



**Regional  
Seas**  
Marine  
Biodiversity  
Assessment  
& Outlook  
Series

# Global Synthesis

A report from the Regional Seas Conventions and Action Plans  
for the Marine Biodiversity Assessment and Outlook Series

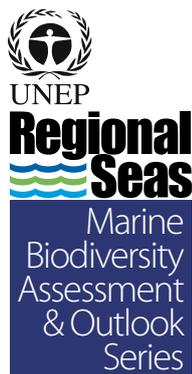
UNITED NATIONS ENVIRONMENT PROGRAMME

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# Global Synthesis

A report from the Regional Seas Conventions and Action Plans  
for the Marine Biodiversity Assessment and Outlook Series





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# Contents

5	Executive summary
7	Introduction
16	West and Central Africa Region Action Plan (WACAF)
18	Arctic Region
20	North American Region
23	Black Sea Commission (BSC)
25	Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention)
27	Framework Convention for the Protection of the Marine Environment of the Caspian Sea
29	The Antarctic
31	Coordinating Body on the Seas of East Asia (COBSEA)
33	Convention for the Protection of the Marine Environment and Coastal Area of the Southeast Pacific (CPPS)
35	Helsinki Commission of the Baltic Region (HELCOM)
37	Mediterranean Action Plan (MAP)
40	Convention for the Protection, Management and Development of the Marine and Coastal Environment of Eastern Africa (Nairobi Convention)
42	Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (NEP)
44	Northwest Pacific Action Plan (NOWPAP)
46	Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR)
48	Convention on the Conservation of the Red Sea and the Gulf of Aden Environment (PERSGA)
50	ROPME Sea Area
52	South Asian Seas Programme (SASP)
54	Convention for the Protection of Natural Resources and Environment of the South Pacific Region (Noumea Convention) Secretariat of the Pacific Regional Environment Programme (SPREP)



## Executive summary

The biological diversity of the 72% of our planet covered by seawater is crucial to global resource security, ecosystem function and climate dynamics. We know little of the extent and the interactions of marine biological diversity but in all of the UNEP Regional Seas changes in biodiversity are the symptom of failures to manage marine ecosystems.

The Marine Biodiversity Outlook Reports and summaries have been prepared by UNEP's Regional Seas Programme for the 10th Conference of Parties of the Convention on Biological Diversity (CBD). They provide the first systematic overview at a sub-global scale of the state of knowledge of marine biodiversity, the pressures it faces currently and the management frameworks in place for addressing those pressures.

The regional reports reflect a poor outlook for the continuing well being of marine biodiversity, which faces increasing pressures in all regions from land sourced pollution, ship sourced pollution and impacts of fishing. These pressures are serious and generally increasing despite measures in place to address them. They are amplified by predicted impacts of ocean warming, acidification and habitat change arising from climate

and atmospheric change. Without significant management intervention marine biological diversity is likely to deteriorate substantially in the next 20 years with growing consequences for resource and physical security of coastal nations.

With respect to fisheries, the main findings of the reports are that in most regions fisheries peaked at some point between the mid-1980s and mid-2000s, that catch expansion is not possible in many cases and that increased exploitation levels would lead to lower catch levels.

All regions report increases in shipping at levels which generally reflect annual economic growth. Reports for the Red Sea and South East Asian Regions reflect concerns at increasing levels of risk of oil and ship sourced pollution because of steadily increasing

volumes of traffic in constricted shipping lanes. The Black Sea report raises the issues of the risks and impacts of growing chronic operational pollution from discharges of bilge, tank and deck washings, minor oil spills and deliberate illegal discharges of oily waste.

The North East Atlantic regional report records significant declines in nitrogen and phosphorus inputs from rivers. In most regions progress in addressing land based sources of marine pollution has been offset by increasing pressures. For the Black Sea, declines in nutrient and chemical pollutant inputs from the Danube River are offset by increases from other major river systems. Of particular concern is the effect of where harmful blooms of toxic algae triggered by nutrients as in the Red Sea, and the increasing size of river-mouth dead-zones reported in the northern Gulf of Mexico.



All regions report progress in the establishment of Marine Protected Areas but current levels of 1.17% of global ocean surface or 4.32% of continental shelf areas fall far short of the 10% target set by CBD COP7 in 2004. It is likely to be many years before this target is reached. The figures do not include some managed fishery areas that have objectives consistent with multiple sustainable use and overall objectives for conservation but even if these are taken into account the proportion managed with objectives explicitly address sustainability of biodiversity or ecosystem processes is inadequate. The need to plan and implement ecosystem scale and ecosystem-based management of the seas is urgent

Climate change overshadows the existing challenges of managing declines in marine biodiversity in the face of current levels of human use and impact. The projected increases in temperature, acidity, severe storm incidence and sea level present major challenges for biodiversity management. This is reflected in the Great Barrier Reef, a globally iconic marine ecosystem that has been subject to adaptive scientifically-based ecosystem-based management for more than 30 years. An Outlook Report by the Great Barrier Reef Marine Park Authority (2009) concluded that “without significant additional management intervention, some components of the ecosystem will deteriorate in the next 20 years and only a few areas are likely to be healthy and resilient in 50 years.” Without strong ecosystem based management the global threats to marine biodiversity are similar and their implications for food and physical security are substantial.

The reports provide a reasonable understanding of the nature and extent of the problems facing marine biodiversity and marine resources. There are examples of effective actions to address those problems but management performance is generally insufficient and inadequately coordinated to address the growing problems of marine biodiversity decline and ecosystem change.

It is hoped that the results of these Regional Seas reports and global synthesis will be presented at Inter-Governmental Meetings (IGMs) and Conference of Parties (COPs) and will lead to initiatives to protect and manage biodiversity, through long, medium and short term management targets. The development and support of such management will require an improved information base for measuring progress in addressing pressures and the effectiveness of responses.

Providing sound scientific assessments is a key element of the Regional Seas Conventions and Actions Plans as they provide an important tool for policy makers to make informed decisions that ultimately affect the livelihoods of millions of people across the world. It is hoped that Regional Seas Conventions and Programmes will be supported in further development and implementation of this system of regular reporting of the regional outlooks for marine Biodiversity.

# Introduction

The biological diversity of the 72% of our planet covered by seawater is crucial to global resource security, ecosystem function and services and global climate dynamics but it is little known. At the conclusion of the decade of the 2000–2010 Census of Marine Life<sup>1</sup> have estimated that in well researched regions of high species richness 25 to 80% of species remain undescribed.

