest and attention, such as a wildlife painting wall. Meanwhile, the core business was agreeing on Resolutions and Decisions, recognising specific species that are in trouble and tracking progress of concerted actions.

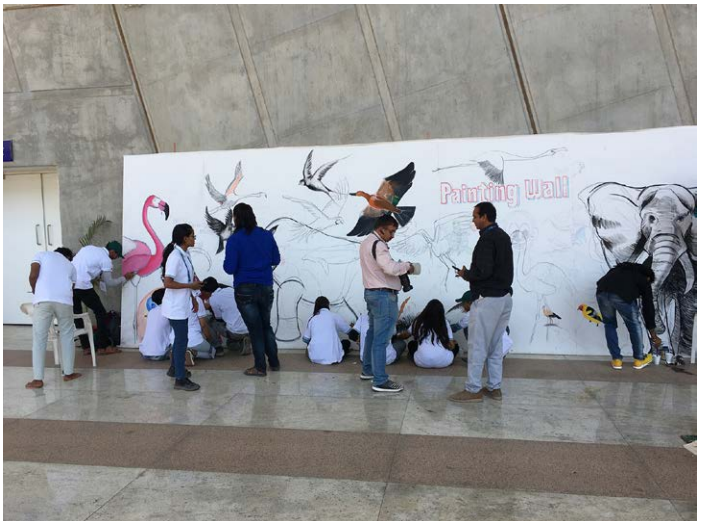
GOBI hosted a successful side event on '*Understanding and Protecting Connectivity in the Ocean*'. It was an opportunity to showcase the latest progress in the development and advancement of new methods for generating and accessing actionable knowledge to conserve and manage migratory species. GOBI partners Giuseppe Notarbartolo di Sciara (Tethys Research Institute) and Daniel Dunn (University of Queensland) presented results of their work and quantified efforts of BirdLife International's seabird tracking database, the Migratory Connectivity in the Ocean (MiCO) system (developed by Duke University & University of Queensland), and Important Marine Mammal Areas, IMMAs (promoted by the Marine Mammal Protected Areas Task Force). In addition, MiCO was presented as an element relevant to a future Global Animal Migration Atlas. India, as host country and having the CMS COP Presidency for the next three years, took a keen interest in proceedings. Two national marine side events in particular were highly stimulating.

First, an overview of marine animal conservation programmes, chaired by the Inspector General of Forest (Wildlife) Government of India, Mr Soumitra Dasgupta (see image below), featured expert analysis of dugong, whale shark, Arabian Sea humpback whale and marine turtles. Efforts to reduce bycatch by creating awareness among stakeholders and involving them in species recovery programmes were emphasised. For example, Dr Sivakumar Kuppusamy of the Wildlife Institute of India explained that the Indian dugong population is highly fragmented and comprises fewer than 250 animals. The Navy and Coastguard have been involved in surveying and monitoring, while a network of volunteers contributes to photo identification and stranding reports. Initiatives are also in place to remove ghost nets from seagrass beds, and India has a dugong scholarship programme to engage the children of local

fishing communities and raise their awareness about dugong and seagrass conservation. Four sites in Indian national waters have been identified as IMMAs for dugong.

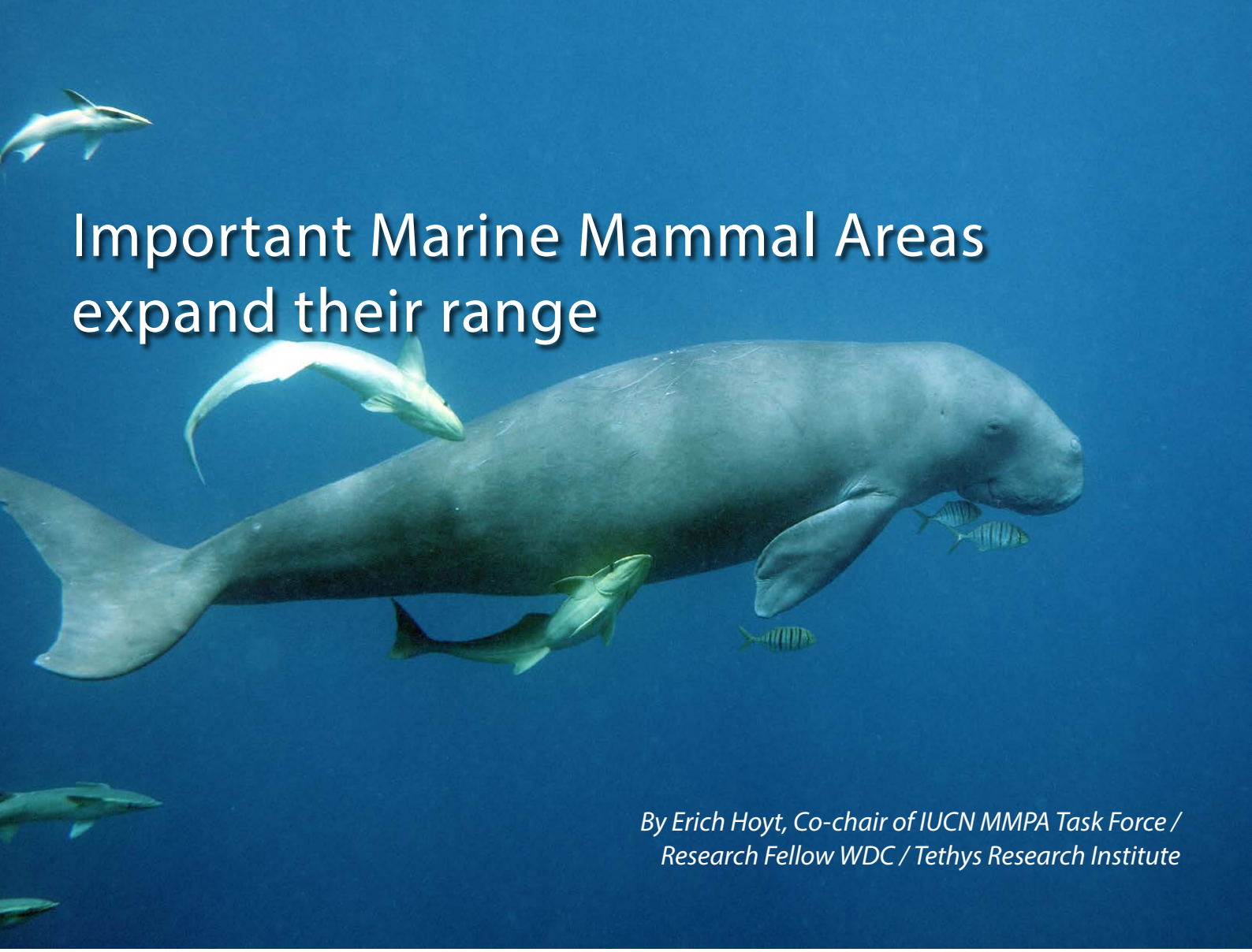
The second event, organised by Wildlife Trust of India, Gujarat Forest department and Tata Chemicals Ltd, concentrated on whale shark conservation success in Gujarat. India has a coastline of 7,516 km, comprising its mainland, the Lakshadweep coast and the Andaman and Nicobar Islands. Gujarat has the longest coast of all Indian states, with part of it being a marine national park. The Government of India recently published India's third National Wildlife Action Plan (2017-2031), the first to recognise concerns relating to marine biodiversity. An initiative in place since 2006 has provided compensation when whale sharks become entangled in fishers' nets and raised awareness amongst local communities. Dr Rima Jabado of Elasmoproject placed the Indian efforts in a global context, explaining research into migration complexity and connectivity based on records of 7,011 individual sharks (from 1964-2016). She noted that 70% of these sharks are male and that very little is known about females and pupping grounds. Ongoing threats to sharks are targeted fisheries, artisanal bycatch, and injuries such as those recorded off Qatar, where large numbers of animals feed on tuna spawn.

GOBI hopes to work further with partners based in India on these issues.



The GOBI team in Gandhinagar

Important Marine Mammal Areas expand their range



By Erich Hoyt, Co-chair of IUCN MMPA Task Force / Research Fellow WDC / Tethys Research Institute

February 2020 saw the IUCN Marine Mammal Protected Areas Task Force complete the 6th Important Marine Mammal Area workshop, held in Perth, Western Australia. This workshop is the fourth of a total of five such workshops supported by GOBI under its grant from Germany's International Climate Initiative (IKI).

The week-long workshop hosted 31 marine mammal scientists and observers from six countries to map the important habitats for marine mammals in the waters of Australia, New Zealand and the South East Indian Ocean.

An impressive total of 45 candidate important marine mammal areas, or cIMMAs, were identified, along with one area of interest (AoI) which will be retained as a potential future IMMA pending further research. A total of 14 cIMMAs are in New Zealand waters, and 31 in Australian waters. Several of the cIMMAs extend well into offshore high seas, outside of the 200 nautical mile exclusive economic zone.

"These are among the best documented candidate IMMAs that we've had to date," said Task Force co-chair Guiseppe Notarbartolo di Sciara. The areas nominated feature nearshore habitat for most of the world's remaining dugong, Australian humpback and snubfin dolphins (only recently recognised as species), as well as deep canyons with vulnerable sperm, and endangered blue and pygmy blue whales.

Also living in Australia are two species of bottlenose dolphin and the endangered Australian sea lion. New Zealand has the world's only population of the endangered Hector's dolphin as well as the subpopulation of Maui dolphin, and many rare beaked whale species.

The Perth workshop follows successful Task Force IMMA regional workshops in the Mediterranean, Pacific Islands, Northeast Indian Ocean-Southeast Asian Seas, the Extended Southern Ocean, and the Western Indian Ocean-Arabian Seas in 2016-2019. The 45 candidate IMMAs stands as the second highest total to date for a single region.

Important Marine Mammal Areas - IMMAs - are defined as discrete portions of habitat, important to marine mammal species. These areas have the potential to be delineated and managed for conservation. They are not marine protected areas but layers that can be used in spatial planning or for other area-based management tools.

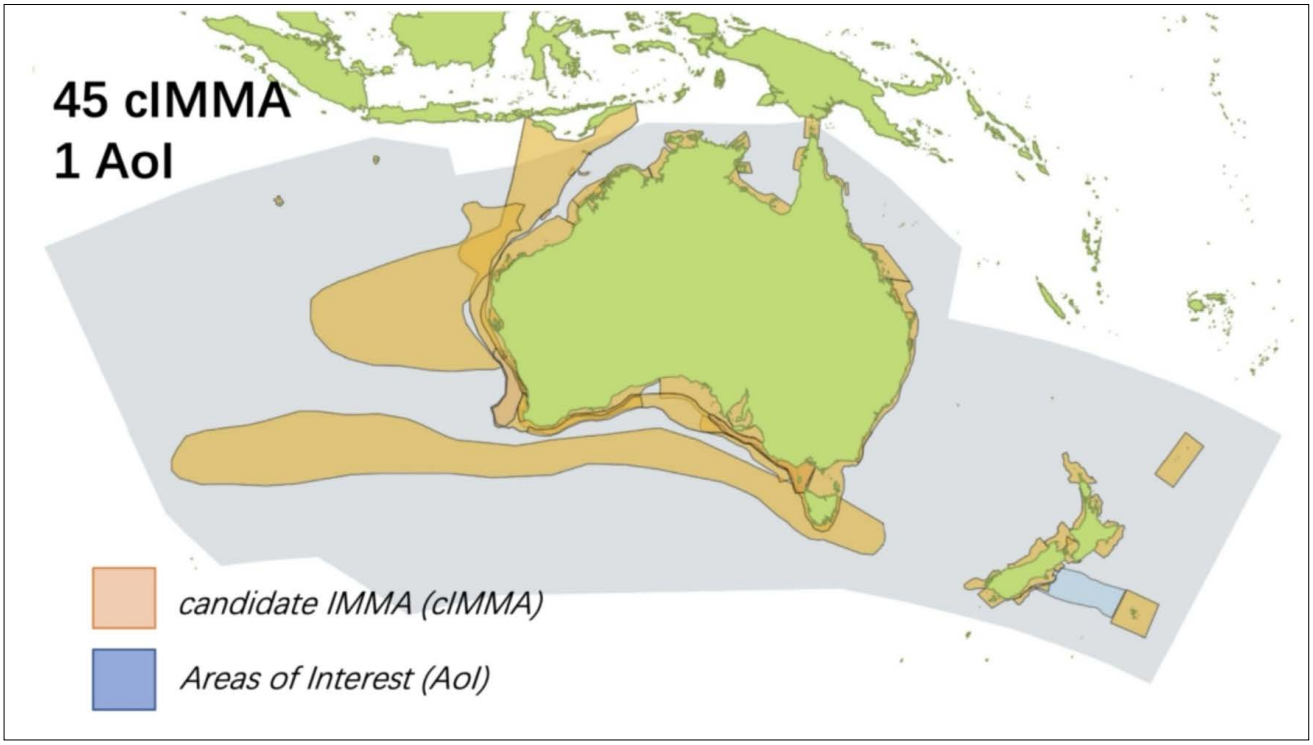
With GOBI and IKI's support the Task Force has adopted as its mandate the mapping of habitats for the 130 species of marine mammals - cetaceans, pinnipeds, sirenians, otters and the polar bear - across the world ocean.

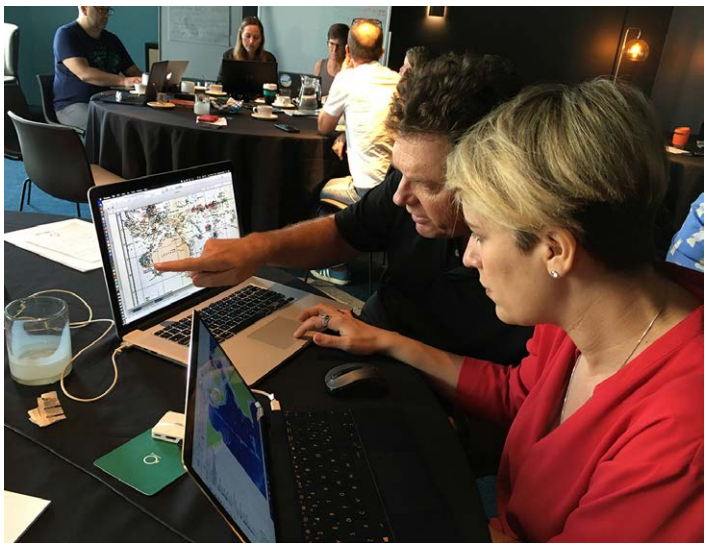
The candidate IMMAs now go to an independent review panel. Once approved, they will be placed on the IMMA e-Atlas, and can be used for conservation planning. Those without sufficient evidence will remain as cIMMAs or revert to AoI. Final results from the panel are expected to be posted online later in 2020. The collective expertise, energy and commitment of the scientists gathered in Perth have made this technical and scientific exercise a great success.

In addition to the cIMMAs identified, potentially 25 of the cIMMAs may qualify as IUCN key biodiversity areas (KBAs). KBAs are a parallel process for identifying areas of international importance in terms of biodiversity conservation for all species using globally standardised criteria.

For more information on the Task Force and its work on IMMAs, see marinemammalhabitat.org.

Main image: Dugong in Palau; image courtesy Mandy Etpison. This page (upper): map showing the 45 candidate IMMAs and one Area of Interest described by the Perth workshop. This page (lower): participants hard at work during the workshop.





Identifying hotspots of threats to marine megafauna

By Ana Carneiro, BirdLife International

There is increased global awareness that our ocean is under threat. Marine megafauna such as seabirds, marine turtles, marine mammals, sharks and rays are in danger largely because of fisheries activities, through direct competition for resources, deliberate capture for food and incidental capture (bycatch). Unfortunately, the behavioural and life-history traits of many marine megafauna populations make them particularly vulnerable. For long-lived and slow-breeding species (which have prolonged maturity, may not breed every year and have few offspring), even small increases in mortality can lead to significant population declines.

Understanding where and when animals overlap and interact with threats is crucial to halt population declines, as it enables conservation actions to be directed to areas where they can have the greatest benefits. Take seabirds as an example: some fisheries have already reduced seabird bycatch by 80% by adopting the use of mitigation measures. Multi-species hotspots of use at the global scale can be identified by mapping the overlap between seabird distributions and fisheries. This provides crucial information for stakeholders and policymakers for improving regulations, targeting bycatch observer programmes and monitoring compliance with recommended bycatch mitigation, in order to reduce bycatch to negligible levels.

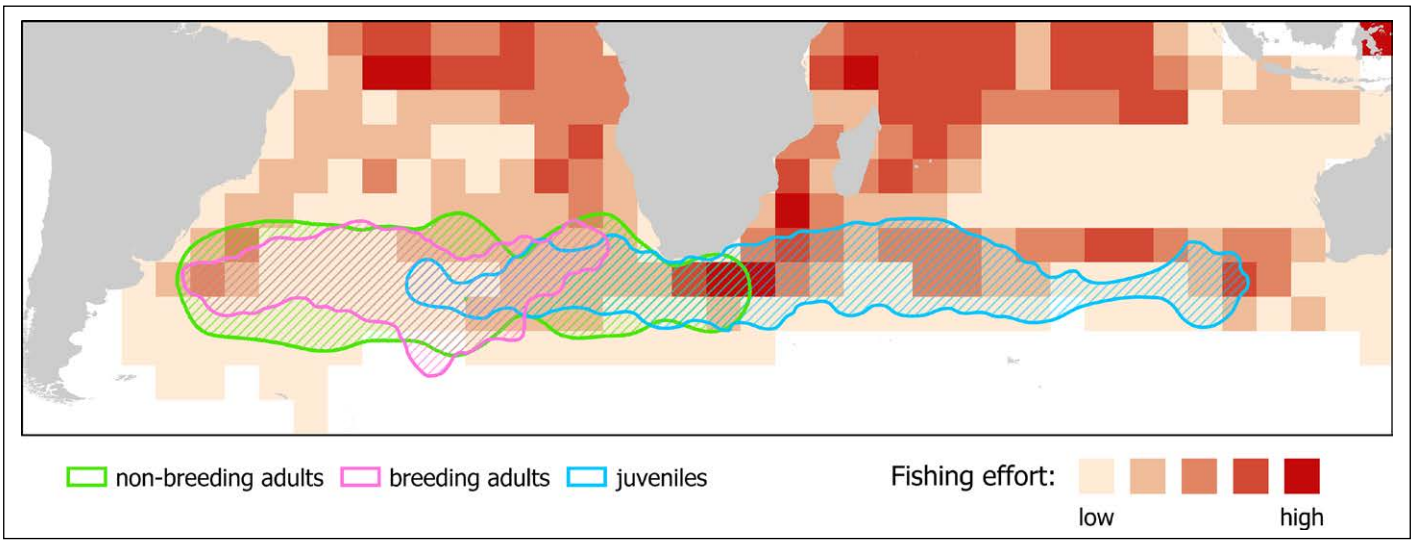
Over the last few decades, researchers have used electronic devices attached to a wide range of seabird species to record bird movements. Tracking devices have provided new insights to the lives of birds at sea. Despite major recent advances, studying movements of juvenile, immature, and non-breeding adults remains particularly challenging because these life-history stages spend extensive periods at sea and return to colonies only for short periods, making the retrieval of devices difficult. As a result, evaluations of risk to this group are likely to be biased or underestimated.

Together with colleagues at BirdLife International, I recently published a paper in the Journal of Applied Ecology that provides a framework that synthesises and improves upon previous approaches to identify seabird hotspots at sea. This is an extension of the work BirdLife has been advancing since the Tracking Ocean Wanderers publication in 2003. We integrate seabird tracking data with demographic information and phenological data from major life-history stages to estimate density distributions of whole seabird populations. We present the results of the application of our framework to 22 seabird species of global conservation concern, and use overlap with fisheries as an example for examining how neglecting particular life-history stages can lead to erroneous maps of risk. We demonstrate in our study that the omission of juvenile, immature and adult non-breeding distributions lead to distribution maps that underestimate longline fishing bycatch risk by 18-42%.

The Seabird Tracking Database (www.seabirdtracking.org) and all our data collaborators have been fundamental in this achievement. We used thousands of tracks, from all the major life-history stages, to identify the most important areas for albatrosses and petrels in the Southern Ocean. We recommend use of our distribution maps to improve and enforce bycatch mitigation measures in areas where large proportions of threatened seabird populations occur. We're publishing all our code and methods, and would love to see our framework being applied to other marine megafauna and different marine threats.

Carneiro et al. (2020) A framework for mapping the distribution of seabirds by integrating tracking, demography and phenology. Journal of Applied Ecology, DOI: 10.1111/1365-2664.13568.

Left: Juvenile Wandering Albatross wearing tracking device on Bird Island, South Georgia. Image courtesy Alex Dodds. Below: Map showing areas of the ocean used by Juvenile Tristan Albatrosses that expose them to risk of bycatch in fisheries. Image courtesy BirdLife.



Advancing a regional governance model to protect the high seas off Central America

by Gustavo Arias, Science Program Manager, MarViva Foundation

Areas Beyond National Jurisdiction (ABNJ) occur beyond 200 nautical miles from coastlines, limiting the territorial seas and exclusive economic zones of coastal States, according to the United Nations Convention on the Law of the Sea (UNCLOS). Not being part of any State, ABNJ are considered as a common good, in principle, usable by all States. Exploration and mining of the seabed in ABNJ are regulated by the International Seabed Authority (ISA), however, an international legally binding instrument to regulate the use and management of biodiversity in the waters of the high seas is still under discussion within the United Nations.

The Costa Rica Thermal Dome (or Dome, for short) is an ocean upwelling system in the Eastern Pacific Ocean, which covers the exclusive economic zones of all the Central American countries and ABNJ. It is a breeding, feeding and transit site for multiple marine species of ecological and economic value, like whales, sharks, sea turtles, tuna, billfish and sea birds. The Dome also plays a key role in carbon sequestration, due to the high primary productivity in surface waters stimulated by a high concentration of nutrients.

Being part of ABNJ, the Dome can suffer from overexploitation of its resources, given the absence of regulatory frameworks that allow the planning of activities that occur within its extent. Unplanned maritime traffic, unregulated fisheries and pollution currently threaten the Dome's natural integrity, putting at risk ecosystems and associated economical activities. Less well known, but also important, are the impacts of global climate change on this area.

Since 2016, MarViva Foundation, has been leading actions to protect the Dome, seeking political engagement to adopt regional governance models that allow the regulation of human activities in the high seas. Currently, this political process takes place within the Central American Commission of Environment and Development (CCAD), which has a major decision-making council integrated by ministers of environment of Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama and Dominican Republic.

In May 2019, the Council of Ministers of CCAD agreed to instruct CCAD's Executive Secretariat to take actions to include the Dome in the Regional Coastal and Marine Agenda. In November 2019, that same body created a sub-committee to address marine issues, under the supervision of CCAD's Committee of Seas and Biodiversity. The next steps for MarViva include the drafting of a regional work plan that will address the critical route through the establishment of a governance model based on best available scientific data and focused on sensitive and ecologically important areas. Participating States are still in the process of designating their technical contacts, who will face this huge challenge with the support of MarViva. If Central America as a region achieves the consolidation of a functional model to manage the high seas areas off its coasts, the Dome could become a case example of success, with the potential to inspire the protection of discrete areas of ABNJ around the world.

Opportunities for enhancing an ecosystem-based approach to high seas pelagic fisheries management

By Guillermo Ortuño Crespo, Duke University

The future of high seas fisheries management is a key research interest for one of GOBI's rising research stars Guillermo Ortuño Crespo, who recently earned his PhD from Duke University. His thesis on '*Opportunities for Enhancing an Ecosystem-based Approach to High Seas Pelagic Fisheries Management*' is an interdisciplinary body of research that aims to identify weaknesses and future opportunities for strengthening the governance, management and scientific processes responsible for delivering an ecosystem-based approach to fisheries management in the high seas. Here he provides an overview of his research and his aspirations for its impact and future use.

"The high seas represent two thirds of the global ocean and cover roughly half the planet's surface. As maritime technologies continue to improve, the vastness and remoteness that once protected high seas ecosystems from anthropogenic impacts are no longer able to deter humans from harvesting their riches. High seas fisheries, in particular, represent the largest direct threat to the stability and health of open-ocean species, biological communities and ecosystems; the management structures in charge of regulating high seas fisheries have not kept up with the expansion rate of this sectoral activity and our window of opportunity for decisive action is narrowing.

My contribution to expanding our understanding of high seas fisheries management started with a theoretical look at existing management measures and frameworks, before taking a dive into the highly dynamic spatial ecology of migratory sharks and tuna fish that roam the open ocean (part of which contributed to the development of MiCO), and then taking a critical look at the commercial fishing fleets that have established themselves as the new 'top predator' of the high seas.

A significant element of my research was a review of the impacts that decades of commercial fishing activities have had on the species, biological communities and ecosystems of the open ocean, whilst also considering how the new international legally binding instrument that is currently being negotiated at the United Nations to sustainably manage high seas biodiversity will interact with existing fisheries management frameworks. The conclusions of this work support the need for an ecosystem-based approach to high seas fisheries management, and demonstrate how the existing institutional framework does not provide sufficient scientific information about the ecological status of associated or dependent species that may be indirectly impacted by high seas fishing. These results are published in the ICES Journal of Marine Sciences and in Nature Ecology and Evolution.

Eological niche theory allowed me to gain a deeper understanding on how fish and fisheries use the open ocean at different times of year. Reducing the impacts of high seas commercial fisheries on biodiversity will require risk mitigation efforts as well as risk avoidance solutions. While most of the efforts to reduce the impacts of fisheries on non-target species have focused on risk mitigation (e.g., gear modification), there have been few attempts to implement bycatch avoidance strategies in the high seas, primarily via spatial management. Avoidance and mitigation of fisheries bycatch are different, yet complementary. While establishing a fisheries closure in the coastal or benthic ocean may be accomplished through identifying important biogenic habitat patches, my research outcomes support the notion that fisheries closures in the open ocean should be based on the likelihood of encountering target and non-target species given multiple dynamic oceanographic parameters. This form of dynamic ocean management has slowly gained traction over the years, but has not yet been embraced by the regional fisheries management organisations responsible for the sustainable management of high seas fisheries; this is something that I hope we can change in the coming years by further developing spatial optimisation analyses aimed to help pelagic fisheries managers reduce unwanted bycatch."

Having completed his PhD, Guillermo is now moving to Sweden to take up a postdoctoral research post at the Stockholm Resilience Centre.

Crespo, G.O. & Dunn, D.C. (2017) A review of the impacts of fisheries on open-ocean ecosystems. ICES Journal of Marine Science 74, DOI: 10.1093/icesjms/fsx084

Crespo, G.O., Dunn, D.C., Gianni, M. et al. (2019) High-seas fish biodiversity is slipping through the governance net. Nature Ecology and Evolution 3, DOI: 10.1038/s41559-019-0981-4

The road to developing a Marine Spatial Planning Framework for ABNJ: Insights for the development of a new legally binding agreement

By Ruth Fletcher, Nina Bhola and Rachael Scrimgeour, UNEP-WCMC

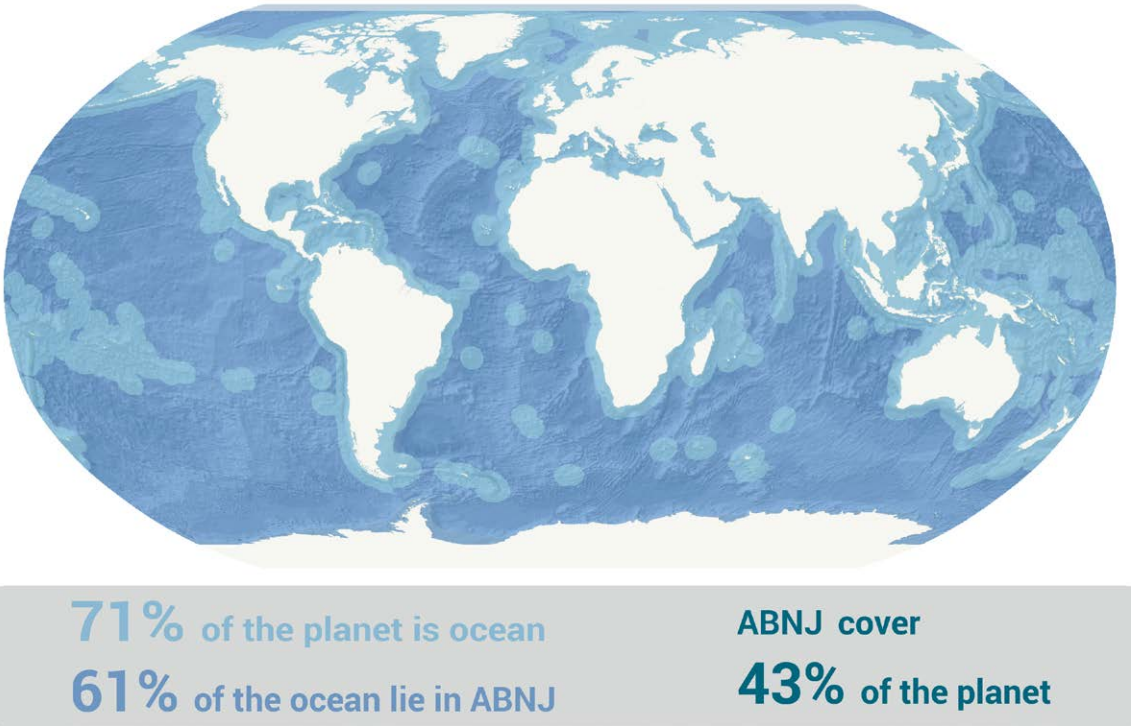
Area-based planning is one solution to the problem of declining marine biodiversity, but can it be applied in Areas Beyond National Jurisdiction (ABNJ)? This was the key question that the ABNJ Deep Seas Project – led by UNEP-WCMC – aimed to explore.

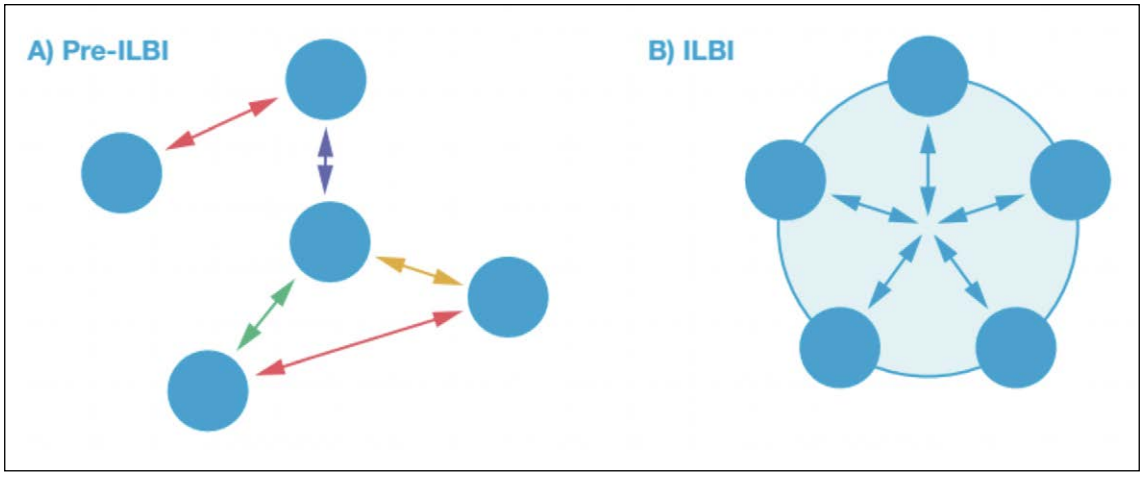
Area-based planning can identify and balance marine uses and support the visibility and conservation of vulnerable habitats and species. However, those who have been working on ABNJ issues know that this vast area, covering 61% of the ocean, presents a great challenge in ensuring it is used wisely. A complex jurisdictional situation and lack of global coordination makes it difficult to ensure that resources in the high seas are sustainably managed. In the absence of an overarching governance framework, cross-sectoral area-based planning approaches can help address the cumulative impacts of different sectors operating in the high seas. However, the presence of a coordinating governance scheme would also considerably support such a planning process. These two scenarios are key to our work.

Our work on the ABNJ Deep Seas Project initially focused on three framing concepts: (1) building a foundation for shared understanding of ABNJ governance arrangements, (2) identifying lessons in area-based planning, and (3) working out what tools could be used.

We examined the legal frameworks already in place to govern ABNJ, both globally and in two study areas - the Western Indian Ocean and the South-East Pacific. We found that marine governance in ABNJ is predominantly sector-specific. There are examples where some sectors have successfully applied their own area-based management tools, however area-based measures such as these are not comprehensive in their coverage or aims, and there remain gaps in coordination and cooperation across sectors. This is a longstanding issue first noted over a decade ago.

Despite the lack of cross-sectoral area-based measures at present, there is considerable interest among national governments, regional and global organisations in strengthening collaboration, in broadening mandates to





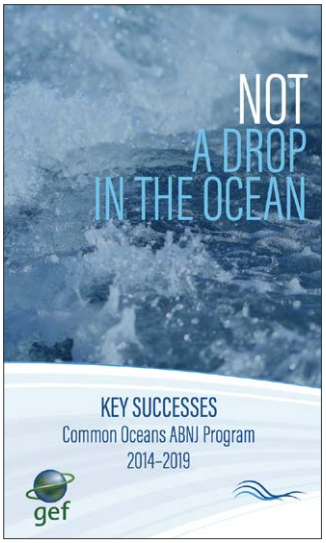
Above: Potential for coordination in ABNJ. A) illustrates the current situation where coordination is occurring; B) provides a visual illustration of what an ILBI could do to support coordination.

provide more comprehensive coverage of a wider area and range of issues in ABNJ, and in integrating working practices so that they can share capacity and learn from one another. In our approach, we focused on exploring current examples of cross-sectoral area-based measures and sought to highlight key lessons to be learnt from existing processes. To complement this, we also reviewed the range of area-based tools available for use in ABNJ and how they could be used to support coordination across sectors.

As work progressed, we identified Marine Spatial Planning (MSP) as a plausible tool to enable cross-sectoral ecosystem-based management in ABNJ. With input from the study areas, we developed a framework for how MSP could be undertaken in ABNJ, and tested the framework through a series of stakeholder workshops. This was carried out in close collaboration with contacts in each of the study areas to ensure that different regional contexts and priorities could easily be considered, and to build stakeholder capacity in area-based planning.

After more than a decade of discussions, the international community is taking positive steps towards improving usage of ABNJ; a new legal agreement for the conservation and sustainable use of biodiversity beyond national jurisdiction is currently being developed. This new International Legally Binding Instrument (ILBI) is not yet finalised, particularly as the fourth intergovernmental conference has been delayed due to the COVID-19 pandemic. However, this delay provides a period to reflect further on the elements of the new agreement.

In our MSP framework report, we discuss aspects of MSP in the absence and presence of a new ILBI, noting where the ILBI could provide valuable support to area-based planning and why. We hope this resource provides useful insights into the world of area-based planning in ABNJ and we welcome any thoughts and comments. A dedicated website offers key resources supported by the project: www.abnjdeepseasproject.com/en/components/4



The ABNJ Deep Seas Project is part of the UN Common Oceans programme. An overview of the programme's key successes over the period 2014-2019 is available online:

Not a Drop in the Ocean: Key Successes by the ABNJ Common Oceans Programme

- Brochure available for download at www.fao.org/3/ca7317en/ca7317en.pdf
- YouTube video: www.youtube.com/watch?v=sWiVVMzmyzI&feature=youtu.be

Why marine protected areas are often not where they should be

By Piers Dunstan, Natalie Dowling, Simone Stevenson and Skipton Woolley, CSIRO

There's no denying the grandeur and allure of a nature reserve or marine protected area. The concept is easy to understand: limit human activity there and marine ecosystems will thrive. But while the number of marine protected areas is increasing, so too is the number of threatened species, and the health of marine ecosystems is in decline. Why? Our research shows it's because marine protected areas are often placed where there's already low human activity, rather than in places with high biodiversity that need it most.

Many parts of the world's protected areas, in both terrestrial and marine environments, are placed in locations with no form of manageable human activity or development occurring, such as fishing or infrastructure. These places are often remote, such as in the centres of oceans. And where marine protected areas have been increasing, they are placed where pressures cannot be managed, such as areas where there is increased ocean acidification or dispersed pollution.

But biodiversity is often highest in the places with human activity – we use these locations in the ocean to generate income and livelihoods, from tourism to fishing. This includes coastal areas in the tropics, such as the Coral Triangle (across six countries including Indonesia, the Philippines and Malaysia), which has almost 2,000 marine protected areas, yet is also home to one of the largest shipping routes in the world and high fishing activity. What's more, many marine industries are already regulated through licences and quotas, so it's hard to establish a new marine protected area that adds a different type of management on top of what already exists. This leaves us with an important paradox: the places where biodiversity is under the most pressure are also the places humanity is most reluctant to relinquish, due to their social or economic value. Because of those values, people and industry resist changes to behaviour, leaving governments to try to find solutions that avoid conflict.

How can we resolve the paradox of marine protected areas? A strategy used in the fishing industry may show the way. Fisheries have had experience in going beyond the limits of sustainability and then stepping back, changing their approach to managing species and ecosystems for better sustainability, while still protecting economic, social and environmental values. In the past, many of the world's fisheries regularly exceeded the sustainable limit of catches, and many species such as southern bluefin tuna declined significantly in number. But strong rules around how a fishery should operate mean declines have since been reversed. Changes to fishery management have reversed population declines in southern bluefin tuna. So how did they do it?

In recent decades, many of the world's large-scale fisheries implemented formal "harvest strategies". These strategies can flip downward trends of marine species in places not designated a marine protected area. Harvest strategies have three steps. First is pre-agreed monitoring of species and ecosystems by fishers, regulators and other stakeholders. Second, regulators and scientists assess their impact on the species and ecosystems. And last, all stakeholders agree to put management measures in place to improve the status of the monitored species and ecosystems. These measures may include changing how fishing is done or how much is done. It's a common-sense strategy that has delivered successful results with many fished species either recovering or recovered.

In Australia, the federal government introduced a formal harvest strategy policy to manage fisheries in 2007. It was evaluated in 2014, and the report found many (but not all) fish stocks are no longer overfished. This includes species such as orange roughy and southern bluefin tuna in Australia, which were overfished but are no longer so. But unfortunately, this positive trend has not been replicated for biodiversity hit by the combinations of other human activities such as coastal development, transport, oil and gas extraction and marine debris.

We need to adapt the experience from fisheries and apply a single, formal, transparent and agreed biodiversity strategy that outlines sustainable management objectives for the places we can't put marine protected areas. This would look like a harvest strategy, but be applied more broadly to threatened species and ecosystems. What might be sustainable from a single species point of view as used in the fisheries might not sustainable for multiple species. This would mean for our threatened species, we would be monitoring their status, assessing whether the total population was changing and agreeing on when and how we would change the way that they are impacted. Such a strategy would also allow monitoring of whole marine ecosystems, even when information is limited. Information on trends in species and ecosystems often exists, but is hidden as commercial-in-confidence or kept privately within government, research or commercial organisations. Still, a lack of data shouldn't limit decision making. Experience in fisheries without much data shows even rules of thumb can be effective management tools. Rules of thumb can include simple measures like gear restrictions or spatial or temporal closures that don't change through time.

Moving forward, all stakeholders need to agree to implement the key parts of harvest strategies for all marine places with high biodiversity that aren't protected. This will complement existing marine protected area networks without limiting economic activity, while also delivering social and environmental outcomes that support human well-being. Our marine ecosystems provide fish, enjoyment, resources and and simple beauty. They must survive for generations to come.

This article was originally published in The Conversation in March 2020, and is reproduced here under the Creative Commons licence. Images courtesy P. Dunstan, CSIRO (left) and Quentin Hanich, University of Woolongong (below).

Finding species new to science in unexpected places

By Hannah Appiah-Madson and Daniel L. Distel, Ocean Genome Legacy

While researchers at the Ocean Genome Legacy Center (OGL) at Northeastern University are always studying, documenting and preserving the threatened biodiversity of our ocean, it's particularly exciting when the organisms studied are new to science.

Most recently, researchers from OGL, in collaboration with scientists from the University of the Philippines and the University of Utah, found a new species of shipworm burrowing into the limestone beds of the Abatan River in the Philippines. Animals and plants burrowing into limestone is not unheard of, but the plot thickens.

Shipworms are a group of marine clams that typically both burrow into wood and eat wood for nourishment, producing hard, calcareous tubes as they dig ever deeper. Like other shipworms, this new species burrows, but it burrows into rock, and evidence suggests it does so, incredibly, by ingesting stone, as researchers have found evidence of limestone in their gut. While other animals can burrow into rock, no other animals are known to create their burrows by consuming the rock, making this species discovery particularly exciting.

It is, perhaps, not surprising that researchers have named the species (pictured below) *Lithoredo abatanica* after its association with rock. The "litho" of Lithoredo comes from the Latin for stone, and "abatanica" denotes the name of the river where it was discovered. Next on these researchers' To Do list is to discover how these stone-eating clams obtain nutrients.

Shipway et al. (2019) A rock-boring and rock-ingesting freshwater bivalve (shipworm) from the Philippines. Proc. R. Soc. B. DOI: 10.1098/rspb.2019.0434

Above: A new species of shipworm, Lithoredo abatanica. *Images courtesy M. Altamia/Ocean Genome Legacy/Northeastern University/PMS-ICBG.*

Keeping up in the virtual world

In this 'new normal' of remote working and virtual connections, ocean supporters have embraced the world of webinars and online conferencing. The array of online opportunities to learn more about new topics, keep up with evolving science, and contribute to thematic discussions has reached almost dizzying heights! To help everyone keep track of these events, IDDRI colleague Glen Wright has put together a useful online listing, available at:

https://docs.google.com/spreadsheets/d/1XqfmKu-bcsMTRi--eSLZfCt7oI8vLJ6RylxDPmoI9fQ/edit#gid=1187216612

Users are welcome to post their events on the site to help keep it up to date.

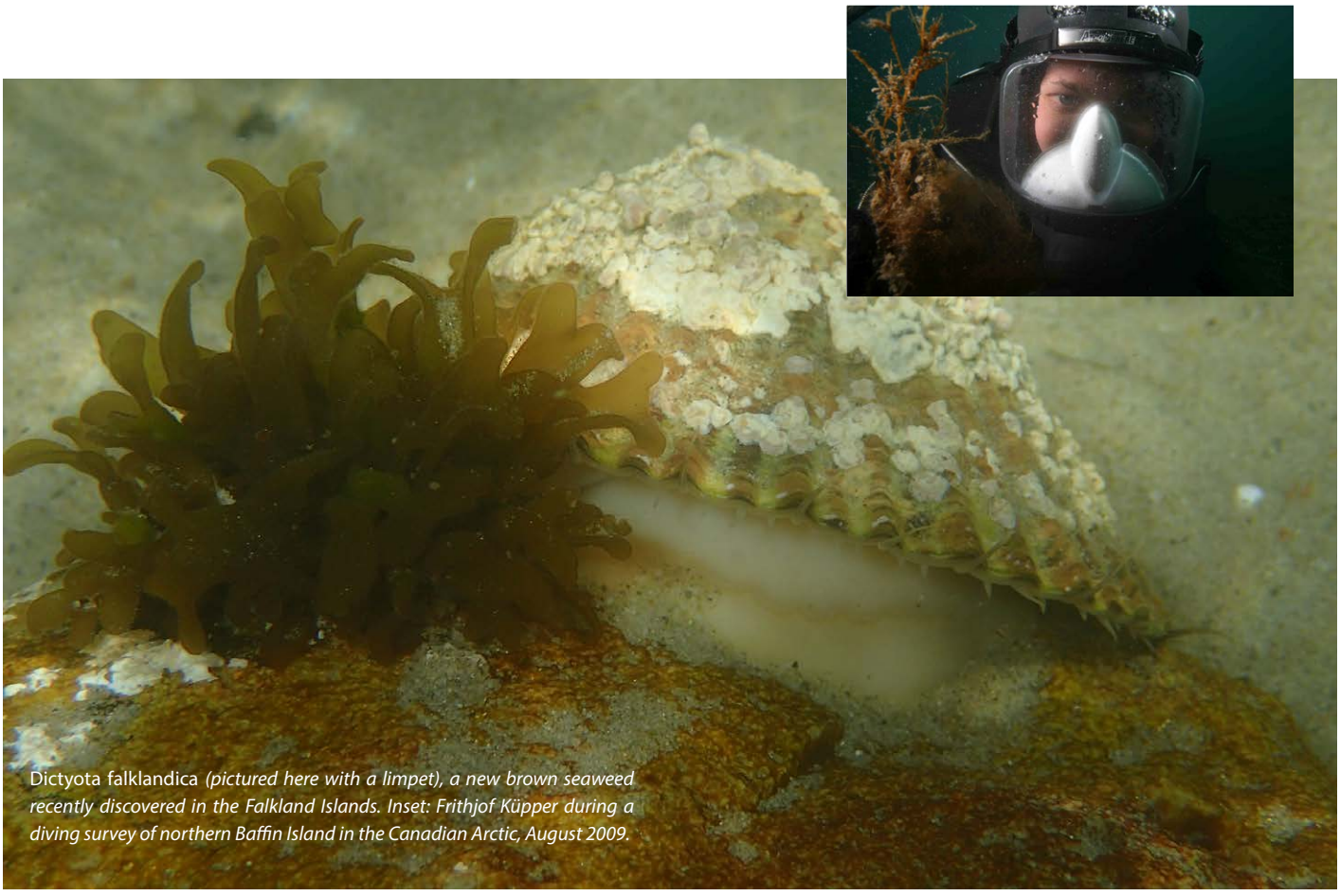
GOBI welcomes new partner University of Aberdeen

By Frithjof C. Küpper, University of Aberdeen

Marine biodiversity research at the University of Aberdeen – recently welcomed into the fold of GOBI partners – is led by Prof. Frithjof Küper, Chair in Marine Biodiversity at the University. Frithjof has worked extensively in UK Overseas Territories in the South Atlantic and Antarctic, namely in the Falkland Islands, Ascension, and the Antarctic Peninsula, but also in the Canadian Arctic. His group has established baseline inventories for Ascension Island, the Adelaide Island/SW Antarctic Peninsula region and the Canadian High Arctic.

A major challenge for assessing the impacts of climate change on marine life in polar regions remains the shortage of historic baseline data, which is a chief objective of research in these areas. Overall, it can be expected that the polar regions will lose more and more of their 'polar' biodiversity character due arrival and establishment of migrants from surrounding subpolar areas. It is also likely that it is only a matter of time before benthic species will migrate between the North Atlantic Ocean and the North Pacific Ocean along the Arctic coasts of North America and northern Eurasia via the increasingly ice-free Arctic. In the Antarctic, Frithjof and his collaborators have recently discovered the hitherto-unknown juvenile morphology of the large canopy-forming brown alga *Desmarestia menziesii*, which forms forest-like communities on the rocky seabed off the western Antarctic Peninsula. In the nearby cold-temperate areas, their work has revealed numerous new biogeographic records for this region and a brown algal species new to science, *Dictyota falklandica*. Detailed accounts of, and results from all this work can be found online, at algae-group.blogspot.com/ and www.abdn.ac.uk/oceanlab/people/profiles/fkuepper

Frithjof is also a member of the Aberdeen Marine Biodiscovery Centre directed by Prof. Marcel Jaspars, where he contributes taxonomic expertise and biological materials of interest to the marine natural products discovery effort.



Dictyota falklandica *(pictured here with a limpet), a new brown seaweed recently discovered in the Falkland Islands. Inset: Frithjof Küpper during a diving survey of northern Baffin Island in the Canadian Arctic, August 2009.*

Basin-scale health check for the Atlantic Ocean

An ambitious mutltidisciplinary research programme involving scientists from countries bordering the length and breadth of the Atlantic aims to undertake a basin-scale assessment of ecosystem health and resilience. The iAtlantic project (*Integrated Assessment of Atlantic Ecosystems through Time and Space*), funded by the EU, focuses on understanding the factors that control the distribution, stability and vulnerability of deep-sea ecosystems. Work spans the full scale of the Atlantic basin, from the tip of Argentina in the south to Iceland in the north, and from the east coasts of USA and Brazil to the western margins of Europe and Africa. Central to the project's success is the international collaboration between scientists throughout the Atlantic region, with sharing of expertise, equipment, infrastructure, data and personnel placed at the forefront of iAtlantic's approach.

iAtlantic is underpinned by an extensive field programme comprising more than 30 research expeditions that collectively span the length and breadth of the Atlantic Ocean. Drawing on a multinational fleet of research vessels and the latest marine technology and instrumentation, efforts focus mainly (but not exclusively) on 12 locations in the deep sea and open ocean that are of international conservation significance and of interest to the Blue Economy. Seven of these study areas coincide with existing EBSAs and were specifically chosen because they have been recognised for their ecological or biological importance.

To assess the status of ecosystems, we need to know more about how they are connected and distributed, what functions they perform and how stable they have been over time. All this requires the collection of new data, but also innovative approaches so that observations taken at local and regional levels can be scaled up to address questions at the ocean basin scale.

To do this, iAtlantic will align deep-ocean observing capacities in the north and south Atlantic, which will provide accurate and detailed insights into ocean circulation in the past, present and future at a range of spatial and temporal scales. The latest marine robotics and imaging technology will be used to develop predictive mapping tools to advance understanding of deep-sea habitat distribution across the ocean. Combined with genomic data and ecological timeseries data, all this new information will provide an unprecedented view of the impacts of climate change on Atlantic ecosystems, allowing us to identify key drivers of ecosystem change and determine which areas of the Atlantic Ocean are most vulnerable to the effects of sustained, increasing and multiple pressures.

A number of GOBI partners are involved in the iAtlantic project. For more information visit www.iatlantic.eu

Assessing biodiversity protection in US waters

GOBI is proud to participate in an exciting new project called '*Gap analysis of U.S. marine biodiversity protection: Scoping a framework for marine stewardship*', sponsored by the Lenfest Ocean Program and the National Marine Sanctuary Foundation. The overarching goal of the project is to establish and implement a coherent, evidence-based framework for evaluating the status of marine habitat and biodiversity protection within the USA's EEZ.

Work entails a structured data gathering and reporting exercise to develop a framework for quantifying marine biodiversity in USA waters, followed by an assessment of spatial gaps in its protection.

Given the current constraints imposed by COVID-19, the project aims to achieve its objectives through a series of interactive meetings, with an option to conduct in-person workshops as circumstances allow. Many GOBI partners are contributing to the effort, including Daniel Dunn (University of Queensland), Pat Halpin and colleagues (Duke University), Nic Bax (CSIRO), Telmo Morato (University of the Azores), Lauren Weatherden (UNEP-WCMC), and GOBI Coordinator David Johnson, as well as other associated luminaries in the field.

The final output of the project, intended for early 2021, will be a peer-reviewed manuscript describing and quantifying the status of marine habitat and biodiversity protection across the USA's EEZ, whilst also identifying the information needed to inform the development of a scientifically based, comprehensive framework for sustaining marine biodiversity through protected areas.

Hot off the press

Spatial planning principles for marine ecosystem restoration by Sarah E. Lester and colleagues, 2020. Frontiers in Marine Science. DOI: 10.3389/fmars.2020.00328

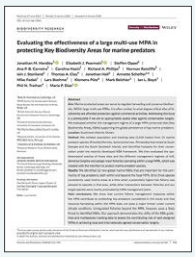
This article reviews options for strategic site selection and optimising spatial planning for marine ecosystem restoration, particularly when applied at larger spatial scales and accounting for ecosystem service outcomes.

Integrating climate adaptation and biodiversity conservation in the global ocean by Derek Tittensor and colleagues, 2019. Science Advances. DOI: 10.1126/sciadv.aay9969

This article reviews the progress made in integrating climate change adaptation into MPA design and management, and provides eight recommendations to expedite this process.

The IPBES Global Assessment: pathways to action by Mary H. Ruckelshaus and colleagues, 2020. Trends in Ecology & Evolution. DOI: 10.1016/j.tree.2020.01.009

Building on the conclusions of the IPBES Global Assessment, this article highlights the need for significant, coordinated and long-term commitments by governments, non-governmental organizations (NGOs), the private sector, civil society, and the scientific community.



Evaluating the effectiveness of a large multi-use MPA in protecting Key Biodiversity Areas for marine predators by Jonathan M Handley and colleagues, 2020. Diversity and Distributions. DOI: 10.1111/ddi.13041.

A study investigating the interactions between various fisheries management regimes and marine predator-defined KBAs within a large MPA in the southwest Atlantic Ocean. It demonstrates the utility of the KBA guidelines and multispecies tracking data to inform MPA design and management.

Ecological Baselines of the Southeast Atlantic and Southeast Pacific – Status of Marine Biodiversity and Anthropogenic Pressures in Areas Beyond National Jurisdiction, by Ben Boteler and colleagues of the STRONG High Seas Project, 2020. DOI: 10.2312/iass.2019.061

This report summarises the major findings from the assessment of key biodiversity features in the two regions, including: areas of special ecological and geological importance, seabed and mid-water habitats, marine birds, fish, reptiles and mammals, fishing and other extractive activities, pollution, energy and climate change. Companion summary documents for decision makers for each of the target areas have also been produced, available in French and Spanish, all available at www.prog-ocean.org/blog/2020/01/30/new-report-on-the-status-of-high-seas-biodiversity-of-the-southeast-atlantic-and-southeast-pacific/

Considering Indigenous Peoples and local communities in governance of the global ocean commons by Marjo K.Vierros and colleagues, 2020. Marine Policy. DOI: 10.1016/j.marpol.2020.104039

This article presents case studies of transboundary connectivity by migratory species to highlight the relevance of IPLCs on islands, coasts and beyond to the governance of the global ocean commons.

Recommendation on the inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework by the International Coral Reef Initiative (ICRI), 2020

ICRI calls upon its members and other relevant stakeholders to ensure the explicit recognition of coral reef ecosystems within the text of the Global Biodiversity Framework in advance of CBD COP 15.

Recognising and reporting other effective area-based conservation measures by the IUCN-WCPA Task Force on OECMs, 2019. DOI: 10.2305/IUCN.CH.2019.PATRS.3.en

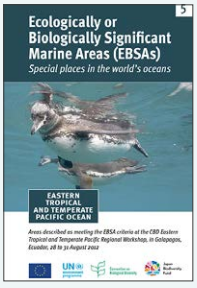
These guidelines are intended to assist Parties in interpreting and operationalising Decision 14/8 and to develop good practice around recognising and reporting OECMs as a means to assess progress on achieving conservation targets.

Stuck in the middle with you (and not much time left): The third intergovernmental conference on biodiversity beyond national jurisdiction by Elizabeth M. De Santo and colleagues, 2020. Marine Policy. DOI: 10.1016/j.marpol.2020.103957.

This article tracks the progress made during the third Inter-Governmental Conference on the conservation and sustainable use of marine biodiversity beyond national jurisdiction, which met in New York in August 2019.

Ecologically or Biologically Significant Marine Areas (EBSAs): Special places in the world's oceans. Volume 5: Eastern Tropical and Temperate Pacific Ocean by the Secretariat of the Convention on Biological Diversity, 2020.

This is the fifth booklet in the series describing the EBSAs present in various regions around the world. Available in English and Spanish at www.cbd.int/marine/



Area Requirements to Safeguard Earth's Marine Species by Kendall R. Jones and colleagues, 2020. One Earth. DOI: 10.1016/j.oneear.2020.01.010.

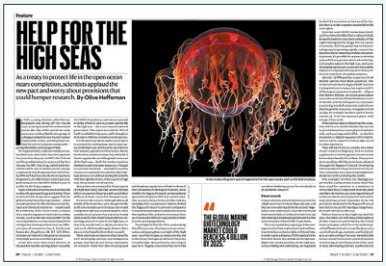
This article provides insights into the scale of conservation action required across the marine realm and identifies new areas that warrant conservation attention.

Data-driven approach for highlighting priority areas for protection in marine areas beyond national jurisdiction by Morgan E. Visalli and colleagues, 2020. Marine Policy. DOI: 10.1016/j.marpol.2020.103927

This paper presents a newly-developed conservation planning algorithm that integrates several relevant data layers as a means to highlight priority regions in ABNJ to be considered for spatial protection.

Protected areas to deliver biodiversity need management effectiveness and equity by Noelia Zafra-Calvo and Jonas Geldmann, 2020. Global Ecology and Conservation. DOI: 10.1016/j.gecco.2020.e01026.

This short communication investigates potential synergies and trade-offs between management and equity, and how they can work together to reduce human pressure in protected areas in an effort to inform international policy processes.



Help for the High Seas by Olive Heffernan. Nature vol. 580, 2 April 2020

This feature article illustrates the relevance to society of the BBNJ treaty still under development, but highlights concerns that some aspects of it could hamper research.

Ecological variables for developing a global deep-ocean monitoring and conservation strategy by Roberto Danovaro and colleagues, 2020. Nature Ecology & Evolution. DOI: 10.1038/s41559-019-1091-z

The article presents the results from an analysis of responses to a consultation of deep-sea experts, as well as offering options for prioritisation of actions to optimise management and conservation of the ocean.

Our Future on Earth - science insights into our planet and society by Future Earth, 2020

This report aims to tell the story of how science can provide insight into how society might move in a more sustainable direction. Available at www.futureearth.org/publications/our-future-on-earth

Proceedings of the International Symposium on Fisheries Sustainability: strengthening the science-policy nexus. FAO Fisheries and Aquaculture Proceedings No. 65, 2020. DOI: 10.4060/ca9165en.

This technical report presents the discussions that led to recommendations intended to improve the sustainability of capture fisheries and progress towards the different targets and objectives of the Sustainable Development Goals.

Global Ocean Biodiversity Initiative

Global Ocean Biodiversity Initiative

Providing the scientific basis for conserving biological diversity in the global ocean

The Global Ocean Biodiversity Initiative is an international partnership of organisations committed to advancing the scientific basis for conserving biological diversity in the marine environment. In particular, GOBI contributes expertise, knowledge and data to support the Convention on Biological Diversity's efforts to identify ecologically and biologically significant marine areas (EBSAs) by assisting a range of intergovernmental, regional and national organisations to use and develop data, tools and methodologies.

GOBI also undertakes research to generate new science that will enhance the value of EBSAs and their utility for promoting environmental protection and management for specific areas of the world's oceans. The intention is ultimately to reduce the rate of biodiversity loss through the application of ecosystem approaches to the management of human activities, and to support the establishment of networks of representative marine protected areas in national and international waters.

The GOBI partnership and activities are coordinated by a Secretariat team, provided by Seascape Consultants Ltd. GOBI is funded by the International Climate Initiative (IKI). The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.

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Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

Federal Agency for Nature Conservation

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