

GOBI secures new 5-year programme of work

The Global Ocean Biodiversity Initiative has been awarded a grant of €5.2m by the German International Climate Initiative (IKI) to support its ongoing efforts in support of the description of ecologically and biologically significant areas (EBSAs) across the globe.

The funding, effective from May 2016 for a period of five years, is spread across seven work packages, comprising six complementary scientific research topics and support for the GOBI Secretariat. Research carried out within this project will help strengthen EBSA descriptions and assist the CBD in determining the strengths, challenges and limitations of data availability. This includes current and emerging techniques, methodologies and expert knowledge. In data-deficient regions, predictive modelling of the occurrence, abundance, movement and range of species or ecosystem features will play an important role. GOBI will therefore contribute to the CBD's Strategic Plan for Biodiversity, which established a series of Aichi Biodiversity Targets to be reached by 2020, by working up detailed biological information, ocean biogeographies and by integrating data on migratory species and hydrothermal vent ecosystems.

Area-based management approaches and tools can help address a multitude of threats. These tools include marine protected areas and networks, environmental impact assessments, improved regulation of sectoral activities and broader ecosystem-based marine spatial planning. GOBI will continue to support such work, while improving the scientific basis of CBD Decisions, UN resolutions and other measures through the application of analyses, network design, training and capacity building.

The scientific partners in this project reflect its global nature. They comprise:

- Australia's national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), one of the largest and most diverse research agencies in the world;
- The Nicholas School of the Environment at Duke University USA, with its world-renowned researchers in the fields of hydrothermal vents and marine spatial ecology;
- The MarViva Foundation, dedicated to enabling the conservation and sustainable use of marine and coastal ecosystems in the Eastern Tropical Pacific;
- BirdLife International, the world's largest conservation partnership with more than 13 million members and supporters;
- The Tethys Research Institute based at the City Aquarium of Milan, specialising in marine mammal conservation with an impressive track record of success in the Mediterranean.

The GOBI Secretariat will act as a coordinating body for the project partnership to help ensure the timely delivery of all project outcomes and provide an overarching perspective of the synergies across the various facets of the project. The Secretariat will also continue its work in supporting the wider GOBI community and its ongoing efforts towards conservation of life in the deep seas and open oceans. With its expanded remit, the GOBI Secretariat has recruited a new team member, Dr Christopher Barrio Froján, who started in his new role at the beginning of September 2016.

A brief synopsis of the science topics covered by this project is given on the following pages.



WP1 Biogeography

Lead: Piers Dunstan (CSIRO)

To ensure the connectivity and ecological coherence of proposed MPA networks in the western South Pacific Ocean and the Indian Ocean, the likely distribution and co-occurrence of selected key species will be modelled and mapped based on shared environmental preferences, thus defining biogeographic units in those areas; this process is referred to as bioregionalisation. To do this, relevant physical and biological datasets will be identified and processed using models developed by CSIRO and partners. Refinement of modelled biogeographic boundaries and ground-truthing for each species will be performed in consultation with the scientific community through a series of regional workshops. The predictive accuracy of the model will be strengthened as additional datasets are added as they become available. Regional stakeholders will be engaged to ensure that the results of the project are used as part of national and regional marine spatial planning processes.



WP2 Area-based planning and network approaches in ABNJ

Leads: Patrick Halpin & Daniel Dunn (Duke University)

In recognition of the recent proliferation of data and information on marine migratory species through the use of satellite tags, an in-depth literature review of marine species migratory routes in areas beyond national jurisdiction will be performed. Findings will populate an open online searchable database of marine migratory species routes, which will enable investigations into how changes in biodiversity or losses of top predators in one location might affect the trophic structure and ecosystem stability in areas connected via migratory routes. Representativity and connectivity of regionally important areas for marine biodiversity established through the EBSA process will also be examined with the aid of habitat models and remote sensing. Together, these components will assist the CBD and CMS in their efforts in developing an effective network of MPAs and progress towards Aichi Target 11. WP2 will convene two workshops, to maximise both the awareness by key stakeholders of the project's purpose and scope, and to get feedback as results are produced.



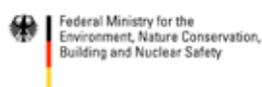
WP3 Costa Rica Thermal Dome

Lead: Jorge Jimenez (MarViva Foundation)

The Costa Rica Thermal Dome (CRTD) is a hotspot of marine biodiversity in the eastern Pacific Ocean off Central America; it is a key component of the Upwelling System of Papagayo and Adjacent Areas EBSA. MarViva aims to secure multi-sectoral participation in the management of biological resources associated with the CRTD. To do this, a spatial and temporal species distribution atlas will be produced highlighting the interdependence between oceanographic processes, ecological features and the commercial value of the CRTD, and their importance for the continued prosperity of the region. A public outreach campaign is planned, including a documentary of a MarViva-led research expedition to the CRTD. Following a multi-sectoral dialogue, a potential governance model for areas of the CRTD beyond national jurisdiction will be developed, with emphasis on maintaining connectivity between the high seas and coastal areas. A final, validated international governance scheme will be recommended, together with publication of the lessons learned, which will facilitate its replication elsewhere.



Supported by:



based on a decision of the German Bundestag



WP4 Seabird data integration

Lead: Maria Dias (BirdLife International)



Seabird tracking data supplied to all EBSA workshops to date will be reviewed and updated to inform and develop models of seabird distribution and abundance, with a particular focus on the Indian Ocean. In doing so, Important Bird and Biodiversity Areas (IBAs) will be identified and described following internationally agreed criteria, with the aim to promote IBAs as standardised inputs to the EBSA process and to other environmental management and conservation initiatives. Model outputs of seabird distribution and abundance in the Indian Ocean will be further used to assess their response to future climate change scenarios and inform discussions on seabird adaptation and protection strategies in the region. Recommendations will be made for the creation of new EBSAs based on the synthesis of all data holdings, ensuring adequate connectivity between EBSAs, as well as identifying potential threats to existing EBSAs from a range of pressures. Management options to mitigate threats to seabirds at a global level will be reviewed, and policy briefs developed and disseminated.

WP5 Hydrothermal vent ecosystems

Lead: Cindy van Dover (Duke University)

This work begins with an assessment of risk sources resulting from proposed deep-sea mining activities on residents and features of the Mid-Atlantic Ridge in the North Atlantic Ocean, followed by an assessment of potential risk responses using an ecosystem approach. The WP5 team will also develop a synthesis of connectivity models for organisms living in close association with hydrothermal vents along the ridge using genetic and hydrographic data. Outputs of these activities will contribute to the development and assessment of spatial management options and draft recommendations to protect hydrothermal vent ecosystem structure and function. After refinement through consultation with stakeholders at expert workshops (with representation from multiple disciplines including policy, legal, risk assessment, industry, ecology, geology, physical oceanography) these recommendations will serve to increase capacity of coastal states and the International Seabed Authority (ISA) to conserve the biological diversity of Atlantic basin ecosystems.



WP6 Important Marine Mammal Areas

Lead: Giuseppe Notarbartolo di Sciara (Tethys Research Institute)



Critical habitats for marine mammal species which have the potential to be delineated and managed for conservation will be identified by experts attending five regional workshops for the South Pacific, the North-east and North-west Indian Ocean, the South-east Pacific and the waters of Oceania surrounding Australia and New Zealand. The habitats identified during these workshops will contribute to the establishment of a global network of sites termed Important Marine Mammal Areas (IMMAs). Since IMMAs represent a relatively recent development in the arena of marine spatial planning and MPA network design, part of the identification and designation process will involve the testing of criteria formulated to define them. Once validated, IMMAs described by this process will be presented to the CBD to strengthen existing EBSA descriptions and contribute towards the description of future EBSAs, as well as to CMS to support migratory species conservation actions. Appropriate conservation and management tools for the proposed IMMAs will be evaluated and selected.

High Seas in New York

Second UN Preparatory Committee meeting (PrepCom2) dives into details on elements of a new treaty for marine biodiversity beyond national jurisdiction

By Hiroko Muraki Gottlieb and Kristina Maria Gjerde, IUCN

The second of four two-week UN Preparatory Committee (PrepCom) sessions concluded on Friday 9 September 2016 with the delegations' strong commitment to continue in 2017 the progress made thus far on the development of an International Legally Binding Instrument under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction. Building on the foundation established in the first PrepCom (April 2016), where the framework for a new treaty began to emerge, participating governments dived into the details of the key elements, with the goal of operationalising previously agreed principles and concepts. In other words, the second PrepCom moved from broad concepts of 'what' the treaty may address to 'how' governments envisage a treaty to work in the real world. This is a significant step forward in the right direction.

The Chair, Ambassador Eden Charles of Trinidad and Tobago, as well as focussing the discussions on the details of each element of a treaty, encouraged negotiators to work towards areas of possible convergence for a consensus. In addition, government representatives identified key issues that will have to be resolved at future PrepCom meetings. While the areas of convergence identified were fewer than the number of issues identified for further discussions, such an outcome is no reason to feel pessimistic. The issues identified will help negotiators to focus their intersessional discussions. Such discussions will lead to more productive negotiations in the third PrepCom meeting. Recommendations for draft elements for a new agreement under the 1982 UN Convention on the Law of the Sea are to be delivered to the UN General Assembly by the end of 2017.



Capacity building and technology transfer remain a critical element for all negotiators. Questions remain over the type of technology to be transferred, how such transfer or capacity building may be conducted, and how the mechanism might be funded. However, there was strong support for non-monetary benefit sharing (joint scientific expeditions, sharing of data, etc.) and for such benefit-sharing to contribute to the conservation of biodiversity beyond areas of national jurisdiction (BBNJ), its sustainable use, and to the benefit of current and future generations.



Above: Kristina Gjerde (IUCN) delivering an intervention to the PrepCom2 plenary group (image courtesy IISD)

On area-based management tools (ABMTs), including marine protected areas (MPAs), possible areas of convergence of views included a number of principles and approaches for establishing ABMTs, such as transparency, ecosystem approach and the science-based approach. The understanding that ABMTs, including MPAs, should collectively contribute to the objective of BBNJ conservation and sustainable use was reinforced. While there are still questions to be addressed – such as the scope, establishment and management of ABMTs – inspiration can be drawn from the work within the CBD to mainstream biodiversity into sectoral and regional decision-making processes and commitments to scale up the coverage of MPAs into ecologically representative networks of MPAs.

On environmental impact assessments (EIAs), delegations agreed that information from EIAs is made publicly available, thus ensuring transparency of the assessment. Questions were raised on thresholds, who should review EIAs and who should take the decision to allow or veto an activity to proceed, as well as who would be responsible for the funding of EIAs. In addressing such questions, there was general agreement that guidance on EIA processes can be gained from existing international standards and sources.

The work of the PrepCom is critical in strengthening the resilience of the ocean against various stressors, including global warming as a result of climate change. In September 2016, IUCN published a report compiled by 80 scientists in 12 countries titled “Explaining ocean warming: causes, scale, effects and consequences” (see page 15). The report contains

the most recent and comprehensive review to date on the rapid and significant changes occurring in the ocean. In fact, the findings show that changes in the ocean are occurring between 1.5 to 5 times faster than the changes occurring on land.

IUCN is hopeful that the common concern for all humankind to conserve the ocean will unite the governments to overcome their differences for much needed swift and strong action. A delegate from Venezuela made a passionate speech and stressed to the PrepCom, ‘if not now, then when? And if not us, then who?’ The PrepCom has the power to restrain the tide of rapidly degrading ocean.

The next PrepCom meeting is tentatively scheduled for 27 March - 7 April 2017 at the UNHQ in NYC.

GOBI side event at PrepCom2 ... and at COP13

During the PrepCom2 meeting, the GOBI partnership convened a lunchtime side event on “Science to inform area-based management”. Chaired by the GOBI Secretariat and Prof. Biliiana Cicin-Sain from the Global Ocean Forum, this event showcased a series of current initiatives that are working to advance the scientific basis for conserving biological diversity, informing agreed inter-governmental processes and assisting countries, regional bodies and global organisations to use and develop data, tools and methodologies. Speakers included:

- Dr Daniel Dunn (Duke University), who spoke about the role of science and scientists in the conservation and sustainable use of biodiversity beyond national jurisdictions;
- Prof. David Johnson (Seascope Consultants / GOBI Coordinator), who presented details of an ongoing initiative for the strategic conservation planning for the Atlantic with a focus on Areas of Particular Environmental Interest;
- Mr Joe Appiott from CBD Secretariat, who outlined the scientific contribution of the CBD EBSA process to area-based planning in ABNJ
- Prof. Pat Halpin (Duke University), who explained how environmental baselines are established and how they

can be enhanced by predictive modeling, particularly in transboundary situations and for migratory species;

- Dr Piers Dunstan (CSIRO) spoke about the opportunities for science to support area-based planning for biodiversity in ABNJ with particular reference to bioregionalisation work and small island developing States;
- Finally, Prof. Johnson gave an overview of the new ATLAS research programme that is focused on responses to to changing oceanic circulation in the Atlantic.

GOBI will convene a lunchtime side event during COP13 on Monday 12 December. The session is titled “Enhancing EBSA Scientific Methodologies and Approaches: The Global Ocean Biodiversity Initiative contribution”, and will take place at 13.15 in the Contact Group 6 meeting room in the Universal Building.

The aim of this side event is to share with delegations the variety of work packages that will be tackled by the GOBI-IKI project, the types of information that will be made available to Parties and competent international organisations, and highlight links to other processes.

Results of efforts by the CBD to describe EBSAs

A review paper by Nicholas Bax et al.

The 204 EBSAs described to date represent the only suite of marine areas recognised internationally for their greater importance for biodiversity in the marine environment. This paper reviews the process of how the international community came together to identify those EBSAs, and uncovers any lessons to be learned from their efforts whilst continuing to engage in that process.

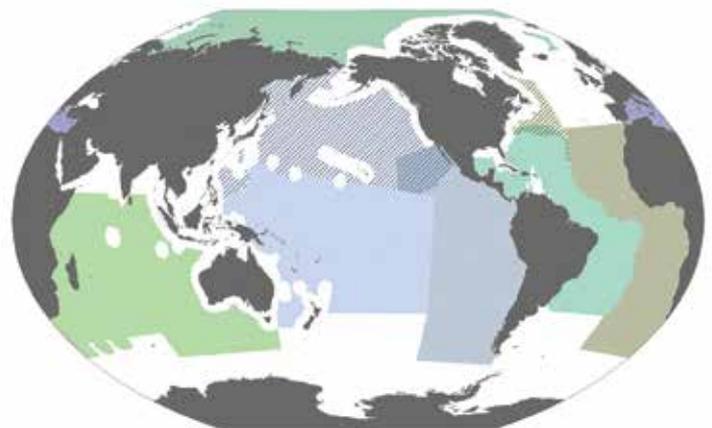
In response to a call by the UN for an increased effort in area-based planning for the better management of biodiversity and natural resources, the Parties to the Convention on Biological Diversity (CBD) embarked on a mission to identify and describe ecologically or biologically significant marine areas (EBSAs). From 2011 to 2014, the Secretariat of the CBD convened nine regional workshops involving experts from 122 countries and 112 organisations. During those workshops, participants considered collectively two thirds of the world oceans and identified, through the application of agreed scientific criteria, areas in need of recognition for their contribution to global biodiversity and the processes that maintain it. As a result, 204 EBSA descriptions have been approved to date by the Conference of the Parties (COP) of the CBD.

Whilst efforts to identify, describe and approve EBSAs continue – targeted primarily at areas of the ocean not yet covered by previous workshops – it seems timely and prudent to review how the process of EBSA identification is working, and to assess whether any stage in the process can be improved. To this end, we have collated and evaluated the outputs of the workshops themselves, considered the factors that contributed to workshop success, and reviewed their results with an eye to glean any lessons that could be learned for the continuing success of the EBSA designation process.

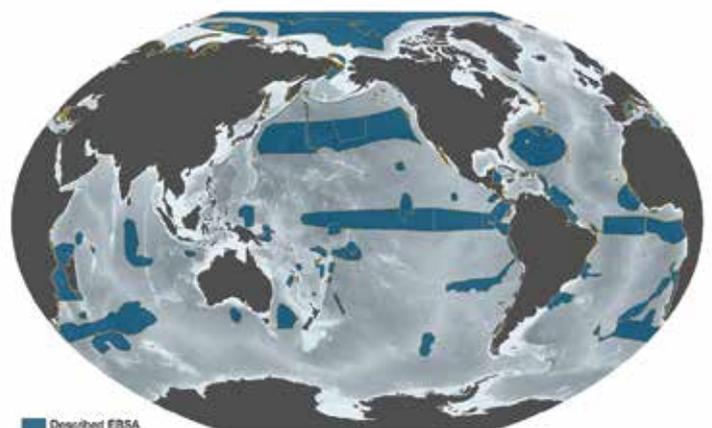
The EBSAs described so far range in area from 5.5 km² to 11.1 million km². Of the 204 described EBSAs, 109 are solely within waters under a single national jurisdiction, 28 EBSAs span the jurisdiction of more than one country but do not extend into areas beyond national jurisdiction (ABNJ), 35 EBSAs cross between national jurisdictions and ABNJ, and 31 are solely in ABNJ. One EBSA has no precise geographical boundaries.

Experts at the regional workshops tended to rank larger EBSAs higher against each of the agreed scientific criteria than smaller EBSAs, therefore, they considered large EBSAs more important for the survival and recovery of threatened and endangered species and habitats. Also, EBSAs farther from shore were considered less likely to be disturbed by human activities than those closer to the coast, and should have a comparatively higher degree of naturalness. Conversely, EBSAs closer to shore were considered more likely to harbour greater biological diversity and an increased level of productivity, as well as being important for special life history stages such as breeding or as nursery areas.

The western South Pacific and the Arctic regions were ranked comparatively high for naturalness. Areas that were considered highly affected by human activities included inshore areas, the northwest Atlantic Ocean, the Mediterranean, and the North Pacific Ocean. The wider Caribbean and western mid-Atlantic areas were not considered as being highly affected by humans by the regional experts. Some of these results are in contrast to those from other published global assessments. These differences between regional expert rankings and the global assessment warrant closer examination, particularly for the level of naturalness or human impact. It is possible that they are artefacts of an expert-driven process or indicate a difference between regional expert opinion accumulated over a lifetime and available data taken from an arbitrary point in time.



From International Living Lab, Biodiversity 2016



From International Living Lab, Biodiversity 2016

The Arctic environment was ranked as most distinct from other environments assessed because of its relatively low importance for biological diversity, its relatively low importance for threatened and endangered species and habitat, and its relatively high importance due to the presence of vulnerable and fragile habitats that support the life-history stages of many other organisms.

During the regional workshops, all criteria could be interpreted by the attending experts and there were sufficient data to rank 88-92% of the EBSAs against each individual criterion (99% for uniqueness). Some criteria (e.g., uniqueness or rarity) were ranked higher more frequently and consistently than others (e.g., naturalness). The ranking of some criteria was often correlated with the ranking of other criteria. For example, naturalness was correlated with uniqueness, fragility, and biodiversity, but not with productivity, while exploited areas were more associated with areas of special importance for species' life history stages, and with endangered and threatened species. This suggests that productive areas are not uncommon in oceans but are likely already exploited. Other patterns were also identified.

Attendance and participation by CBD staff together with technical support from a broad range of experts (including members of GOBI who attended all workshops) provided consistency in assessments across the regional workshops, despite the lack of overlap of regional experts across workshops. Datasets used in the ranking of criteria were typically identified through existing scientific networks and additional contacts identified in preparatory meetings. It is likely that important datasets were either missed or not available to some of the workshops. Consequently, identified EBSAs reflect only the assessment of available data and probably underrepresent ecologically important but data deficient areas. The responsibility of scientists to provide open access to regional and global datasets was recognised as an important factor in achieving the workshop goals.

Each workshop recognised the need for further effort to build a more systematic approach to EBSA selection. Pre-workshop meetings and established regional programmes that brought countries together to work on marine issues helped participants better understand the EBSA process. The absence of strong regional programmes was noted as limiting for some workshops. In many regions, the workshops and pre-workshop meetings provided valuable capacity-building opportunities and endowed participants with an improved understanding of their EEZs and beyond. It was acknowledged by the workshop organisers that the EBSA process could also benefit from increased sociocultural considerations.

Some Parties to the CBD have already used the EBSAs to inform national MPA processes or to secure international funding to support national processes. Competent authorities in ABNJ have also begun to incorporate information from the EBSA process into their management decisions, including in the identification of vulnerable marine ecosystems by regional fisheries management organisations and in considerations of how the World Heritage Site concept might be applied to ABNJ. It is anticipated that EBSAs will play an important role in negotiations that will consider developing a new international legally binding instrument under UN Convention of the Law of the Sea to support the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction. The EBSA description process provides an international standard for others to build and improve on.

This summary article is based on a review by Nicholas J. Bax, Jesse Cleary, Ben Donnelly, Daniel C. Dunn, Piers K. Dunstan, Mike Fuller and Patrick N. Halpin (2016) Results of efforts by the Convention on Biological Diversity to describe ecologically or biologically significant marine areas. Conservation Biology 30 (3), 571-581. It is available to download at: <http://www.sciencedirect.com/science/article/pii/S0964569115300703>.

Left, top map: The geographic boundaries of the 9 regional EBSA workshops convened up to the end of 2014, the results of which were considered at CBD COP12. A further 3 regional workshops took place in 2015, covering the NE Indian Ocean, NW Indian Ocean and the East China Seas, the results of which will be considered at COP13 in December 2016.
Left, bottom map: Boundaries of the EBSAs described by the 9 regional workshops that were considered at COP12. Maps courtesy MGEL/Duke University.



A review of the impacts of fisheries on open-ocean ecosystems

G. Ortuño Crespo & D. C. Dunn, Duke University

The detrimental effects of industrialised fishing on the marine environment have long been recognised, mostly as a result of witnessing fish stock declines and observable changes to the seabed after trawling. Emerging evidence suggests that such effects extend far beyond our limited view of the ecosystem, impacting non-target species through destabilised foodwebs, reducing the resilience of communities, and even altering the genetic make-up and behaviour of populations. Here we review current knowledge on how fishing practices can affect the marine ecosystem in ways more subtle than previously thought.

There is now a general consensus amongst scientists, fishermen and politicians that industrial fishing practices represent one of the largest sources of impact on biodiversity in the ocean. Consequently, there has been much deliberation about whether fisheries management measures should be incorporated into laws ensuring the sustainable use of biodiversity, both in national waters and in the high seas (referred to in law as areas beyond national jurisdiction (ABNJ)). At present, there are high-level conversations taking place amongst stakeholders in the marine environment (i.e., representatives from maritime industries, national governments, intergovernmental organisations and NGOs) to formulate an international legally binding instrument under the United Nations Convention on the Law of the Sea (UNCLOS) for the conservation of the living resources of the high seas, giving particular attention to the effects of species associations with – or dependent upon – harvested species. It is our firm belief that the full extent of the effects of fishing on the ocean ecosystem ought to be considered in these discussions. To this end, we have collated

and reviewed present knowledge on the interconnectivity of marine ecosystem processes and how such processes are affected by fishing.

Up until the 1960s, the high seas were one of the last frontiers of exploitation by the fishing industry, as technological constraints rendered them operationally inaccessible at a profitable level. As fishing technology advanced, open-ocean fisheries expanded through the 1980s and 1990s, soon reaching a peak, followed by a plateau and eventually a decline in global fish catches. Now, while catches remain at best stagnant, fishing effort continues to grow, especially in the high seas beyond areas under national jurisdiction. During this same period, scientific exploration and research in the high seas has lagged behind industry, thus limiting our understanding of what effects such intense and widespread fishing activity is having on the marine ecosystem.

Our review has revealed that the impacts of fishing on the marine environment occur across three distinct yet interrelated scales: species, communities and the entire ecosystem. Species are nested within broader communities, which are comprised of multiple interacting species. In turn, communities are the living component of ecosystems, which also encompass the non-living components of the environment. Changes to one component, such as the removal of a predator or the permanent alteration of the seabed, will have knock-on effects on the rest of the ecosystem. It is generally accepted that the greater the diversity of species within a community, the more resilient that community is to change, as any alteration (physical or biological) to the prevailing state of equilibrium within the ecosystem can usually be compensated for by another member of that community, up to a point. That capacity for resilience of a community to carry on performing its various functions is often referred to as ecosystem health.

Organisms most affected by industrialised fishing practices are fish, sea turtles, seabirds, marine mammals and sharks. Many species belonging to these groups are migratory, with distributions that straddle multiple jurisdictional boundaries. This makes them particularly vulnerable to overfishing, as managing their stocks is a multinational endeavour, with inevitable variability in harvest control rules amongst parties and an increased risk of illegal, unreported and unregulated fishing. In 2011, the FAO estimated that these so-called straddling stocks were overfished or experiencing overfishing at a rate twice that of stocks within national jurisdictions (64%



vs 29%). Similarly, an assessment of the 48 highly mobile fish stocks managed by the world's 18 regional fisheries management organisations (RFMOs) concluded that 67% of these were either overfished or depleted; all of them are open-ocean species. Specific examples abound. According to a dedicated international scientific committee, Pacific bluefin tuna (*Thunnus orientalis*) have declined 96% within their range. Other studies have indicated very strong (99%) declines for oceanic whitetip sharks (*Carcharhinus longimanus*) in parts of their range, as well as declines of other predatory species in the Northwest Atlantic.

The impact of fishing on marine species extends far beyond the species being targeted for capture. Incidental capture of non-target species in fishing gear, known as bycatch, can lead to unsustainable mortality of those species. In addition, discarded, lost or abandoned fishing gears can continue to kill animals that become trapped or entangled in it, the problem being termed 'ghost fishing'. High bycatch rates have been implicated in the collapse of many sea turtle populations. For example, Pacific loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) turtles accidentally caught in pelagic longline gear may have played a role in the severe decline (>80% and >95%, respectively) in the nesting populations of these species over the last 30 years. Similarly, all 22 species of albatross and 19 of 21 species of oceanic sharks and rays are listed as at least 'near threatened' on IUCN's Red List of Threatened Species, with bycatch cited as the main threat. Such reductions in abundance may translate to an increased risk of extinction. A recent report concluded that 36% of the 153 migratory or potentially migratory species of sharks and rays are threatened with extinction. Declines for species like the oceanic whitetip shark (*Carcharhinus longimanus*) are thought to be as high as 99% in parts of their range. Moreover, the targeted harvest of adult individuals – of higher economic value – has a significant negative impact on the population, as larger adults produce a greater proportion of the offspring; this can lead to fluctuations in abundance that can lead to a population crash.



The excessive exploitation of target and non-target species can result in a significant loss of genetic variation in those species. Genetic variation within populations is important, as it enables a species to adapt over generations to gradual changes in the environment. A severely reduced gene pool can compromise the ability of a population to adapt to future conditions. Fishing-induced genetic fluctuations within fished populations can increase the risk of extinction and decrease the rate of recovery of overfished stocks.

The removal of a large proportion of a population of a species may also have effects on the demographic profile of that species. The targeted removal of larger specimens from a population, for instance, may lead to changes in the average body mass of a species. A study in the tropical Pacific Ocean showed body mass reductions between 29 and 73% in 11 of the 12 species assessed. This type of fisheries-induced change may reduce yield, as well as reduce the overall reproductive potential of populations, decrease the recovery time of collapsed stocks and increase the variability in survivorship of the young in future generations. An altered demographic profile can also translate into a contraction in a species' geographic range. A recent study on the range-abundance relationship in exploited marine predators uncovered range contractions in 9 of the 13 species of tuna and billfish assessed. A reduction in the range of a predatory species may alter the balance in the predator-prey relationship within those communities where the predator has ceased to occur in high numbers. This can result in an uncontrolled increase in the population of prey species, and has potential consequences further down the food chain (i.e., it creates a trophic cascade). A comparative study of the tropical Pacific pelagic community between the 1950s and the 1990s found that the abundance of predatory species declined severely by a factor of 10 during that period, while that of prey species was either maintained or increased; the same trend was also observed for the mean body mass of the prey species. In the Eastern and Central North Pacific Ocean, the tuna fishery led to changes in the biological community,



Albatross caught on longline, Brazil. Image courtesy Projeto Tamar Brazil/Marine Photobank

reducing the abundance of large predatory species (the catch), which in turn caused an increase in the abundance of their prey (skipjack tuna). Several other studies have found similar trophic cascades as a result of declines in predator abundance.

In the pelagic realm, changes at the ecosystem level are mostly expressed as transitions from one stable state of equilibrium in a community to another. Such transitions represent a change in the stability and functioning of the ecosystem, and are known as regime shifts. Ample evidence supports the claim that regime shifts are more likely to occur when the resilience of an ecosystem is compromised. Evidence also suggests that the steep decline in abundance of some oceanic species, caused by decades of intense fishing activity, has reduced the biodiversity and altered the species composition of marine communities, both of which influence the resilience of marine ecosystems. The diversity, measured as species richness and density, of open ocean predators across all ocean basins has declined between 10 and 50% in recent decades. This trend is correlated with an increase in fishing pressure, while no trend was found between the reduction of diversity and changes in oceanographic conditions during the study period (1960s-1990s). It seems likely that these observed ecosystem-level changes are caused by the cumulative effects of fishing-induced changes in the biological community and climate-dependent fluctuations of the system. Two regime shifts described in the North Sea (1983-1993 & 1993-2003) involved a change in the productivity of the biological community, which was more susceptible to change by variations in climate during

those times. Similar evidence is also available from pelagic systems in large inland seas.

Several of the impacts described above have been identified as factors that can lead to an increase in the susceptibility of exploited species to predicted changes in global climate. Altered population structures, decreased species ranges, diminished genetic diversity within species, unstable predator-prey relationships, and climate-dependent fluctuations in stable ecosystem states could all conspire against the maintenance of biodiversity, productivity and sustainable exploitation of the high seas.

Given their life history characteristics, distribution patterns and the challenges in their management across international borders, migratory oceanic species are more vulnerable to overfishing than previously thought. With the synergies between all the impacts described, the interconnectivity and interdependence between species, populations and ecosystems, and the potential for regime shifts that may be difficult if not impossible to reverse or mitigate (e.g., those caused by global climate change), it is imperative that management schemes are developed to minimise the adverse outcomes of such scenarios.

This article is based on a review by Guillermo Ortuño Crespo & Daniel C. Dunn (Duke University), currently under review by the ICES Journal of Marine Science.



Grey Nurse Shark with hook and long wire trace. Image courtesy Mark Gray/Marine Photobank

First workshop to identify Important Marine Mammal Areas

Erich Hoyt and Giuseppe Notarbartolo di Sciara, Tethys Institute

The first ever workshop to identify Important Marine Mammal Areas (IMMAs) concluded on 28 October 2016 in Chania, Greece, resulting in the identification of 41 candidate IMMAs in the Mediterranean region. The candidate IMMAs identified range in size from 50 km² for species such as the Mediterranean monk seal, to over 134,000 km² across the Ligurian Sea and Northwest Mediterranean for fin and sperm whales. Candidate IMMAs were proposed for nine marine mammal species from a total of 11 being evaluated by the participating experts. Some of the identified candidate IMMAs feature multiple species of marine mammals.

IMMAs are a new tool for conservation modelled on the concept of Important Bird and Biodiversity Areas (IBA). IMMAs are defined as discrete portions of habitat, important to marine mammal species, that have the potential to be delineated and managed for conservation. IMMAs are an advisory expert-based classification, and have no legal standing as MPAs but are intended to be used in conservation planning by governments, intergovernmental organisations, conservation groups, and the general public. Some IMMAs may become part of future MPA or zoned protection areas, while others will be valuable for marine spatial planning (MSP) or to monitor areas for climate change, bycatch, noise, shipstrike and other threats faced by marine mammals. In some cases, IMMAs may reveal that existing MPAs, management zones or protection measures may have to be altered based on new emerging evidence. Because of their high visibility relative to non-surfacing sea-dwellers, marine mammals, like seabirds, are important indicator species for assessing ecosystem health and biodiversity. They are also considered ‘umbrella species’, as their protection also covers that of many other less conspicuous species that share their habitat.

The 5-day workshop was organised by the IUCN Marine Mammal Protected Areas Task Force and sponsored by the MAVA Foundation. There were 34 expert participants from 18 countries including Albania, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Morocco, Slovenia, Spain, Syria, Tunisia, Turkey and the United Kingdom. Malta, Duke University and UNEP’s World Conservation Monitoring Centre attended as observers. ACCOBAMS – the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area – joined the Task Force as a Partner, helping with the organisation along with the Tethys Research Institute.

Participants considered many areas of interest which were submitted to the workshop by themselves and by the wider

marine mammal research and conservation community. At the end of the workshop, participants agreed that 41 candidate IMMAs should be proposed based on the best evidence available. These are to be submitted to an independent review panel who will assess whether the criteria were applied correctly and verify that the available supporting evidence was sufficient to support each of them. If approved, the boundaries and supporting evidence will be made available on the Task Force website. Areas of interest identified by experts that were not proposed as candidate IMMAs will be used to assist with highlighting reference areas for further marine mammal research, which will help build an evidence base on which future IMMAs may be proposed.



Gerick Bergsma 2009/Marine PhotoBank

The Task Force is already making plans for a series of IMMA workshops in the southern hemisphere, funded as part of the GOBI project in collaboration with the German Government’s International Climate Initiative (IKI). The next workshop will cover the South Pacific Ocean and will be held in Apia, Samoa, in March 2017. From 2018-2021, further workshops will bring together marine mammal experts from the Northeast Indian Ocean, the Northwest Indian Ocean, the Southeast Pacific Ocean and the waters of Australia-New Zealand and adjacent waters of Oceania. Other Task Force sponsors for the IMMA preparatory work have included Tethys Research Institute, Whale and Dolphin Conservation, Animal Welfare Institute, and the Eulabor Institute.

For more information about the IUCN Marine Mammal Protected Areas Task Force and the IMMA Project, see the Task Force website (<http://www.marinemammalhabitat.org>).

Accelerating progress towards the Aichi Biodiversity Targets

Sustainable Ocean Initiative Global Dialogue with Regional Seas Organizations and Regional Fisheries Bodies (Seoul, republic of Korea, 26-28 September 2016)

David Johnson, GOBI Coordinator

The aim of this meeting was to explore opportunities for strengthening collaboration at the regional scale to accelerate progress towards the Aichi Biodiversity Targets, in particular targets 6, 10 and 11, and relevant Sustainable Development Goals, in particular goal 14. The recently released UNEP Regional Oceans Governance report (see page 15) provided useful background to the discussions.

The meeting was convened by the Secretariat of the Convention on Biological Diversity in collaboration with the United Nations Environment Programme, the Food and Agriculture Organization of the United Nations, the Secretariat of the North East Atlantic Fisheries Commission, the Secretariat of the Nairobi Convention, the IUCN-CEM-Fisheries Expert Group and the Global Ocean Biodiversity Initiative (GOBI). The organisation of this meeting was financially supported by the Government of the Republic of Korea, through the National Marine Biodiversity Institute of Korea (MABIK), the Korea Maritime Institute and the Korea Marine Environment Management Corporation, as well as the Government of Japan, through the Japan Biodiversity Fund, and the European Commission.

In particular the meeting sought to highlight several topics, including: (i) ways to accelerate progress towards achieving the Aichi Targets, (ii) exchange of regional experiences (Ecosystem Approach, Environmental Impact Assessment, Area-Based

Management Tools), (iii) indicators for state of the environment reporting, and (iv) cooperation lessons (e.g., between Regional Seas Conventions and Regional Fisheries Bodies).

Key discussions focused on scientific collaboration and cooperation at regional scale, as well as on indicators and tools to enhance progress in achieving Aichi Biodiversity targets and SDGs at regional scale. It was recognised that regional coordination in turn also depends on effective national coordination. Participants explored opportunities for future collaboration, information sharing and exchange of experiences. Respective mandates were emphasized by participants as well as diversity of experiences, challenges, priorities and capacities. Participants also noted the supportive roles played by scientific organisations and Large Marine Ecosystem Projects. The meeting recognised the need to achieve integrated assessments whilst at the same time effectively managing reporting burdens by, for example, adopting simple agreed standardised reporting metrics. Of particular interest were topics of common interest such as MPAs and fisheries, bycatch mitigation, ecosystem management approaches and data sharing.

For GOBI these discussions were directly relevant to how new scientific information and assessments can best enhance descriptions of EBSAs and identify Vulnerable Marine Ecosystems (VMEs). A recognised strength of the EBSA regional workshops has been the opportunity to share scientific information, acknowledging the broad range of information being produced by respective regional organisations. Global information, such as information in the Ocean Biogeographic Information System (OBIS), and regionally owned information has been synthesised in the context of the EBSA criteria. The EBSA process is also taking steps to facilitate incorporation of traditional knowledge.

A series of theme presentations to illustrate how global processes and initiatives can better support regional collaboration included a GOBI presentation showing how various governments and regional initiatives are using EBSA descriptions to inform area-based management initiatives. Information was also presented on the Global Ocean Observing System (GOOS) Biology and Ecosystems Panel, which has proposed a suite of Essential Ocean Variables to streamline and improve sampling strategies. The meeting underlined

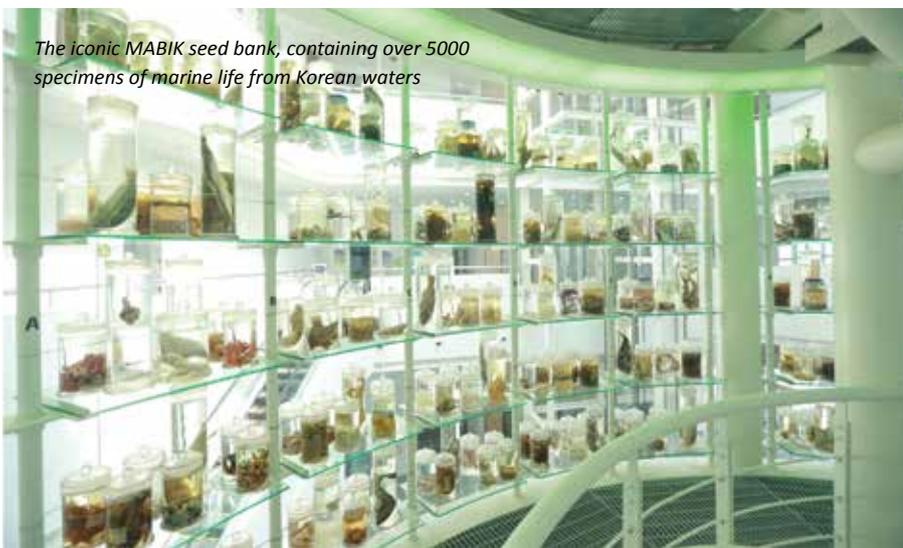


the importance of partnerships such as these and expressed interest in sharing lessons learned at the forthcoming High-Level UN Conference to Support the Implementation of SDG 14 (June 2017, New York). The Government of the Republic of Korea expressed interest in continuing to organize a global forum for periodically sharing inter-regional experiences.

In the margins of the meeting, MABIK hosted a partnership luncheon meeting to explain their organisation and its remit. GOBI partners were among guests invited to explore synergies and exchange information. MABIK is a government-sponsored agency based in Choongnam Province, Seocheon City (adjacent to the West Sea). It conducts research to enhance

conservation of marine bio-resources and wishes to provide the general public with high-quality exhibition and educational programmes for nurturing ocean literacy. Of most interest to GOBI partners were biodiversity management tasks, including the application of mapping techniques for biodiversity change, and policy advice and international cooperation tasks. At MABIK a symbolic icon is an impressive seed bank (pictured below) displaying more than five thousand specimens of marine life collected from Korean waters.

A report of the meeting is available to download from the CBD website at: <https://www.cbd.int/doc/meetings/mar/soiom-2016-01/official/soiom-2016-01-outcome-en.pdf>



The iconic MABIK seed bank, containing over 5000 specimens of marine life from Korean waters



Conserving the other 50% of the planet: status and opportunities in conservation of areas beyond national jurisdiction

by Daniel Dunn, Duke University

In June of 2015, the UN General Assembly adopted a resolution to establish a Preparatory Committee (PrepCom) to begin negotiations on a new legally-binding instrument for the conservation and sustainable use of marine biological diversity beyond national jurisdictions (BBNJ). This consensus resolution marked both the culmination of a herculean 10-year effort to bring this topic to the floor of the UNGA and, at the same time, the first step in a larger process. The negotiations that have ensued and that will continue over the next year set the stage for the conservation of biodiversity in the 50% of the planet's surface that lies beyond the influence of national jurisdictions. They also represent an enormous opportunity to inform conservation policy and effect change. Beyond the scope and principles to underlie the new treaty, the package of issues under discussion at the PrepCom include: (i) access and benefit sharing of marine genetic resources, (ii) area-based management tools, (iii) environmental impacts assessments, and (iv) technology transfer and capacity development.

In a focus group held in conjunction with the fourth International Marine Conservation Congress (IMCC4) this past July in St. John's, Newfoundland, we examined the status and opportunities for conservation in areas beyond national jurisdiction (ABNJ) by reviewing new scientific findings and current sectoral efforts to conserve biodiversity. Organized by Duke University, UNEP-WCMC, and the University of the Azores, the objectives of the focus group were to synthesise existing scientific research into consensus statements and recommendations that may inform the BBNJ negotiations, and to develop the capacity and interest of the research community and local and indigenous knowledge holders to contribute to and inform the BBNJ negotiations. Through the support of the Nippon Foundation Nereus Program, the Pew Charitable Trusts and GOBI, as well as many self-funded participants, the organisers were able to bring together over 40 experts to discuss 'Conserving the other 50% of the planet: status and opportunities in conservation of areas beyond

national jurisdiction.' Sessions covered the background policy context, anthropogenic impacts in ABNJ, Environmental Impact Assessments, area-based management tools in ABNJ, two sessions on data for EIAs and area-based management of ABNJ, and a final session on new directions for technology transfer and capacity building.

IMCC4 preceded the second meeting of the BBNJ PrepCom by three weeks. The main objective of the focus group was to develop one or more high-level policy briefs describing the status and opportunities for the conservation and sustainable use of ABNJ for that PrepCom meeting. In the end, hundreds of copies of six policy briefs (see below) were distributed at the PrepCom meeting and at many side events. The briefs and the presentations given at the focus group were also summarized at an IMCC symposium and in three presentations at PrepCom side events organized, respectively, by the International Oceanographic Commission (IOC), GOBI and one co-organised by the Sasakawa Peace Foundation and the IUCN. The policy briefs and presentations had a strong impact, and text from both entered into interventions by both Parties and NGOs within hours of their distribution. Looking forward, the focus group plans to develop further policy briefs for the third meeting of the PrepCom to be held in spring 2017, focusing on issues of adjacency and impacts on the conservation of migratory species, and the role of migratory species in connecting indigenous peoples and local cultures to the areas beyond national jurisdiction. Opportunities to inform the upcoming sessions of the PrepCom abound, all GOBI partners are encouraged to identify topics that they might inform through the development of a short policy brief by looking at the list of areas of convergence and divergence promulgated by the chair of the PrepCom after its last session.

The policy briefs are available online at <http://www.nereusprogram.org/tag/Nereus-Scientific-&-Technical-Briefs-on-ABNJ-series/>



Hot off the press

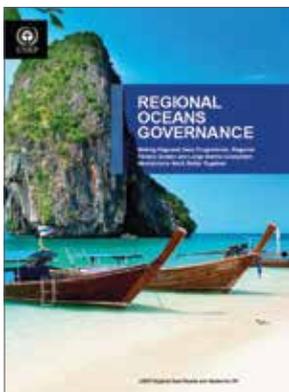
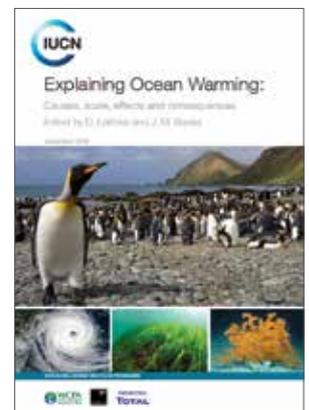


Special places in our oceans: An introduction to ecologically or biologically significant marine areas

A new brochure explaining the basic concept and objectives of the EBSA process has been created by a partnership of organisations working on marine conservation issues. Led by Blue Solutions (implemented by GIZ, GRID-Arendal, IUCN and UNEP and funded by BMUB) and with input from the CBD Secretariat, the GOBI Secretariat, the Sargasso Sea Commission and the Benguela Current Commission, the brochure provides a useful overview of the EBSA work and will be available at COP13.

Explaining Ocean Warming (IUCN, September 2016)

This report represents the most comprehensive review to date on ocean warming. It is the result of the work of several leading scientists from around the world and tells of the scale and nature of changes being driven by ocean warming, often in association with other stressors, such as ocean acidification and deoxygenation. It contains many recommendations on capability gaps and research issues that need to be resolved to tackle the impacts of ocean warming with greater confidence in the future. The focus of the report is on gathering facts and knowledge and communicating this to show what is now happening in and to the ocean. There is purposefully much less focus on political ramifications. The authors hope that the report will help stimulate further debate and action on such issues. Available at: https://portals.iucn.org/library/sites/library/files/documents/2016-046_0.pdf



Regional Oceans Governance (UNEP, May 2016)

The development of regional governance for the protection of the environment and its biodiversity is unquestionably a cornerstone of international environmental law and policy. This review of existing regional oceans governance mechanisms is intended to assist states that participate in such mechanisms, as well as those that considering participating, by clarifying the key distinctions between the mandates of these mechanisms, highlighting their successes and the challenges they face, and outlining cooperation between them. Options are identified for strengthening existing mechanisms and cooperation between them, as well as for the creation of new regional oceans governance mechanisms, with particular reference to the ecosystem approach. Available at: <https://www.cbd.int/doc/meetings/mar/soiom-2016-01/other/soiom-2016-01-unesp-06-en.pdf>

IUCN Marine News - 13th Edition (September 2016)

The 13th edition of the IUCN Global Marine and Polar Programme newsletter was published in September 2016. It compiles and presents in its usual authoritative and accessible way the latest marine and coastal news from around the Union. Also featured are global threats to marine biodiversity and ecosystem services, including the growing concerns about increases in plastic waste in the marine environment, the effects of ocean warming on marine mammals and on jellyfish, the emergent deep-sea mining industry, and the potential causes for the uncontrolled outbreaks of the crown of thorns starfish on coral reefs. In addition, it shines the spotlight on some impressive examples of capacity building and advocacy projects across the globe. Lastly, it presents a compilation of stunning images selected from entries to the IUCN GMPP Oceans Photographer of the Year competition 2016. Available at: https://www.iucn.org/sites/dev/files/marine_news13-web_2.pdf





Mami Wata Project: Enhancing marine management in West Africa through training and application

The marine and coastal environment of the African Atlantic coast is home to a range of biodiversity hotspots and highly productive ecosystems. These natural assets provide important services to Western, Central and Southern African communities and are essential to people's wellbeing. They also hold important livelihood opportunities and will continue to be fundamental for social and economic development. However, coastal and marine living resources and ecosystems are in widespread decline due to human activities.

The management of marine and coastal ecosystems is challenging for a range of reasons – the complexity of managing a high variety of potentially conflicting activities in an environment subject to constant change is one of them. Integrated Ocean Management brings together all relevant Government bodies, sectors and stakeholders is an approach for more effective and sustainable management. Mami Wata aims to strengthen national and regional action to capture the value of marine and coastal ecosystems through a dual approach, building capacity through training and applying State of Marine Environment Assessments (SoME), CBD Ecologically and Biologically Significant marine Areas (EBSA) and Marine Spatial Planning (MSP), in an IOM framework.

Mami Wata will be applied in the countries of the Abidjan Convention region, which covers 22 countries and a combined EEZ of approximately 4.8 million km² in size. It is funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, and implemented by GRID-Arendal, the Abidjan Convention Secretariat and UNEP. For more information, please visit the Mami Wata project website at <http://mamiwataproject.org>.



Right: Gorée Island, Senegal. Copyright © 2016 Mami Wata Project.



Global Ocean Biodiversity Initiative

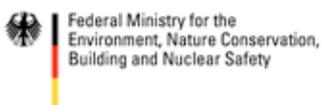
Working towards high seas conservation

The Global Ocean Biodiversity Initiative is an international partnership advancing the scientific basis for conserving biological diversity in the deep seas and open oceans. It aims to help countries, as well as regional and global organisations, to use and develop data, tools and methodologies to identify ecologically significant areas with an initial focus on the high seas and deep seabed beyond national jurisdiction.

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

For more information about GOBI please visit our website at www.gobi.org

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