Marine ecosystems is largely invisible and mysterious to land dwellers and human coastal communities have developed on the basis of cultural expectations that there will always be another fish and the sea can always accept another drop of liquid waste. It is now clear that human impacts on marine ecosystems are pervasive. An ecosystem specific, global multi-scale modelling study<sup>2</sup> concluded that no marine area is unaffected by human influence and that almost half of the areas are strongly affected by multiple drivers of change.

A review of a broad range of scientific evidence<sup>3</sup> concluded that the cumulative impacts of fishing, pollution, and climate change are on the verge of causing mass extinctions that is substantial while little understood in marine multi-cellular life. The levels of risk of consequent resource and security implications for human communities are substantial but little understood.

The information to support multi-scale modelling studies of marine phenomena is diverse and often with noticeable gaps. Global data sets derived from satellite remote sensing provide good coverage of sea surface and shallow sea phenomena and atmosphere/ocean interactions. There is a growing understanding of global seabed topography from towed instrument arrays but less data on the associated biodiversity of seabed and water column communities.

Knowledge of the extent and the interactions of marine biological diversity may be limited but in all of the Regional Seas Conventions and Action Plans there are some examples or figures in biodiversity and the capacities of marine systems to supply goods and services that sustain life on land. These are the symptoms of poor management of marine and coastal ecosystems and they could grow to become significant threats to food, coastal dynamics and physical security.

The Marine Biodiversity Assessment and Outlook Reports have been prepared to provide the first systematic overview at a sub-global scale of the state of knowledge of marine biodiversity, the pressures it currently faces and the management frameworks in place for addressing those pressures. They also provide a window into regional outlooks for marine biodiversity in the face of climate change and other continuing and growing pressures from expected increases in human uses and impacts.

For many of the issues regional information has been scarce and patchy or has had to be derived from complex data sets and interpreted through global analyses. This is particularly the case for fisheries where there are some differences in the coverage between Food and Agriculture Organization of the United Nations (FAO) areas and

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1 Costello et al (2010)  
2 Halpern et al (2008)  
3 Jackson (2008)

the Regional Seas and in the nature and detail of data collected for fishery statistics. The situation is similar for projections on the basis of the Intergovernmental Panel on Climate Change (IPCC) scenarios of regional effects likely to arise from climate change. UNEP commissioned a technical report from the Fisheries Centre of the University of British Columbia that provides detailed information and discussion of regional implications of relevant global data and analyses<sup>4</sup>.

The regional reports provide a snapshot of the situation in 2010. They measure the performance of each region and therefore provide a basis to identify the respective management response in areas where regional and global action is needed. Their preparation has revealed major differences in data availability, analytical protocols and in preparedness and approaches for management of marine biodiversity, natural resources and ecosystem services. They stand as a baseline for future assessments as part of the Regular Process for the Global Reporting and Assessment of the State of the Marine Environment (GRAME) and engagement in international discussions such as Rio+20. They provide many lessons and insights and a basis for a consistent set of indicators for regional seas to monitor the impact of global and regional measures on protecting and managing marine biodiversity.

## The report development process

The approach of the regional reports was developed through consultation with the main stakeholders and the Convention on Biological Diversity (CBD). A set of common indicators (Figure 1) was developed to establish a consistent basis for the assessment and outlook reports. The indicators are based on a DPSIR model<sup>5</sup> with the three main drivers: pollution, fishing and climate change as identified in the Millennium Ecosystem Assessment Report (2005). The set of state, pressure and response indicators was developed by a group of stakeholders based on the outcomes of the Millennium Assessment. At the fourteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 14) of the CBD in Nairobi, Kenya in May 2010, the indicators were further reviewed by a group of experts. UNEP and the Regional Seas Conventions and Action Plans were well equipped to utilize their convening power to channel the necessary data to conduct these assessments through partnerships with credible scientific networks and academia.

**Figure 1: Pressure, State, Response and Outlook Indicators**

Pressure	State	Response	Outlook
Nutrient loading		GPA – NAPs – LBS	Nitrogen deposition
Port activity		Ballast water Convention	Species invasions
Climate change – Sea surface temp – CO <sub>2</sub> flux	Aragonite saturation	National CC adaptation	Aragonite
Fish landings	FAO stock status  Marine Trophic Index	Fish Stocks Agreement	Potential fisheries MTIs Species invasion Local species extinction
	Red List	Marine Protected Areas	

Where possible, the data for each region was country driven, providing a more responsive and detailed perspective into the actual state of marine biodiversity. In the outlook section of each report the Marine Trophic Index (MTI), species index and invasive species indicators are based on the work of the Sea Around Us Project ([www.seararoundus.org](http://www.seararoundus.org)) and the acidification indicator - Aragonite saturation is based on the work at NOAA<sup>6</sup>. Each Regional Seas report was based on peer-reviewed documents.

4 Christensen et al 2010

5 DPSIR is a causal framework for describing the interactions between society and the environment. The components of this model are: Driving forces, Pressures, States, Impacts and Responses

6 Feely et al 2004

A traffic light scorecard was used to enable readers to compare the state of marine biodiversity across the regions and the background documents and criteria for these scores (Red/Yellow/Green) for each of the relevant indicators can be found at ([www.marinebiodiversityseries.org](http://www.marinebiodiversityseries.org)).

## Results

The marine biodiversity assessment and outlook series is regional in nature, encompassing the areas governed by the Regional Seas Convention and Action Plans. Each regional report provides a detailed summary assessment of marine biological diversity using a common set of pressure-state-response indicators and common scenarios to look at the potential future of marine biodiversity. The details in the reports provide a story, relevant to policy makers in their specific region.

This global synthesis cannot reflect the level of internal detail found in the regional reports. Its purpose is to identify existing and emerging global needs and opportunities for action to address regional, and in some cases sub-regional biological diversity management issues. It seeks to highlight regional and global issues and action priorities for mitigating and reversing impacts on marine biological diversity and ecosystem services. In many cases this will involve working with partners to develop understanding of the direct linkages of matters of resource, socio-economic and physical security to biological diversity and ecosystem health.

### ● Fisheries

Fishing is the oldest and most widespread use of marine resources and services. Fisheries issues are addressed in all the regional reports. The individual reports speak for themselves but the general situation is that fishery yields peaked at some point between the mid 1980s and mid 2000s and have declined since that time. This decline has led to increasing concern about the impacts of destructive fishing practices, unsustainable fishing and illegal, unreported and unregulated (IUU) Fishing on Marine Biodiversity and Habitats.<sup>7</sup> The reports use the marine trophic index (MTI)<sup>8</sup> based on the average predator status of landed fish in the food chain. A detritus feeder has a low score and a top predator such as a marlin has a high score. The precise value of the MTI is not an issue but declining trends in MTI in most regions suggest that the phenomenon of “fishing down the food chain”<sup>9</sup> is typical of all regions. As fisheries remove large species they turn to smaller species lower in the food chain. An example of this is the situation in the Baltic Sea where yields of large and medium sizes predators, cod and herring, have reduced and been overtaken by finger-sized sprats that were historically very minor fishery targets. The situation regarding fisheries globally and regionally is complex but relatively well known. UNEP and FAO are developing approaches for the integration of management objectives to achieve verifiably sustainable levels of fisheries and the maintenance of marine biodiversity and ecosystem services,

Fisheries statistics are extensive and diverse but tend to have little or limited coverage of subsistence or recreational catch, effort or impact. This creates particular problems for management of coastal stocks that are targeted by subsistence, recreational and commercial fishers.

### ● Shipping

The carriage of cargo in ships is the second long standing use of the seas. In all regions other than the Antarctic shipping and the consequent risks of operational and accidental pollution are an increasing issue. Growth in shipping volumes and high densities of traffic in restricted waterways present risks of catastrophic accidents which are compounded by security considerations in some regions. The specific regional figures generally reflect variations around annual average global growth of shipping traffic of 9- 10% with faster growth of bulk cargoes on some routes. Six of the reports (Black Sea, COBSEA, HELCOM, ROPME, SACEP and SPREP) mention operational or accidental oil pollution due to shipping activity. An issue of direct impact of shipping to marine biodiversity is the introduction of invasive species which can have significant impact on biodiversity and ultimately on ecosystem services. Increasing global shipping and volumes of ballast water transfers increases the risk of moving alien species to new waters where they will thrive. A good example is the Caspian where the America Comb Jelly was introduced to the Black Sea in ballast water and with in a few decade it has spread to the Caspian altering the species structure there. The high ecological, resource and economic values of

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7 UNEP/CBD/SBSTTA/14/INF/6 – ‘Impacts of Destructive Fishing Practices, Unsustainable Fishing and Illegal, Unreported and Unregulated (IUU) Fishing on Marine Biodiversity and Habitats’ (FAO-UNEP-CBD, 2010).

8 Pauly et al,1998;Pauly and Watson, 2005

9 (Pauly et al 1998

marine biodiversity are recognised when major accidents such as the wreck of the Exxon Valdez occur. Chronic operational oil pollution from discharges of bilge, tank and deck washings, minor spills and deliberate illegal discharges of oily waste has biodiversity impacts that attract less attention. It has been claimed that the volume of such oil involved amounts to the equivalent of 8 Exxon Valdez oil spills every year in EU waters alone<sup>10</sup>. This is an issue that should receive increased systematic risk assessment and management with the International Maritime Organisation.

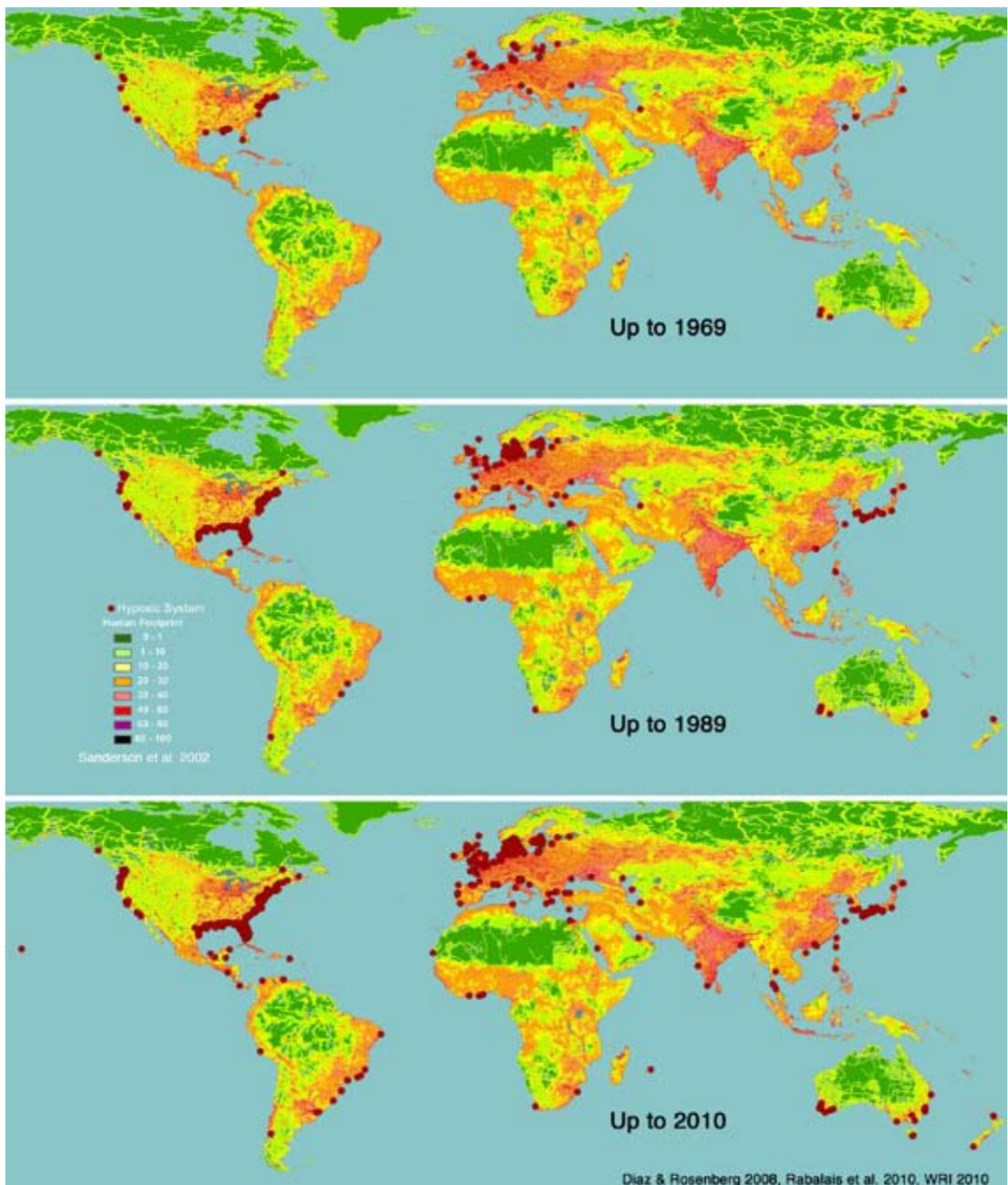
- **Water Pollution**

For much of the history of terrestrial development it was said that the solution to pollution was dilution so liquid wastes could be flushed down waterways to be dissolved and remediated by the sea. Within limits this can be true but pollution is a substantial and growing issue in most regions. Levels of land sourced agricultural and urban sewage pollution through nutrients and chemicals are continuing and increasing sources of concern.

**Figure 1**

There has been a growing trend of coastal hypoxia (Red Dots) around the globe. By the mid 20th century, hypoxia started to spread in coastal systems. Much of this increase can be traced back to increasing eutrophication driven by increased loading of nutrients and organic matter. The association of hypoxia with human population centers in the northern hemisphere is strong. Redder land areas indicate higher levels of human impact (Global Human Footprint: [http://www.ciesin.columbia.edu/wild\\_areas/](http://www.ciesin.columbia.edu/wild_areas/)). The 1960s marked a point where the number of hypoxic systems started to double about every 10 years. The 60 sites at the end of the 1960s

went to 120 by the end of the 1970s and 275 by the end of the 1980s. By the end of the 1990s most coastal systems close to populations centers were effected by hypoxia. There are now over 500 systems globally. Reports are starting to emerge from the southern hemisphere but data from India and Asia are slow to emerge. Given the close association of population and hypoxia in the northern hemisphere, there must be many systems with hypoxia yet to be reported.



There are examples of management of the issue. The OSPAR report records significant declines in riverine nitrogen and phosphorus inputs. The Black Sea report reflects declines in nutrient and chemical pollutant inputs from the Danube but these are offset by increases from other major river systems discharging into the Black Sea. Of particular concern is the effect of eutrophication where nutrients trigger harmful blooms of toxic algae, as in the Red Sea, and increasing size of rivermouth deadzones in the northern Gulf of Mexico. While there is information on the levels of nutrients entering marine waters only 5 of the reports make specific mention of occurrences of harmful algal blooms or dead zones. Systematic reporting would clearly be useful



for identifying recurrent hotspots for priority treatment to reduce levels of nutrient and other pollution arising from urban, industrial and agricultural activities.

Land sourced water pollution can be a major pressure on near-shore and linked marine ecosystems. The issue is increasingly important because of growing pressures of coastal development in most regions. Sewerage and water treatment systems are relatively inexpensive if installed during initial development but costly and challenging if fitted to existing structures or developments.

As with fishery issues, the reports provide a regional perspective. Land sourced pollution is a continuing and, unless further addressed, an increasingly threatening process, particularly for biological diversity of near-shore and enclosed waters. An ongoing reporting cycle will help to inform the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) and broader international community on hotspots, vulnerable areas, opportunities, standards and priorities for action.

The statistics are stark: Globally, two million tons of sewage, industrial and agricultural waste is discharged into the world's waterways and at least 1.8 million children under five years old die every year from water related disease, or one every 20 seconds. Over half of the world's hospital beds are occupied with people suffering from illnesses linked with contaminated water and more people die as a result of polluted water than are killed by all forms of violence including wars.<sup>11</sup>

- **New uses of the seas**

The reports were not required to address newer uses of the seas such as of petroleum and gas exploration and production, environmental energy production through wind-farms or tidal installations, potential seabed mining or sub seabed carbon dioxide storage. The Abidjan Convention report discusses pollution from petroleum industries and the Western Indian Ocean report mentions expansion of exploration activities. As with shipping, it is important that such activities should be designed, implemented and monitored to establish effective operational conditions that minimise the risks of human errors or incompetence.

- **Atmospheric Pollution – Global warming**

The management challenges of the pressures of marine and coastal uses are compounded by the growing effects of atmospheric pollution by carbon dioxide and other greenhouse gases. Ocean temperature has been rising since the early 20<sup>th</sup> century and is accompanied by sea-level rise. The gradual signals of both rises are widely under appreciated because they are masked/overshadowed by greater short term variations caused by weather cycles, tidal dynamics and storms. As the trends continue to rise, in the medium to long term, temperature, acidification and sea-level rise will pose major threats to biodiversity, habitats, fisheries, food production. Model studies predict major changes in animal and plant distributions with poleward movement of tropical and subtropical communities following their preferred temperature conditions. Widespread extinctions are predicted for polar species through loss of specialised habitats and of tropical species unable to adapt to increasingly high temperatures and the increased frequency of severe storm events could lead to further destruction of habitats. The consequent implications for fisheries are widespread with declines predicted in most tropical fisheries and increases in currently cool temperate and sub-polar areas as species and communities move in from warming subtropical and warm temperate areas.

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11 UNEP and UNHABITAT's Sick Water Report, 2010

## Response

The reports reflect different capacities and approaches in regional responses to pressures on marine biological diversity. The key elements include actions under international and regional treaties, conventions such as stock agreements and other fishery management plans, measures under the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), National Adaptation Programmes for Action/National Communication Strategies for Climate Change, the establishment of Marine Protected Areas, implementation of ballast water regulations and measures to address the status of populations of species on the International Union for Conservation of Nature (IUCN) endangered species Red List.

## Outlook

The regional reports reflect an alarming outlook for the continuing well being of marine biodiversity. All regions are predicted to face increasing pressures from land sourced pollution, ship sourced pollution and impacts of fishing. These pressures are serious and generally increasing despite measures in place to address them. They are amplified by predicted impacts of ocean warming, acidification and habitat change arising from urban development, coupled with climate and atmospheric change. Table 1 presents a summary of expected trends from the global outlook analysis.<sup>12</sup>

**Table 1**  
**Regional trends from global outlook analysis**

- ▼ decreasing trends
- ▲ increasing trends
- stable trends

	Atmospheric Nutrient Deposition 1993-2050	Fish Catch Potential 2000-2055	Marine invasive species	Species Extinction
Abidjan	▲	■	■	▲
Black Sea	▲	▲	▲	▲
CAR	▲	▼	▼	▲
CCAMLR	▲	▲	▲	▲
Caspian	N/A	N/A	N/A	N/A
COBSEA	▲	▲	▼	▲
CPPS	▲	▼	▲	▲
HELCOM Baltic	▲	■	■	▲
MAP	▲	■	■	▲
Nairobi	▲	■	■	▲
North America	▲	▼	▲	▲
NEP	▲	■	■	▲
NOWPAP	▲	▼	▲	▲
OSPAR	▲	■	▲	▲
PAME	▲	▲	▲	▲
PERSGA	▲	■	▼	▲
ROPME	▲	▲	▼	▲
SACEP	▲	▲	■	▲
SPREP	▲	▼	▲	▲

The global analysis is the result of computer model studies in which the best accessible data is used. The outcomes are consistent with other global studies and, like them, constrained by absence, gaps and lack of comparability of data at regional and finer scales. This is reflected in the differences between the Regional Seas Reports but they provide an important baseline for developing necessary responses to the problems they identify.

12 Christensen et al 2010.

The differences reflect the problems of global coordination in the context of different regional priorities and capacities. Providing sound scientific assessments is a key component of the Regional Seas Conventions and Actions Plans as they provide an important tool for policy makers to make informed decisions that ultimately affect the livelihoods of millions of people across the world. The challenge and opportunity now exist to develop a reporting system that can provide a robust basis to engage with other international and regional agencies in planning and management for conservation of marine biodiversity, and sustaining the natural resource supply and ecosystem services that underpin the food, socio-economic and physical security of most coastal nations.

Despite their differences, the regional reports and the global synthesis present a consistent picture of overall decline in marine biological diversity and ecosystem services in the face of increasing cumulative impacts from direct human uses of marine ecosystems, transferred impacts from human use of land and freshwater and changes driven by atmospheric pollution.

### ● Fisheries management

Results from ocean models that include primary production were used as inputs into fisheries ecosystem models for 15 FAO fishing areas. The modeled results under the IPCC SRES A1B<sup>13</sup> climate change scenario, suggest that by 2050 the MTI will decrease in most areas from 2004 levels under three effort regimes: no change in effort; a 3% increase; and a 3% decrease annually. Similarly, in many areas fish landings will decline compared to 2004, increasing food insecurity for many coastal areas. Even if fishing effort could be curtailed by 3% each year, the MTI indicates that marine biodiversity could decline in 11 of the 15 FAO areas modeled. Increasing effort may result in increased catches in 6 FAO areas, but the MTI will decrease in 5 other areas. The continuing decline in marine biodiversity will compromise the resilience of marine and coastal ecosystem to the impacts of climate change, as well as their ability to mitigate the effects of climate change.

The main finding of this analysis was that catch expansion was not possible in many cases and that increased exploitation would result in lower catch rates. Stocks showed a common pattern of initial discovery, growing yield, brief plateau, followed by decline with overall productivity, maintained by moving to exploitation of new stocks. This highlights the fact that there may be a false sense of security obtained from total aggregate landings when development phase is not taken into account.



Analyses of the performance and impacts of fisheries are complicated by inconsistencies in data collection methods, limited effort data and the difficulty of comparing levels of effort over time because of technological creep whereby units of effort become more efficient through better targeting and better gear design. The technologies exist to achieve much clearer information on the nature, extent and location of fishing activities. Their application could provide much clearer information on sustainability and

biodiversity implications of commercial fisheries. In coastal areas the management and analytical pictures are further obscured because of lack of information on levels of subsistence and recreational fisheries, particularly where they target stocks that are also commercially targeted.

### ● Marine Biodiversity management

Marine Protected Areas (MPAs) are being established as primary biodiversity management measures in all regions. Their creation responds to the resolution of 7<sup>th</sup> Conference of Parties of the CBD that called for a 10% of the marine environment to be included as MPAs. Current levels of 1.17% of global ocean surface or 4.32% of continental shelf areas fall far short of that target.<sup>14</sup> Definitions of MPAs cover a spectrum from strict protection, through habitat protection to multiple sustainable uses consistent with overall objectives for conservation<sup>15</sup>. The figures for MPA coverage do not include some managed fishery areas that have objectives consistent

13 Special Report on Emissions Scenarios

14 (Toropova et al, 2010)

15 (Kennington, 2010)

with multiple sustainable use and overall objectives for conservation<sup>16</sup>. Even so, it is clear that the proportion of the marine environment managed with objectives that explicitly address sustainability in the sense of maintenance of biodiversity or ecosystem processes is inadequate to meet obligations of coastal states under Articles 61, 62, 118, 119 and 237 of the United Nations Convention on Law of the Sea. Informed management of marine biodiversity requires more comprehensive global and regional data on the extent, objectives and performance of marine management regimes.

- **Land-based Pollution**

Land-based sources of marine pollution are mainly derived from urban populations, agriculture and industrial activities. Global populations are rapidly expanding with urban populations expected to double in the next 40 years (UNFPA, 2009), increasing demands on food and water resources and already inadequate wastewater infrastructure. This is in the light of changing climatic patterns, and water availability, weakened ecosystems and inconsistent and poorly integrated management. The challenges that unmanaged wastewater poses in the urban environment, to food production, industry, human health and the environment are interconnected and becoming ever more severe. It is critical that wastewater management is dealt with urgently and given very high priority to become an integral part of urban planning and integrated watershed and coastal management. Recognising wastewater as a resource, placing real economic values on water, changing policies and incentives – these as well as other measures are currently being implemented all over the world to help re-address our relationship with a commodity that is simply key to life on planet earth.

- **Ship and marine industry sourced pollution**

The regional reports record increases in shipping that are generally consistent with global economic growth. Issues of vessel management including discharges of polluted wastes and transfer of species on hulls and in ballast water are addressed by the International Maritime Organization. Estimates point out that in EU waters alone the combination of legal, illegal and accidental discharges of oil amount to the equivalent of 8 Exxon Valdez oil spills every year are a matter of concern<sup>17</sup>. They reflect complex impacts on marine biodiversity that are linked to growth in ship traffic and highlight an area of inadequacy in regional and global data on impact levels and management response.

- **Climate Change**

The existing challenges of managing declines in marine biodiversity in the face of current levels of human use and impact are overshadowed by the projected increases in temperature, acidity, severe storm incidence and sea level as a consequence of climate change. A systematic report by the Great Barrier Reef Marine Park Authority (2009) evaluated the long term outlook for the Great Barrier Reef, as poor with the specific explanation that “without significant additional management intervention, some components of the ecosystem will deteriorate in the next 20 years and only a few areas are likely to be healthy and resilient in 50 years.” This assessment is made in the context of existing “significant protection and management initiatives to improve resilience to give it the best chance of adapting to and recovering from the serious threats ahead, especially from climate change.” It concludes “Given the strong management of the Great Barrier Reef, it is likely that the ecosystem will survive better than most other reef ecosystems around the world.”

The Great Barrier Reef is a globally iconic marine ecosystem that has been subject to adaptive ecosystem-based management for more than 30 years. It is arguable whether coral reef ecosystems are inherently more fragile than other marine ecosystems but the physical and physiological consequences of human uses and impacts and climate change are similar for all marine ecosystems. Without strong ecosystem based management the global threats to marine biodiversity and their implications for food and physical security are substantial.

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16 (Wood et al, 2008)

17 Camphuysen’s (2007)

## Future Action

The Regional reports and global synthesis form a baseline for understanding the main pressures, states and management responses relating to the marine biodiversity.

The reports provide a sensible understanding of the nature and extent of the problems facing marine biodiversity and marine resources. There are examples of effective actions to address those problems but management performance is generally insufficient and inadequately coordinated to address the growing problems of marine



biodiversity decline and ecosystem change. Without proper ecosystem based management of sectoral activities and impacts affecting marine ecosystems, the combination of pressures from increasing human uses and impacts and the expected effects of rising temperatures and acidification of sea water promises an unwelcoming outlook for marine biodiversity and human activities that depend upon it.

It is hoped that the results of these reports from the Regional Seas Conventions and Action Plans and the global synthesis will be presented at Inter-Governmental Meetings (IGMs) and Conference of Parties (COPs) for discussions on initiatives to protect and manage biodiversity, through setting long, medium and short term management targets. The development and support of

such management will require an improved information base for measuring progress in addressing pressures and the effectiveness of responses.

It is hoped that the Regional Seas Conventions and Programmes, through their contracted parties, will be supported in further development and implementation of a regular process for global reporting and assessment of the state of the marine environment, to which these marine biodiversity reports contribute to.

## References

All references can be found at [www.marinebiodiversityseries.org](http://www.marinebiodiversityseries.org)

# West and Central Africa Region Action Plan (WACAF)

## INTRODUCTION

The coastal waters within the convention area contain highly productive ecosystems that support rich fisheries. The coastal area also supports coastal tourism, industries and numerous busy ports. These ecosystems provide an important livelihood for many coastal communities. The coastal area also supports tourism, gas and oil industries and many of the busiest ports in the region. These ecosystems provide important livelihoods for coastal communities, and are a source of survival especially during serious conflicts. In the past 30 years development, resource overexploitation and extensive pollution has negatively impacted the coastal ecosystems.

## DRIVERS OF CHANGE

The coastal waters within the Abidjan Convention Region contain highly productive ecosystems that support rich fisheries. The coastal area also supports coastal tourism, industries and numerous busy ports. These ecosystems provide an important livelihood for many coastal communities. The region, however, has seen serious conflicts resulting in immense human suffering and poverty. In the last three decades, rapid development, improper use of resources and extensive pollution has impacted negatively on the marine and coastal ecosystems.

### Main drivers of change

- **Land and Sea-based sources of pollution**

The major contaminants originate from various domestic discharges and run-offs well as industrial facilities. Oil, gas and related products predominate mainly in the Gulf of Guinea, and partly along the Nigerian, Gabonese, Congolese and Angolan coasts, where beach pollution by oil in the form of tar balls and oil spills, is frequently observed. The other main concern of the region, as a major source of pollution from land-based activities is constituted by litter, solid wastes, plastics and other marine debris which threaten marine life, degrades the visual amenities of marine and coastal areas, with negative effects on tourism and general aesthetics. This is particularly frequent along the beaches of the main large cities.

- **Overfishing**

Fish catches in the Abidjan region peaked in the late 1970s and have been declining since then despite a few good years. From 2000-2008, total fish catch by countries in the Abidjan Convention area has been stable, however, the general trend suggests that the fish catches have been decreasing since the 1980s. The observed increase in 2008 is due to a slight increase in fishing effort and the number of vessels.

- **Physical alteration and destruction of habitats**

Socio-economic development in the Abidjan region has drastically altered the coastal environment leading to coastal erosion, sedimentation, and siltation and soil acidification.

- **Climate change**

Sea surface temperature in the Abidjan region has been increasing steadily since the pre-industrial times. While current temperature levels have not been increasing drastically, the region of warmer ocean temperatures has been expanding.

- **Marine Invasive Species**

Overall, the number of ports per country is between 1 and 8. Maritime transport accounts for 90% of the volume of international trade of African countries. Additionally, the size of vessels, particularly of the size of containers, has gradually been increasing to meet the growing demand. This represents a high risk in the introduction of marine invasive species into the region.

## POLICY RESPONSES

A number of difficulties, including competing priorities and lack of resources, resulted in slow progress in activities of the Abidjan Convention between 1990 and 2002. However, today the Convention is back on track. Armed with renewed political goodwill from the Contracting Parties, together with the opportunities presented through other initiatives such as the African Process for the Development and Management of the Coastal and Marine Resources and the New Partnership for Africa Development, they can finally begin to fulfill the promise of their rich and prosperous region and its natural marine and coastal splendors. Many member states have also responded to the need to address many of the issues of protecting and managing marine biodiversity and the services it provides as described below.

### Policy platforms

- **Abidjan Convention Protocol**

The Convention covers the marine environment, coastal zones and related inland waters falling within the jurisdiction of the States of the Western African Region.

- **Protocol concerning Cooperation in Combating Pollution in Cases of Emergency in the Western and Central African Region**

The Protocol applies to actual or potential marine emergencies which constitute a substantial pollution danger to the Protocol area and related interests of the Contracting Parties, who undertake to cooperate in all matters relating to the taking of necessary and effective measures to protect their respective coastlines and related interests from the threat and effects of pollution resulting from marine emergencies.

- **United Nations Convention on the Law of the Sea (UNCLOS)**

Of the 21 participating countries, 19 countries have ratified the UNCLOS. There are a number of other fisheries agreements implemented in the western coastal African countries. These include: Agreement on Cooperation in the Protection and Enhancement of the Marine and Coastal Region of West and Central Africa, and the African Convention on the Conservation of Nature and Natural Resources.

- **Management of Land-Based Pollutants**

Participating countries have taken steps to combat land-based pollution including: Protocol to the 1973 International Convention for the Preservation of Pollution from Ships, and the Convention on the Conservation of Marine Pollution by Dumping of Waster.

- **International Convention for the Control and Management of Ships Ballast Water**

Of the 21 participating countries, only Nigeria, Liberia, Sierra Leone, and South Africa have signed the convention.

**Table 1**  
**State of the Marine Biodiversity in the Western Africa Region**

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients		-	●	●
Temperature	●	-	●	●
Acidification	●	N/A	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# Arctic Region

## INTRODUCTION

The Arctic is characterized by a harsh climate with extreme variation in light and temperature, short summers, extensive snow and ice cover in winter and large areas of permafrost. Its terrain varies from high mountains to flat plains, wide tundra and great expanses of sea, snow and ice. The plants and animals of the Arctic have adapted to these conditions, but this has rendered them in some cases more sensitive to increased human activities. The lives of indigenous and other Arctic peoples are closely linked to local resources, particularly by their dependence on wildlife harvesting. However, a combination of several factors makes the Arctic and its inhabitants among the most exposed populations in the world. The biggest concerns today are the effects from long-range air and sea transport of contaminants and certain human activities such as interference with ancient animal migration routes, oil and chemical spills into the sea, and the unforeseen impacts from the climate change causing the melting of the ice cover. Many of these impacts will take a very long time to reverse: the low temperatures mean slow chemical breakdown of contaminants, whereas populations of large mammals can be slow to recover.

## DRIVERS OF CHANGE

The greatest concerns today for the Arctic region are the effects from long-range air and sea transport of gas, oil and contaminants and specific human activities such as interference with ancient animal migration routes, and oil and chemical spills into the sea. It will take decades to centuries to reverse these impacts, especially pollutants, in the Arctic. The low temperatures of the Arctic waters implies slow chemical breakdown of contaminants, and populations of large mammals can be slow to recover.

### Main drivers of change

- **Climate Change**  
Sea surface temperatures for the Arctic region have been rising steadily since the 1960's. Surface air temperatures north of 60°N, for the last decade are the warmest for the past century. Variability in time and space is high. During winter 2009, Eurasian Arctic was very cold, while other Arctic areas were warm. For the entire 2009, the central Arctic had warming amplified by at least a factor of two compared to lower latitudes.
- **Overfishing**  
Commercially reported fish catches peaked in the 1970's, and have been declining since then which threatens the food security of many indigenous communities in the region.
- **Marine Invasive Species**  
Maritime activity in the Arctic is primarily transport of general cargo and bulk (wet and dry) cargo, and containers to primarily service the coastal communities. Other marine activities such as fishing and tourism use the shipping routes. It is anticipated that vessel activities will increase as the ice-free period is extended due to

PAME does not officially associate with the findings of this report and the opinions expressed therein.

climate change. Currently there are low levels of foreign ballast water discharged in the area and therefore a low risk of impacting marine biodiversity. However, if shipping increases, especially tankers, the risk for reducing biodiversity and other disasters increases (Norway Maritime Directorate 2000).

## POLICY RESPONSES

In 1996, Foreign Ministers of the Arctic States agreed in the Ottawa Declaration, to form the Arctic Council with a mandate to undertake a broad programme to include all dimensions of sustainable development. The Arctic Council is a high-level intergovernmental forum that provides a mechanism to address the common concerns and challenges including marine biodiversity protection and management faced by the Arctic governments and the people of the Arctic addressing all three of the main pillars of sustainable development; the environmental, social, and economic.

### Policy platforms

- **Global Programme of Action Implementation**

The PAME Working Group developed the Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-Based Activities (RPA). The Arctic RPA was updated and adopted by the Arctic Council in 2009 and represents the regional extension of the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities.

- **Fish Stock Agreements**

Issues related to fisheries management is not addressed within the Arctic Council and reference is made to relevant regional fisheries management organizations. Fish stock agreements are the responsibility of regional fisheries management organizations such as the Northwest Atlantic Fisheries Organization (NAFO), the North East Atlantic Fisheries Commission (NEAFC), the North Atlantic Salmon Conservation Organization (NASCO), the North Atlantic Marine Mammal Commission (NAMMCO), and the International Council for the Exploration of the Sea (ICES).

- **The Protection of the Arctic Marine Environment Working Group (PAME)**

PAME was first established under the 1991 Arctic Environmental Protection Strategy and was continued by the 1996 Ottawa Charter that established the Arctic Council. PAME is the focal point of the Arctic Council's activities related to the protection and sustainable use of the arctic marine environment. It has a specific mandate to keep under review the adequacy of global and regional legal, policy and other measures, and where necessary to make recommendations for improvements that would support the Arctic Council's Arctic Marine Strategic Plan.

- **Ballast Water Regulations**

There are no Arctic-wide specific ballast water regulations and member states are encouraged to ratify and implement the International Convention for the Control and Management of Ship's Ballast Water and Sediments. Canada for example has specific guidelines for ballast water management for the Arctic, and has designated two areas for exchanging water.

**Table 1**  
**State of the Marine Biodiversity in the Arctic Region**

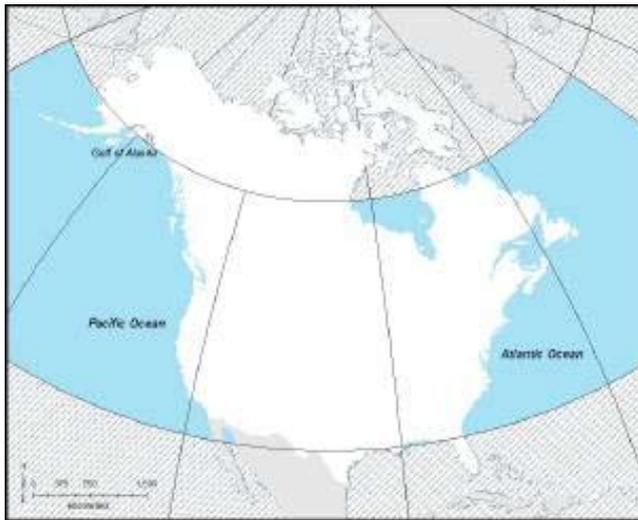
- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# North American Region

## INTRODUCTION

No Regional Seas Programme was developed for this region, though the United States is a party to the Wider Caribbean Regional Sea Programme, which includes the Gulf of Mexico and the Southeast U.S. Continental Shelf. Both the United States and Canada participate in the Regional Seas Programme for the Arctic. There is no regional legislative framework such as a Regional Seas Convention and Action Plan for the North America region, though Canada and the United States participate in other regional seas programs. The two countries have a long history of working together on trans-boundary waters issues using bilateral agreements and programs in the Atlantic, Arctic and Pacific Oceans.



The UNEP Regional Office North America (RONA) is responsible for a range of issues in Canada and the United States. These countries are vast with long coastlines and expansive marine areas, and they to face the issues of pollution, over-exploitation of marine resources, urbanization and climate change. UNEP RONA's mission includes fostering cooperation on environmental issues between North America and the international community, including issues such as climate change, biodiversity and ecosystem management. The governments of Canada and the United States contribute to UNEP activities related to marine conservation through funding, international and regional agreements, partnerships, research, and action plans related to fisheries, ecosystem management, climate science, monitoring, and other activities related to marine biodiversity.

## DRIVERS OF CHANGE

Canada and the United States are unique in that both have very long coastlines along three oceans that span from polar to tropical ecosystems. Since there is no regional sea program for shared waters of the Pacific and Atlantic, this report reports on the waters for these two oceans separately where appropriate. This section provides information on three pressure indicators for North America: fish catches, nutrient loading, and port activity as an indicator of the potential introduction of alien species.

### Main drivers of change

- **Land and Sea-based sources of pollution**

The amount of nitrogen fixed by natural processes (microbial activity, wildfires, lightning) is surpassed today by the increasing quantities of reactive nitrogen released by human activities such as production and use of synthetic fertilizers, burning of fossil fuels, and planting of nitrogen-fixing crops. Excess nitrogen that is not

cycled on land ecosystems reaches the oceans where it can trigger algal growth, measured by chlorophyll concentration, and oxygen depletion in coastal waters (also known as dead zones). Occurrences of dead zones have grown exponentially in the last decade. Chlorophyll concentration has increased from 1997 to 2006 in coastal areas of the Pacific Northwest, Southern California and North Atlantic.

- **Overfishing**

North American waters include significant fishing grounds such as the Grand Banks, Scotian Shelf, Gulf of Maine, Georges Banks, and the Gulf of Alaska. Fish landings expanded after Canada and the United States declared EEZs in the late 1970s, continuing through the 1980s, but began to decline after the early 1990s. The significant rise in US catches after 1990 is attributable to departure of foreign groundfish fleets off Alaska in 1991, which were replaced by domestic vessels. After the collapse of the Atlantic cod stocks in the early 1990s, total landings in the Northwest Atlantic have decreased by nearly 30 percent.

- **Marine Invasive Species**

North American ports have seen a modest but continuous growth since 1990. Although increased security concerns and economic downturn in the region have dampened the growth of imports and trade, international shipping represented 85% of port traffic in Canada in 2007. This represents a high risk in the introduction of marine invasive species into the region.

## **POLICY RESPONSES**

There is no regional legislative framework such as a Regional Seas Convention and Action Plan in the region. However, management of the marine environment is integrated into national legislations both in the United States and Canada.

### **Policy platforms**

- **Global Programme of Action Implementation**

Action to combat land-based sources of marine pollution are called for in a variety of instruments in addition to the protocol to the Convention on Biological Diversity (CBD). Canada has reported in its voluntary and national reports to the CBD on work towards reducing land-based sources of marine pollution. The United States, while not party to the CBD, is signatory to the LBS Protocol of the Cartagena Convention (Caribbean Regional Seas Programme). Ocean discharge criteria for the nation set limits for chemical, biochemical and ecological pollutants. Both countries have begun to address the effects of agricultural practices and their potential effects on the marine environment.

- **United Nations Convention on the Law of the Sea (UNCLOS)**

Canada and the United States have numerous bilateral agreements for the management of shared living marine resources, and both are signatory to UNCLOS, the FAO Code of Conduct and the UN Straddling Stocks Agreement. Both nations have measures in place to implement their responsibilities under several regional and international fish stock agreements, such as the Northwest Atlantic Fisheries Organization (NAFO), International North Pacific Fisheries Commission (INPFC), North Atlantic Salmon Conservation Organization (NASCO) and International Commission for the Conservation of Atlantic Tunas (ICCAT).

- **International Convention for the Control and Management of Ships Ballast Water and Sediments**

Canada and the United States have taken action to control ballast water discharges in the coastal waters of North America, including the Great Lakes area, to reduce the threat from non-native fish and other introduced species. The two countries began addressing ballast water in 1989 with voluntary guidelines. The United States enacted the Non-indigenous Aquatic Nuisance Prevention and Control Act in 1990, and amended it with the National Invasive Species Act of 1996. The guidelines in the law apply to all vessels operating on U.S. waters and call for monitoring, reporting, and testing. Canada enacted regulations in 2006, making mandatory a number of the existing voluntary measures. According to Transport Canada, which implements the rules, the regulations are "harmonized as much as possible with the U.S. Coast Guard requirements and with the International Convention for the control and Management of Ships Ballast Water and Sediments." Canada and the United States both signed the 2004 Ballast Water Treaty, but the United States has yet to ratify the agreement.

**Table 1**

**State of the Marine Biodiversity in the North America Region**

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# Black Sea Commission (BSC)

## INTRODUCTION

**The Black Sea is connected to the World Oceans via the Mediterranean Sea through the Bosphorus, Dardanelle and Gibraltar straits and with the Sea of Azov in the northeast through the Kerch Strait. Due to a large catchment area compared to surface area the Black Sea is very vulnerable to pressure from land-based human activity and its health is equally dependent from the coastal and non-coastal states of its basin.**

## DRIVERS OF CHANGE

The coastal areas of many Black Sea member states are densely populated and specific features make it very vulnerable to disturbances of its environment and ecosystems. