Arctic Council/PAME Workshop, Washington DC, September 22-23, 2016

The role of MPAs and other area-based conservation measures for marine conservation in a changing world

Dan Laffoley

Senior Advisor, Marine Science & Conservation
Global Marine and Polar Programme, IUCN

Vice-Chair – Marine
IUCN's World Commission on Protected Areas

Paul Nicklen, SeaLegacy

Key elements

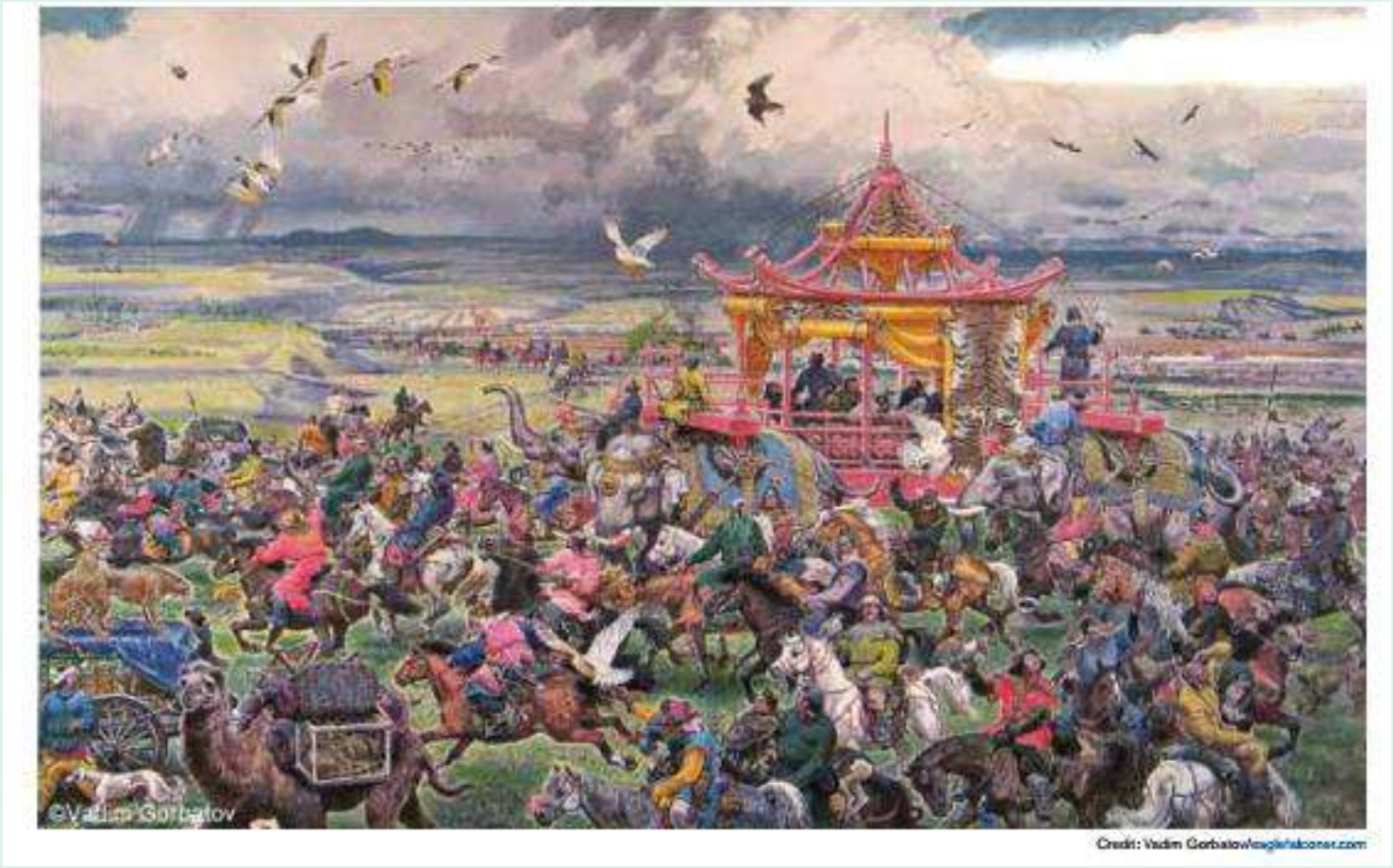
1. Current progress and existing MPA guidance

2. Challenges and ambition– update on IUCN's new ocean warming report

3. New CBD guidance on OECMs – other effective area based measures

4. Six concluding thoughts

Protecting the environment to realise benefits is not a new idea – cultural origins



Paradeisos - the origin of the word ‘paradise’, originally referring to a walled enclosure where wildlife was abundant and readily observed and procured

Courtesy of Raul Valdez

Protecting the ocean ‘seen’ as a more recent idea

The first MPA.

Royal National Park, part of which includes a large tidal inlet – located on the southern outskirts of Sydney and was designated in 1879.

The ‘proper’ MPA for ecosystems.

Fort Jefferson National Monument in Florida, a coastal marine site designated in 1935.

Marine Protected Areas – a key tool for ocean conservation and management

Eight major MPA benefits *from high protection levels*:

- maintaining or restoring ecosystem structure, function and integrity
- maintaining the abundance of important keystone species
- protecting habitats from physical damage of fishing and other human activities
- maintaining genetic integrity, and restoring population size, age structure and community composition
- protecting key ecological functions and processes e.g. food webs & trophic structure
- enhancing broad-scale ecosystem resilience to pressures
- providing ’insurance’ to mitigate any detrimental effects, especially in adjacent areas
- protecting areas that can provide reproductive ‘seed banks’ to promote recovery

MPA target revised in 2010

Target 11: By 2020.....10 per cent of coastal and marine areas.....are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and ..... integrated into wider landscape and seascapes

Target 6 – sustainable harvesting of fish by 2020

Target 8 – pollution control by 2020

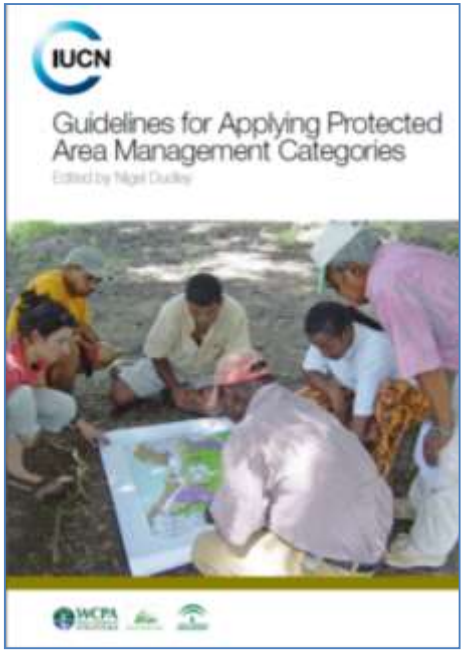
Target 9 – invasive alien species control by 2020

Target 10 – management of pressures on coral reefs by 2015

Target 15 – management of carbon stocks by 2020

Better clarity on what is a marine protected area?

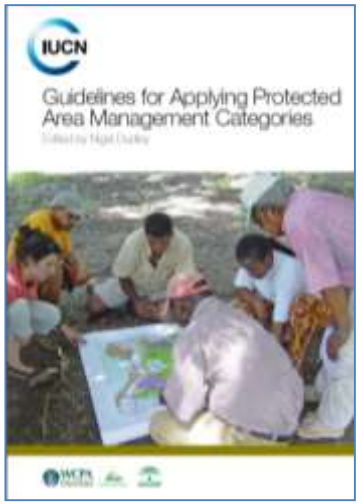
- Many terms, diverse meanings
- Huge variation in objectives and types of regulations
- Over 350 designation types globally



IUCN MPA guidance for the CBD

Primary purpose of the supplementary guidelines - **to increase the accuracy and consistency of assignment and reporting of the IUCN categories when applied to marine and coastal protected areas – as much for the MPA community as for other sectors**

To avoid unnecessary duplication of text, these supplemental guidelines must be read in association with the 2008 Guidelines



https://cmsdata.iucn.org/downloads/iucn_categoriesmpa_eng.pdf

IUCN categories

IUCN CATEGORY		MAIN OBJECTIVE OR PURPOSE
IA	Strict Nature Reserve	Managed mainly for science
IB	Wilderness Area	Managed mainly to protect wilderness qualities
II	National Park	Managed mainly for ecosystem protection and recreation
III	Natural Monument	Managed mainly for conservation of specific natural/cultural features
IV	Habitat/Species Management Area	Managed mainly for conservation through management intervention
V	Protected Landscape/ Seascape	Managed mainly for landscape/seascape conservation and recreation
VI	Managed Resource Protected Area	Managed mainly for the sustainable use of natural ecosystems

The definition of an MPA

IUCN revised definition of Protected Area (2008):

'A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values'

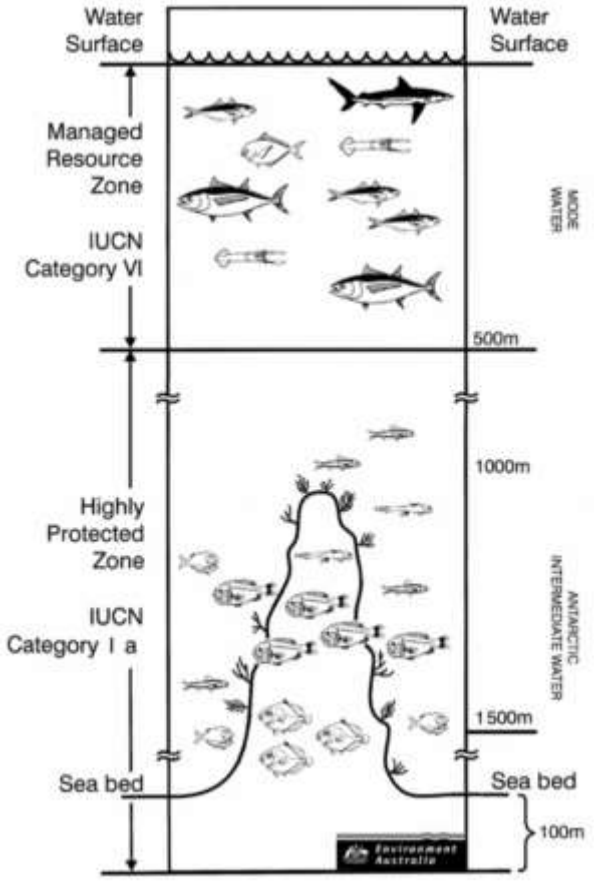
Phrase	Explanation provided in the 2008 Guidelines	Discussion and example of application in the marine realm
Clearly defined	*Clearly defined implies a spatially defined area with agreed and demarcated borders. These borders can sometimes be defined by physical features that move over time (e.g., river banks) or by management actions (e.g., agreed no-take*	This implies that MPAs must be mapped and have boundaries that are legally defined. However, while some MPAs can be clearly defined (e.g. an entire bay bounded by headlands), for others it may be difficult to
Geographical space	*Includes land, inland or a combination of t three dimensions, e.g protected area is pro marine protected are protected or the seab is not: conversely su protected (e.g., are o*	

Phrase	Explanation provided in the 2008 Guidelines	Discussion and example of application in the marine realm
Recognised	*Implies that protection can include a range of governance types declared by people as well as those identified by the state, but that such sites should be recognised in some way (in particular through listing on the World Database on Protected Areas – WDPA).*	**Example:** • The Government of Canada and the Council of the Haida Nation co-manage Gwaii Haanas National Park Reserve and Haida Heritage Site, and the Gwaii Haanas National Marine Conservation Area Reserve off the Pacific coast of Canada.
Dedicated	*Implies specific binding commitment to conservation in the long term, through e.g.:* • *International conventions and agreements* • *National, provincial and local law* • *Customary law* • *Covenants of NGOs* • *Private trusts and company policies* • *Certification schemes*	**Examples:** • The Ga under n Galapag • Vuetl Na area (LM declare
Managed	*Assumes some active steps to conserve the natural (and possibly other) values for which the protected area was established; note that "managed" can include a decision to leave the area untouched if this is the best conservation strategy.*	The requir marine an of MPA ma **Example:** • Bonaire Antilles users of
Legal or other effective means	*Means that protected areas must either be gazetted (that is, recognised under statutory civil law), recognised through an international convention or agreement, or else managed through other effective but non-gazetted, means, such as through recognised traditional rules under which community-conserved areas operate or the policies of established non-governmental organisations.*	As for terr include ag **Example:** • Dhimur and sea Gulf of Manage the Trad
… to achieve	*Implies some level of effectiveness – a new element that was not present in the 1994 definition but which has been strongly requested by many protected area managers and others. Although the category will still be determined by objective, management effectiveness will progressively be recorded on the WDPA and over time will become an important contributory criterion in identification and recognition of protected areas.*	As for terr of effective subject to **Example:** • The ass the Aida undertal project provide objectiv
Long term	*Protected areas should be managed in perpetuity and not as short term or a temporary management strategy.*	As with ter (over time for effectiv an area fo whale bree biodiversit conservati Seasonal a useful co **Examples** • The Co New Ze for the n shellfish • In the M Australi the use each ye area for

Phrase	Explanation provided in the 2008 Guidelines	Discussion and example of application in the marine realm
Conservation	*In the context of this definition conservation refers to the in situ maintenance of ecosystems and natural and semi-natural habitats and of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties*	**Examples:** • Ecological Reserves in the Florida Keys National Marine Sanctuary in the United States are designed to provide natural spawning and nursery areas for the replenishment and genetic protection of marine life and aim to protect and preserve all habitats and species found throughout the Sanctuary. • The inclusion of a minimum of 20% of all 70 bioregions within Australia's Great Barrier Reef Marine Park is designed to provide in situ protection of representative examples of all species and ecosystem processes.
Nature	*In this context nature always refers to biodiversity, at genetic, species and ecosystem level, and often also refers to geodiversity, landform and broader natural values.*	All protected areas, whether terrestrial or marine should aim to protect all the features of conservation importance within their boundaries. **Example:** • The overall objective of the Great Barrier Reef Marine Park is to provide for the long term protection and conservation of the **environment, biodiversity and heritage values** of the Great Barrier Reef Region.
Associated ecosystem services	*Means here ecosystem services that are related to but do not interfere with the aim of nature conservation. These can include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits.*	MPAs provide a wide range of ecosystem services: **Examples:** • Ecosystem services: The MPA network in Belize has been estimated to contribute nearly US$20 million annually in reef-related visitor expenditure. • Regulating ecosystem services, for example seagrass meadows, mangroves and kelp forests as carbon sinks: The four MPAs designated by the Malta Environment and Planning Authority to protect Malta's *Posidonia* (seagrass) beds together protect over 80% of this habitat in Malta. Areas set up for wave/wind power are generally NOT MPAs (see section 2.3).
Cultural values	*Includes those that do not interfere with the conservation outcome (all cultural values in a protected area should meet this criterion), including in particular:* • *Those that contribute to conservation outcomes (e.g., traditional management practices on which key species have become reliant)* • *Those that are themselves under threat.*	Areas set aside for cultural values are only protected areas under the IUCN definition, if they have nature conservation as a primary aim. However, many MPAs contain sacred sites or have significant cultural and heritage value and understanding of this is important. **Examples:** • Nosy Ve, an island in southern Madagascar protected under a local 'dina' agreement is both a sacred site and an area important for corals and as a tropic bird nesting colony. • Papahanaumokuakea Marine National Monument in the North West Hawaiian Islands is important for Native Hawaiians at genealogical, cultural, and spiritual levels.

Advice on a range of issues

Governance types / Protected area categories	A. Governance by government			B. Shared governance			C. Private governance			D. Governance by indigenous peoples and local communities	
	Federal or national ministry or agency in charge	Sub-national ministry or agency in charge	Government-delegated management (e.g., to an NGO)	Transboundary management	Collaborative management (various forms of pluralist influence)	Joint management (pluralist management board)	Declared and run by individual land-owners	... by non-profit organizations (e.g., NGOs, universities)	... by for-profit organizations (e.g., corporate owners, cooperatives)	Indigenous peoples' protected areas and territories – established and run by indigenous peoples	Community conserved areas – declared and run by local communities
Ia. Strict Nature Reserve											
Ib. Wilderness Area											
II. National Park											
III. Natural Monument											
IV. Habitat/ Species Management											
V. Protected Landscape/ Seascape											
VI. Protected Area with Sustainable Use of Natural Resources											



Relationship between different categories and different activities

Table 5: Matrix of marine activities that may be appropriate for each IUCN management category.

Activities	Ia	Ib	II	III	IV	V	VI
Research: non-extractive	Y*	Y	Y	Y	Y	Y	Y
Non-extractive traditional use	Y*	Y	Y	Y	Y	Y	Y
Restoration/enhancement for conservation (e.g. invasive species control, coral reintroduction)	Y*	*	Y	Y	Y	Y	Y
Traditional fishing/collection in accordance with cultural tradition and use	N	Y*	Y	Y	Y	Y	Y
Non-extractive recreation (e.g. diving)	N	*	Y	Y	Y	Y	Y
Large scale low intensity tourism	N	N	Y	Y	Y	Y	Y
Shipping (except as may be unavoidable under international maritime law)	N	N	Y*	Y*	Y	Y	Y
Problem wildlife management (e.g. shark control programmes)	N	N	Y*	Y*	Y*	Y	Y
Research: extractive	N*	N*	N*	N*	Y	Y	Y
Renewable energy generation	N	N	N	N	Y	Y	Y
Restoration/enhancement for other reasons (e.g. beach replenishment, fish aggregation, artificial reefs)	N	N	N*	N*	Y	Y	Y
Fishing/collection: recreational	N	N	N	N	*	Y	Y
Fishing/collection: long term and sustainable local fishing practices	N	N	N	N	*	Y	Y
Aquaculture	N	N	N	N	*	Y	Y
Works (e.g. harbours, ports, dredging)	N	N	N	N	*	Y	Y
Untreated waste discharge	N	N	N	N	N	Y	Y
Mining (seafloor as well as sub-seafloor)	N	N	N	N	N	Y*	Y*
Habitation	N	N*	N*	N*	N*	Y	N*

Key:

No	N
Generally no, unless special circumstances apply	N*
Yes	Y
Yes because no alternative exists, but special approval is essential	Y*
* Variable; depends on whether this activity can be managed in such a way that it is compatible with the MPA's objectives	*

Compatibility of fishing and collecting activities and management categories

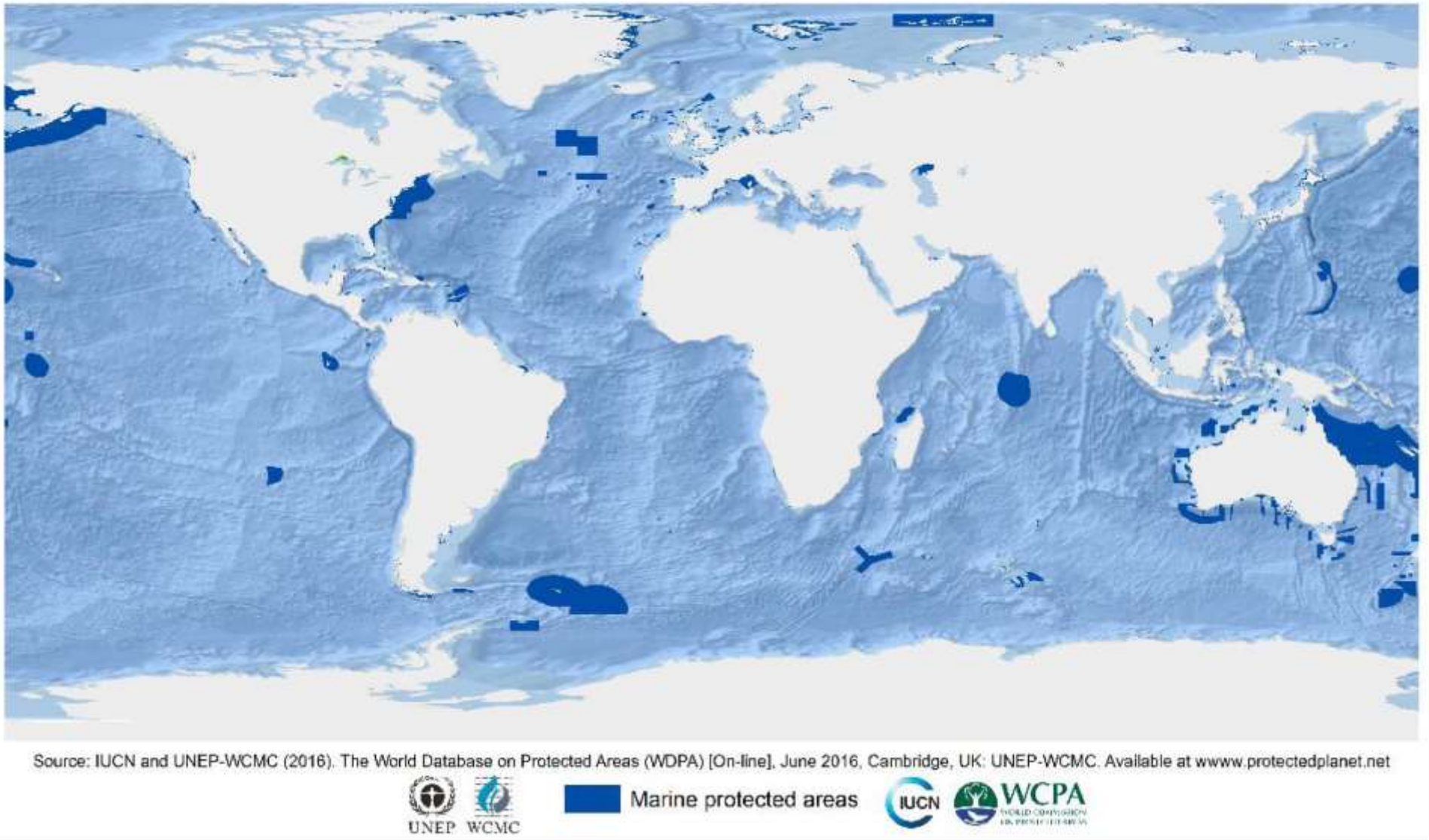
Table 6: Compatibility of fishing/collecting activities in different management categories – a preliminary assessment.

IUCN category	Long term and sustainable local fishing/ collecting practices	Recreational fishing/ collecting	Traditional fishing/ collecting	Collection for research
Ia	No	No	No	No*
Ib	No	No	Yes**	Yes
II	No	No	Yes**	Yes
III	No	No	Yes**	Yes
IV	Variable#	Variable#	Yes	Yes
V	Yes#	Yes	Yes	Yes
VI	Yes#	Yes	Yes	Yes

Key:

*	any extractive use of Category Ia MPAs should be prohibited with possible exceptions for scientific research which cannot be done anywhere else.
**	In Categories Ib, II and III MPAs traditional fishing/collecting should be limited to an agreed sustainable quota for traditional, ceremonial or subsistence purposes, but not for purposes of commercial sale or trade.
#	whether fishing or collecting is or is not permitted will depend on the specific objectives of the MPA.

The Official Marine Protected Areas map

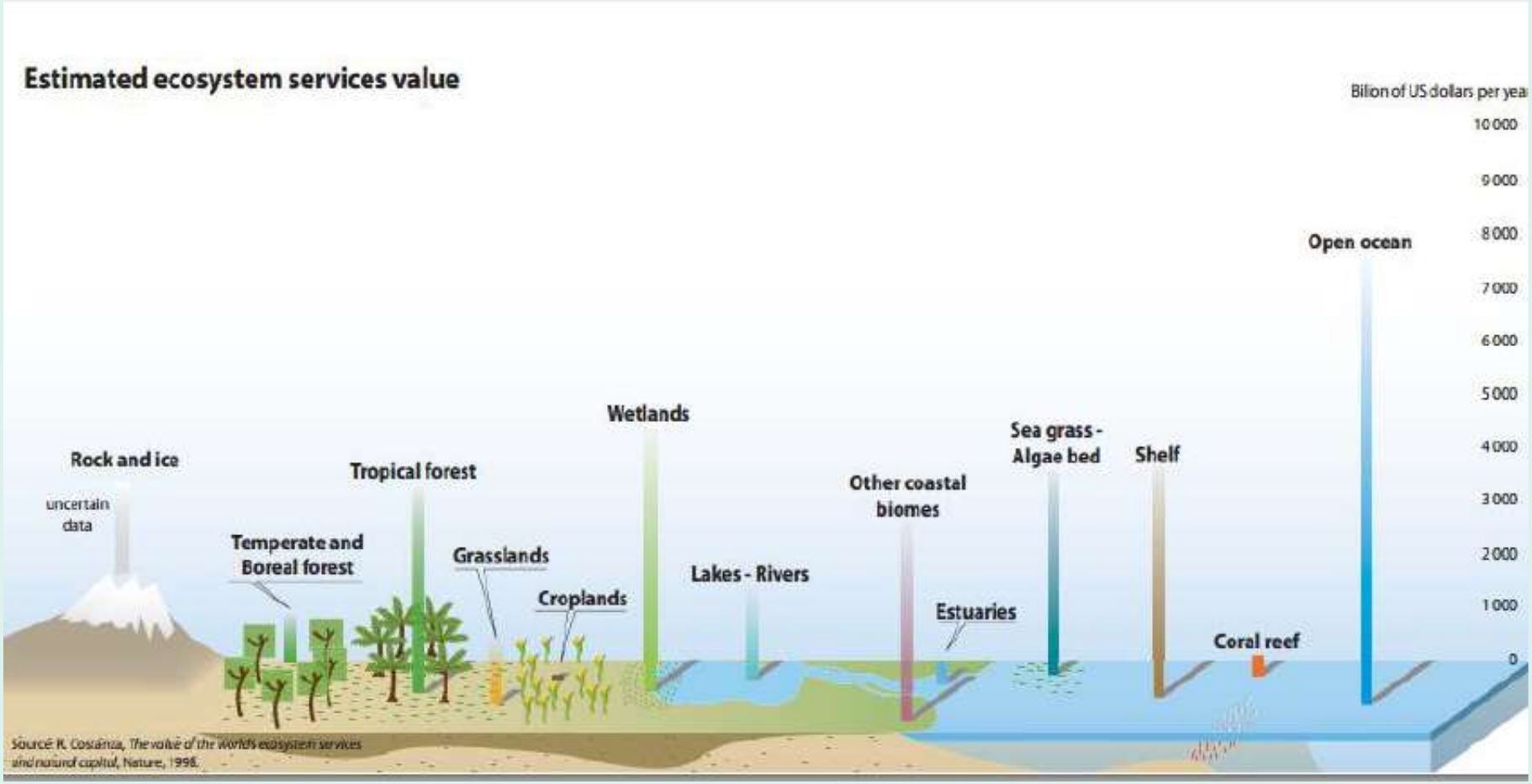


% coverage of national waters (Territorial seas + EEZ) 11.55%
% coverage of global waters: 4.6%

As of 13/09/2016

Ocean health matters: ecosystem-based solutions

"*protecting biodiversity and the essential ecosystem services it supports has become a priority for the scientific community, resource managers, and national and international policy agreements…*" (Selig et al, 2014)



Courtesy GRID-Arendal

FACTORS AFFECTING RESILIENCE

HERBIVORY
Herbivorous fish control algal overgrowth

CORAL RECRUITMENT
Juvenile corals are the new generations

SUBSTRATE QUALITY
Stable substrate for new coral larvae to settle and grow

HIGHER WATER QUALITY
Nutrients and pollution increase algal overgrowth

BIODIVERSITY
More species performing ecological functions = Higher resilience

REFUGES
Habitat diversity = More areas to reseed

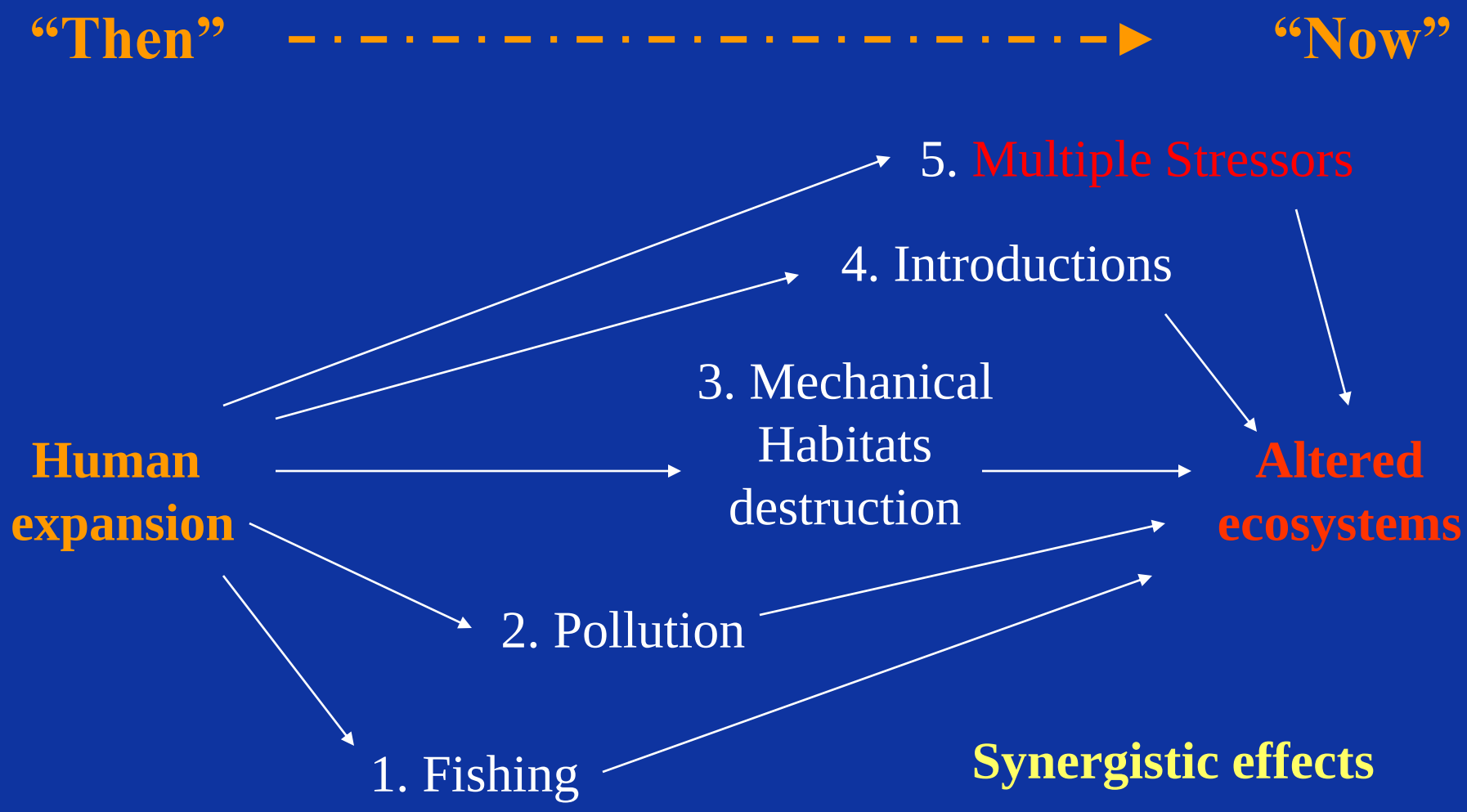
ANTHROPOGENIC PRESSURES
Lower disturbance = Higher resilience

Source: US AID infographic, Maldives Project

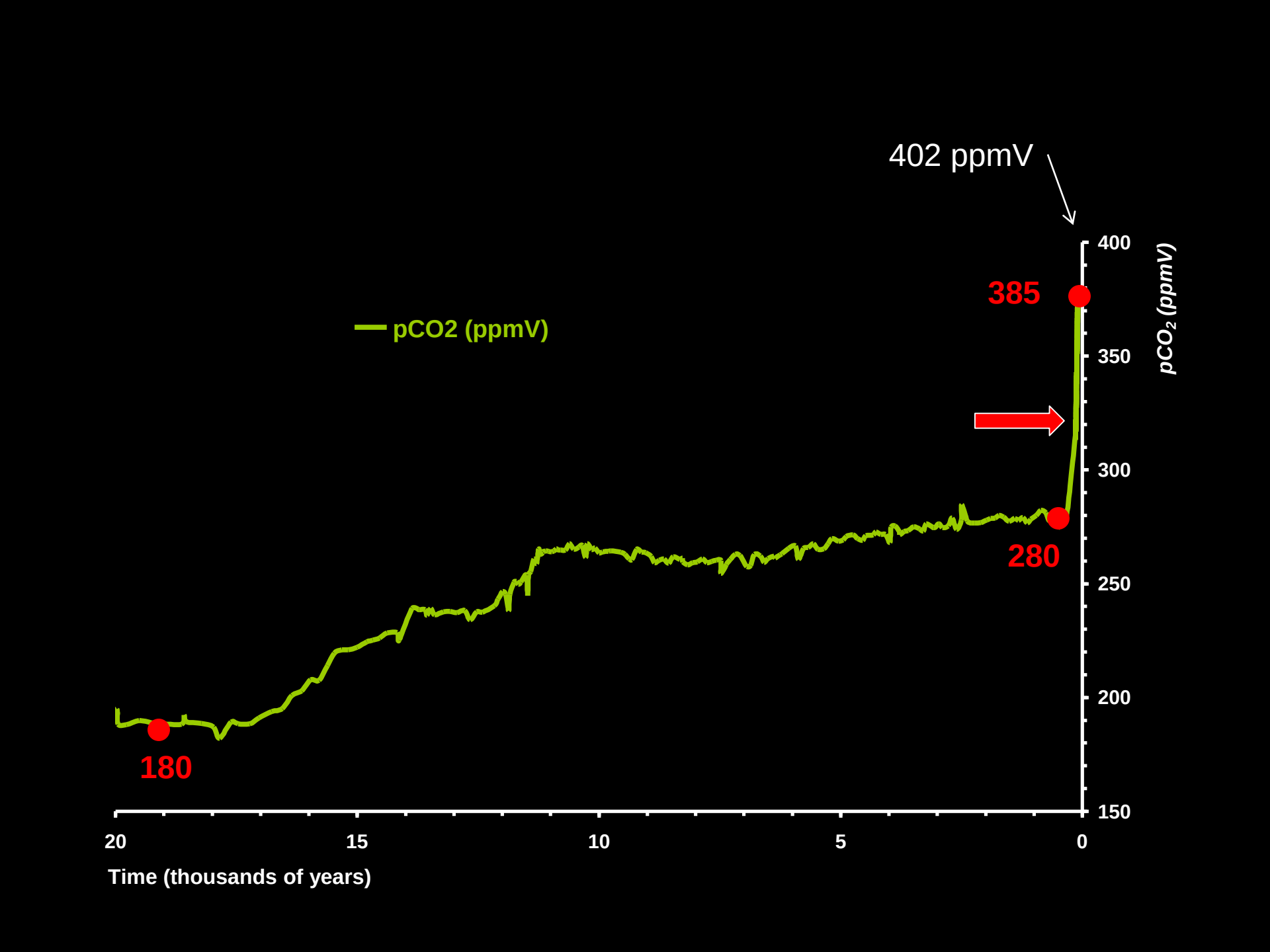
IUCN's Green List of Protected Areas

- Promoting success and achievement in biodiversity conservation outcomes
- Recognizing exemplary efforts that meet and exceed international standards
- Help partners achieve quality

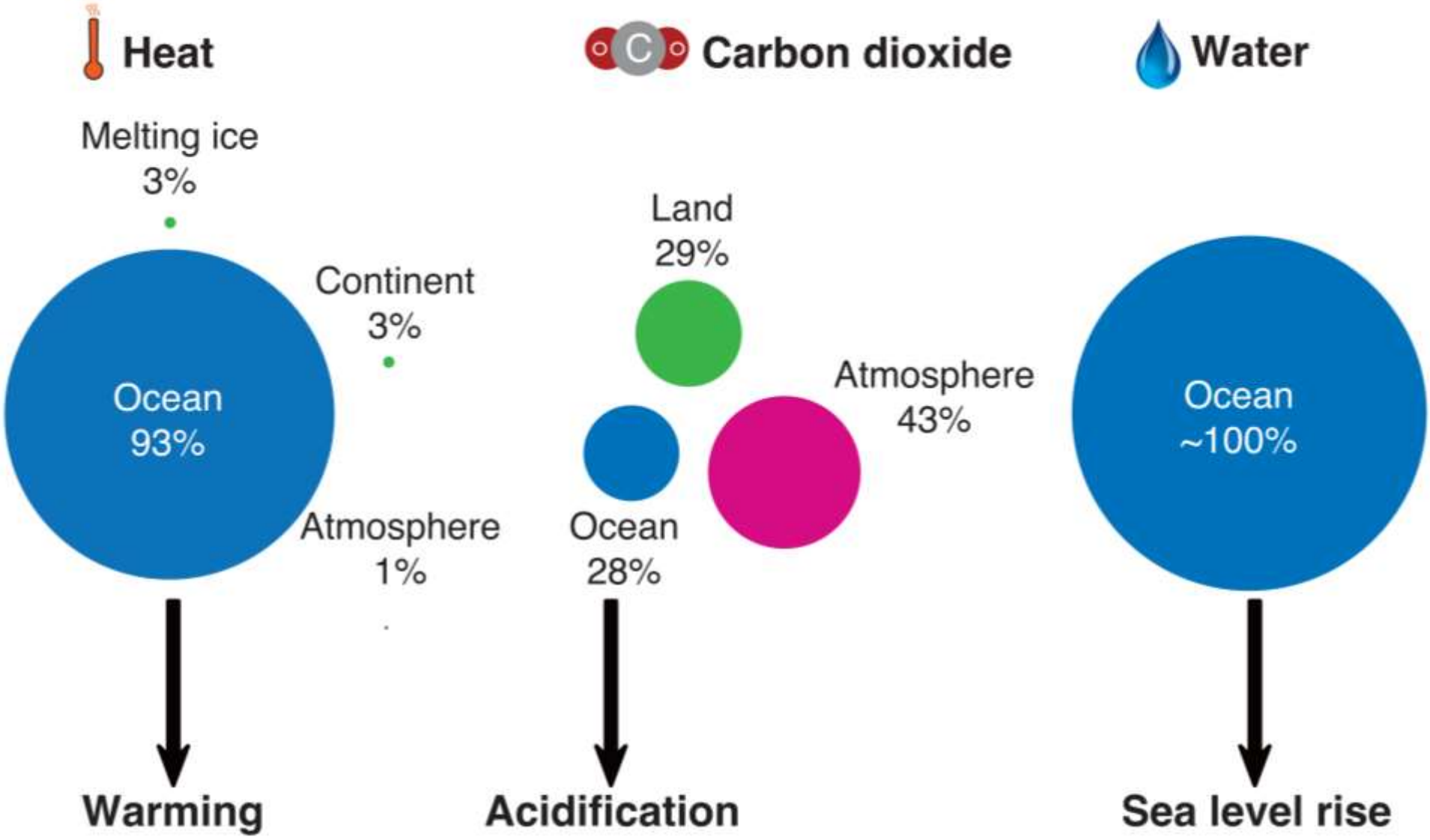
The Ocean: the future we may get



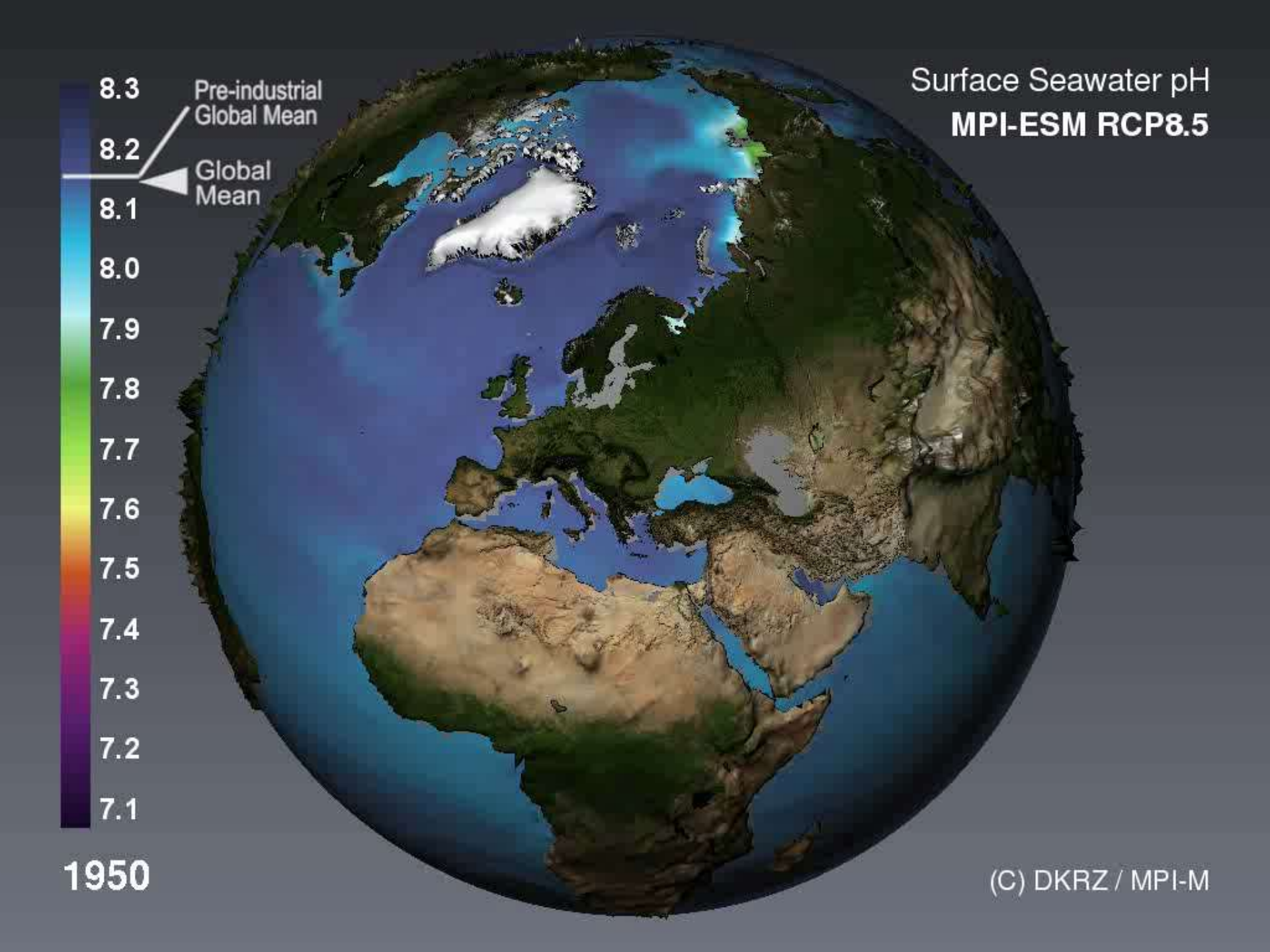
Adapted from Jackson, 2001


402 ppmV
385
280
180
pCO2 (ppmV)
400
350
300
250
200
150
pCO2 (ppmV)
20
15
10
5
0
Time (thousands of years)

The importance of protecting the ocean



Slide courtesy of Jean-Pierre Gattuso

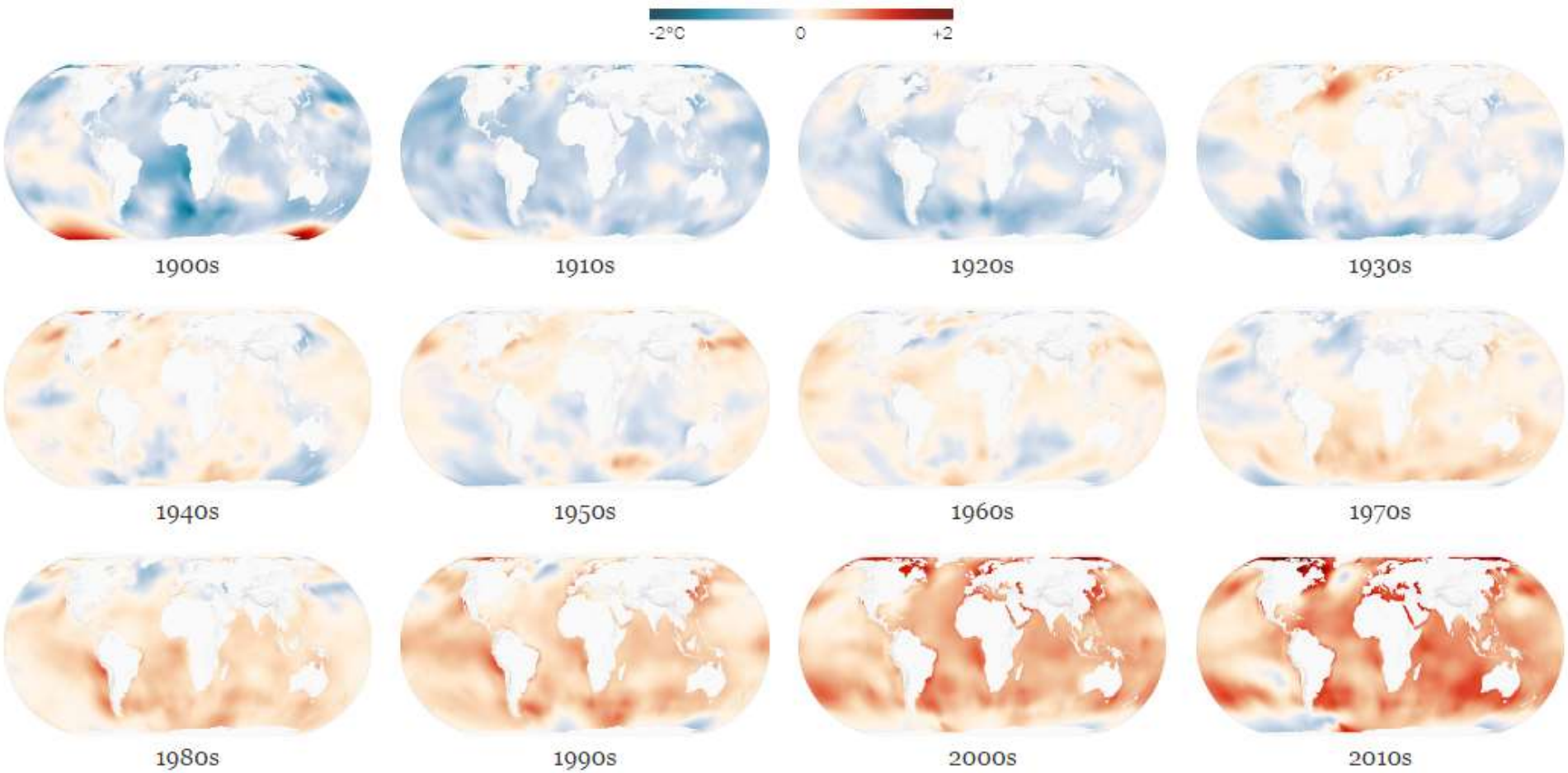

Surface Seawater pH
MPI-ESM RCP8.5
8.3
8.2
8.1
8.0
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
Pre-industrial Global Mean
Global Mean
1950
(C) DKRZ / MPI-M

TAXA	RESPONSE	MEAN EFFECT
 Calcifying algae	Survival	
	Calcification	
	Growth	
	Photosynthesis	–28%
	Abundance	–80%
 Corals	Survival	
	Calcification	–32%
	Growth	
	Development	
	Abundance	–47%
 Coccolithophores	Survival	
	Calcification	–23%
	Growth	
	Photosynthesis	
	Abundance	
 Molluscs	Survival	–34%
	Calcification	–40%
	Growth	–17%
	Development	–25%
	Abundance	
 Echinoderms	Survival	
	Calcification	
	Growth	–10%
	Development	–11%
	Abundance	

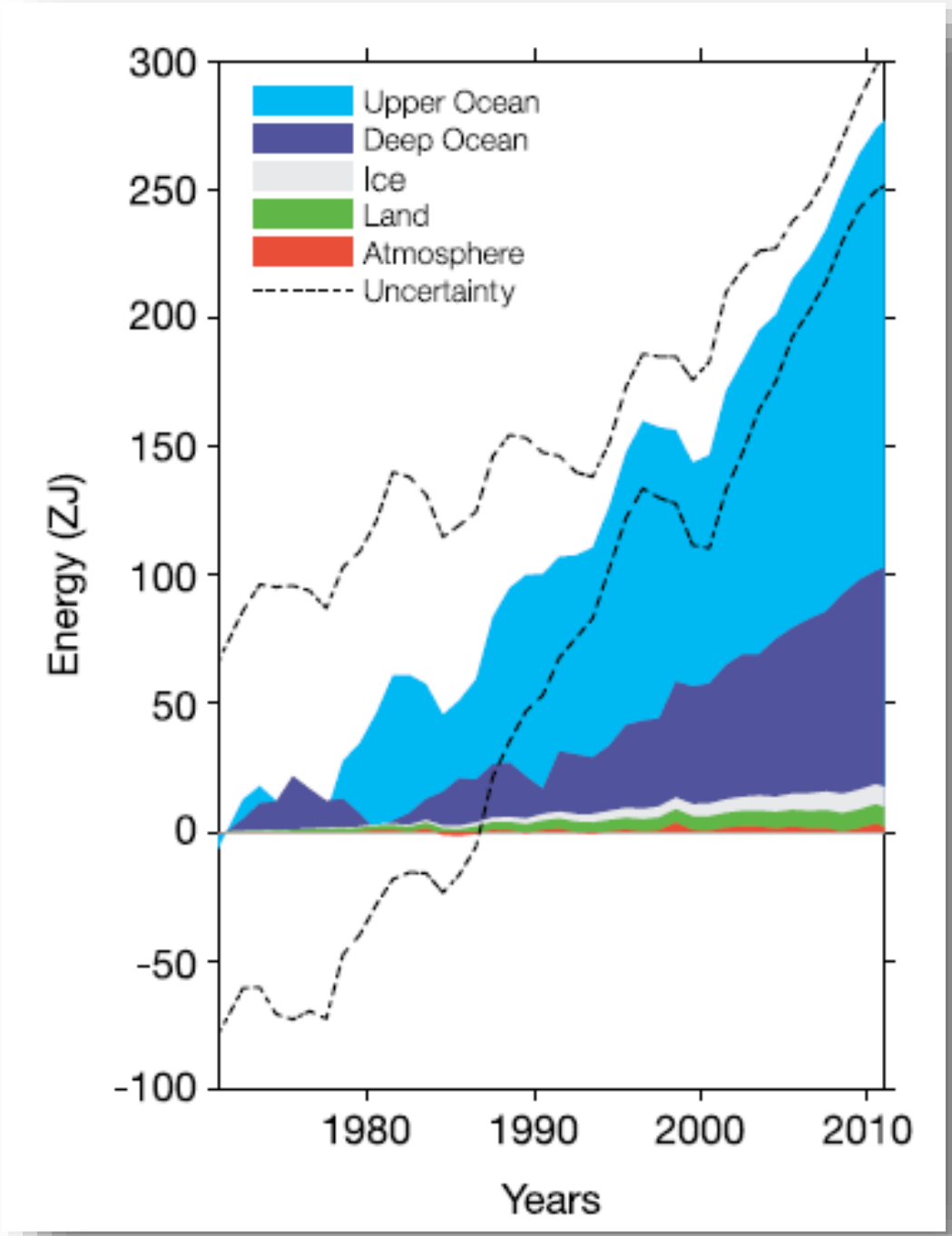
TAXA	RESPONSE	MEAN EFFECT
 Crustaceans	Survival	
	Calcification	
	Growth	
	Development	
	Abundance	
 Fish	Survival	
	Calcification	
	Growth	
	Development	
	Abundance	
 Fleshy algae	Survival	
	Calcification	
	Growth	+22%
	Photosynthesis	
	Abundance	
 Seagrasses	Survival	
	Calcification	
	Growth	
	Photosynthesis	
	Abundance	
 Diatoms	Survival	
	Calcification	
	Growth	+17%
	Photosynthesis	+12%
	Abundance	

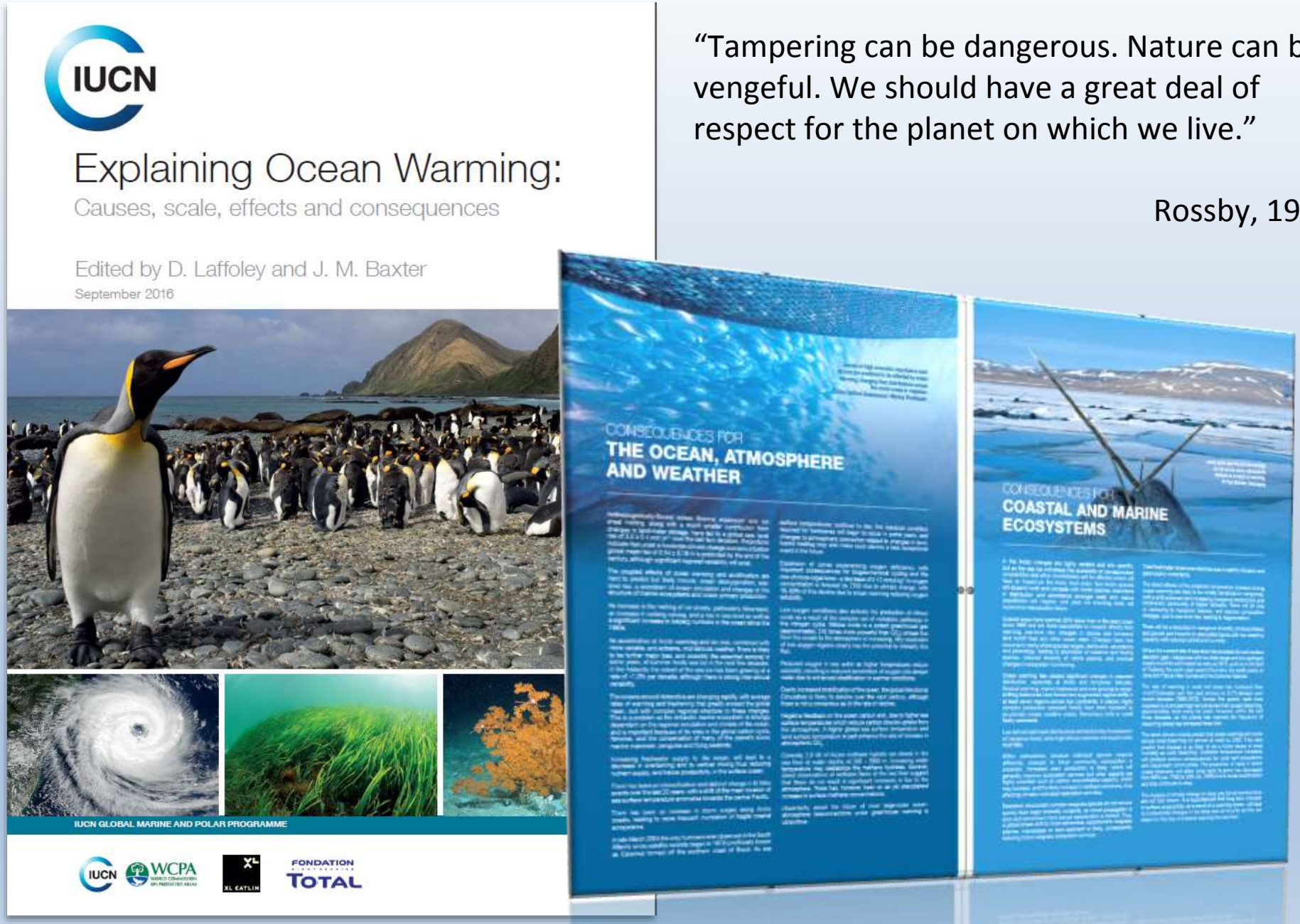
Not tested or too few studies
Enhanced <25%
No overall +ve or -ve response
Reduced <25%
Reduced >25%

http://www.fpa2.com/documents/MonacoActionPlan_en.pdf



Sources: National Oceanic and Atmospheric Administration


300
250
200
150
100
50
0
-50
-100
Energy (ZJ)
1980
1990
2000
2010
Years
Upper Ocean
Deep Ocean
Ice
Land
Atmosphere
Uncertainty



"Tampering can be dangerous. Nature can be vengeful. We should have a great deal of respect for the planet on which we live."

Rossby, 1956


Australian Government
Department of the Environment and Energy
Australian Antarctic Division


ACE
CRC
ANTARCTIC CLIMATE
& ECOSYSTEMS CRC


ANCORS
UNIVERSITY OF WOLLONGONG AUSTRALIA


BIOLOGICAL
SCIENCES
WITH
PLYMOUTH
UNIVERSITY


British
Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL


CONSERVATION
INTERNATIONAL


NOAA
CORAL REEF WATCH


FAU
FLORIDA ATLANTIC
UNIVERSITY


FLORIDA STATE UNIVERSITY
1851


IMAS


MacArthur Green


THE MARINE BIOLOGICAL
ASSOCIATION


Marine Institute
PLYMOUTH UNIVERSITY


NEREUS PROGRAM

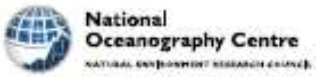

SAMS


Smithsonian Environmental
Research Center


UNIVERSITÀ
POLITECNICA
DELLE MARCHE


WMU
WORLD MARITIME UNIVERSITY


ISMAR


National
Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL


SAHFOS


stazione
zoologica
anton dohrn
napoli


UNIVERSITÀ
DEL SALENTO


The
University
Of
Sheffield.


UNIVERSITY OF
Southampton


UNIVERSITY of
TASMANIA
AUSTRALIA


THE UNIVERSITY OF
WESTERN
AUSTRALIA

A warming ocean

Since the 1970s, the Earth's ocean has absorbed more than 93% of the enhanced heating arising from human activities. This extra heat is causing changes in the ocean, which are beginning to alter species, ecosystems,and ecological processes.

Disease outbreaks

Warming water temperatures are changing the distribution of pathogens around the world. There are early signs that these changes are impacting human health.

Shifts in timing of key biological events

Changes in the seasonal availability of plankton mean that plankton food stocks are becoming more unpredictable for the marine life that feeds on them.

Global scale change

Change is being observed from polar to tropical regions, and from coasts to seabeds - not just coral reefs.

Vulnerable societies

Mangrove, seagrass and coral reef ecosystems that provide vital coastal protection and food security for seaside communities are being lost or degraded, and making people less resilient to environmental change.

Species on the move

Plankton, jellyfish, fishes, turtles and seabirds - especially those in the tropics - are being driven to the poles to keep within favourable environmental conditions. These shifts are putting global food security at risk.

Disappearing breeding grounds

Seabirds, turtles and other species are losing breeding grounds, which is reducing their breeding success.

Marine ‘climate trajectories’

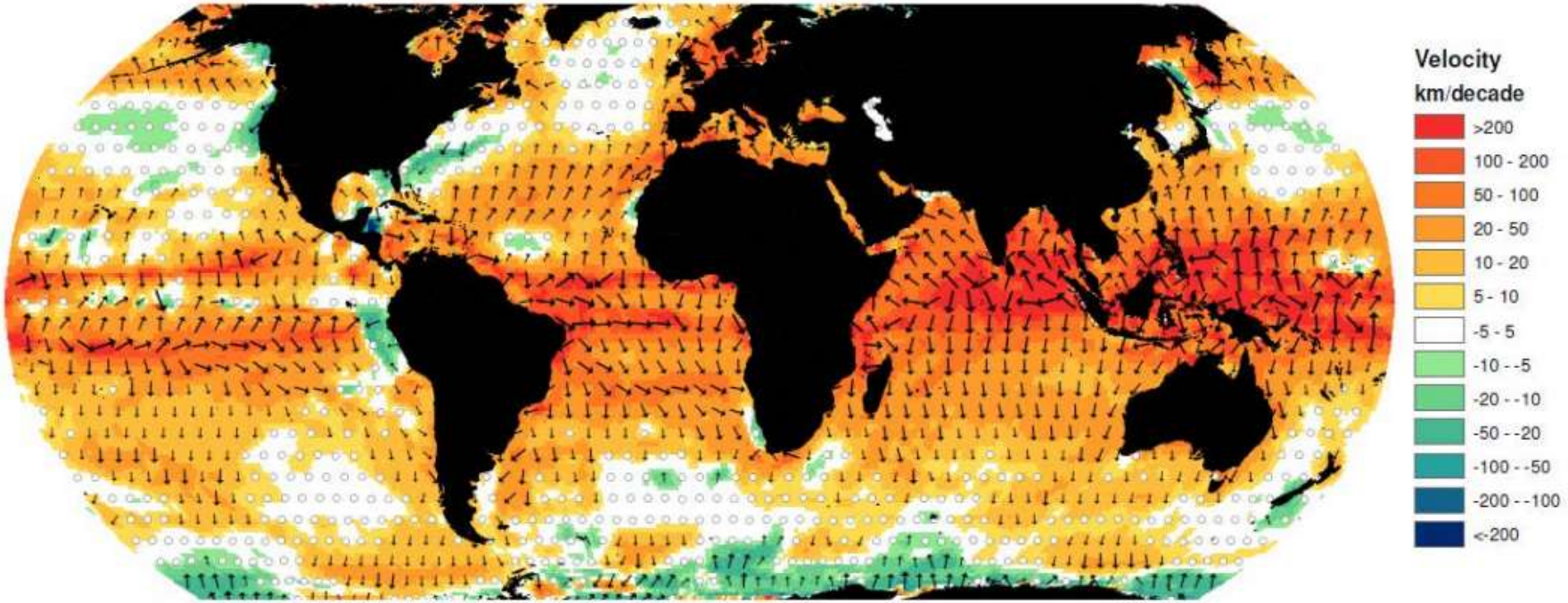


Figure 30-3: Velocity at which sea surface temperature (SST) isotherms shifted (km decade^{-1}) over the period 1960–2009 calculated using HaDISST1.1, with arrows indicating the direction and magnitude of shifts. Velocity of climate change is obtained by dividing the temperature trend in °C decade^{-1} by the local spatial gradient °C km^{-1}. The direction of movement of SST is denoted by the direction of the spatial gradient and the sign of the temperature trend: towards locally cooler areas with a local warming trend or towards locally warmer areas where temperatures are cooling. Adapted from [*Burrows et al.*, 2011].

Chapter 30, AR5, IPCC

New Guidance in development for the Convention on Biological Diversity

Target 11:

"By 2020, at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas ***and other effective area-based conservation measures****, and integrated into the wider landscapes and seascapes."*

Timetable for the guidance

- Workshops in Cambridge, UK and Vilm, Germany –spring and summer 2016

- Draft guidance - autumn 2016

- Field testing – spring 2017
- Final workshop – Canada spring 2017
- Refine guidance - summer and autumn 2017
- Release guidance via CBD– winter 2017

 **= draft guidance**

Working definition of an OECM

"A clearly defined geographical space, beyond the protected areas network, governed and managed in ways that deliver the long-term and effective conservation of nature and associated ecosystem services and cultural values, regardless of its current dedication."

The destination (conservation outcome) is the same as protected areas, but the origin and journey may be very different

OECM screening tool

Three key steps:

- **Step 1**: **Ensure that the areas is not already recorded as a Protected Area and that Aichi Target 11 is the right focus** – there are 20 Aichi Biodiversity Targets, many with area-based approaches. Some site-based approaches will contribute better to the other targets
- **Step 2**: **Ensure that the area has the essential conservation characteristics** that are associated with an OECM under Target 11. There are four tests in this step and all four must *simultaneously* be passed.
- **Step 3**: **Ensure that the conservation outcome can be sustained under normal day-to-day challenge.** This makes the difference between accidental conservation that could disappear overnight if other uses are proposed, and an OECM that can sustain the conservation delivery whatever its origin over time.

Step 2 tests

1/4

LOCATION: The area is a clearly defined geographical space. Wider measures for species and/or environment that are not ‘area-based’, such as species-specific national or regional hunting bans or temporary fishing closures, fail this test (see guidance note 1).

Not a question of value but rather deciding which ‘basket’ they better belong in? Note for example Aichi Target 6!

Step 2 tests

2/4

GOVERNED AND MANAGED: The area is governed and managed. Areas where there is no governance authority or conscious management are not OECMs (see guidance notes 3 and 4). Accordingly, an area currently in a natural or near natural state is not automatically an OECM.

Step 2 tests

3/4

EFFECTIVE, LONG-TERM CONSERVATION: The area delivers the long-term, and effective conservation of nature and associated ecosystem services and cultural values. Areas that deliver conservation outcomes only over the short-term or areas that are intended or offer potential to conserve nature but do not yet deliver conservation outcomes do not qualify as OECMs (see guidance notes 6, 7, 8, 9, 10 and 11).

Step 2 tests

4/4

RECOGNITION OF CONSERVATION: The area need not be dedicated to nature but there must be [recognition of the conservation significance by those managing the area,] a direct causal link between the primary objective(s) of the OECM and a demonstrable conservation outcome in the long-term (see guidance note 12).

Step 2 tests – must pass all four simultaneously

LOCATION: The area is a clearly defined geographical space. Wider measures for species and/or environment that are not 'area-based', such as species-specific national or regional hunting bans or temporary fishing closures, fail this test (see guidance note 1).

GOVERNED AND MANAGED: The area is governed and managed. Areas where there is no governance authority or conscious management are not OECMs (see guidance notes 3 and 4). Accordingly, an area currently in a natural or near natural state is not automatically an OECM.

EFFECTIVE, LONG-TERM CONSERVATION: The area delivers the long-term, and effective conservation of nature and associated ecosystem services and cultural values. Areas that deliver conservation outcomes only over the short-term or areas that are intended or offer potential to conserve nature but do not yet deliver conservation outcomes do not qualify as OECMs (see guidance notes 6, 7, 8, 9, 10 and 11).

RECOGNITION OF CONSERVATION: The area need not be dedicated to nature but there must be [recognition of the conservation significance by those managing the area,] a direct causal link between the primary objective(s) of the OECM and a demonstrable conservation outcome in the long-term (see guidance note 12).

Opportunities

- OECMs may usefully augment the current system of protected areas, including enhancing ecological representation, landscape/seascape connectivity and buffer zones around protected areas.
- Clear guidance on OECMs might bring increasing numbers of actors and governance models into more formal conservation networks.
- Recognizing OECMs, their biodiversity values and conservation outcomes might give them greater visibility and status, and enhance their security against threats.
- If an area is recognized as an OECM, it might change the mindset of the people governing and managing that area towards strengthening their focus on conservation outcomes.
- With a common understanding of the core traits of an OECM, accurate data can be collected.

Six concluding thoughts

- A changing ocean world is locked-in – will confound ‘us’
- Changing recognition and achievement of nature protection locked in – should hearten us
- ‘Overwhelming effects’ bringing common cause, but ‘tool kit’ to act is deficient to tackle ‘business unusual’ – should concern us
- Protecting Arctic coherence and resilience through integration of efforts across the entire seascape – MPAs + OECMs + ‘MSP’ of what ‘happens in between’ – should engage us?
- ‘Visioning’ a ‘triple lock’ of in situ protection, wider sustainability measures, and connectivity action – should focus us?
- A future ‘world’ where MPAs and OECMs form part of dynamic, integrated whole-ocean Arctic management – ‘beyond 2020’ – should inspire us? Now is the time to ‘get ahead of the curve’

It’s time to think bigger!

With special thanks to Max-Planck Institut fur Meteorology

Find out more: www.danlaffoley.com

DAVID DOUBILET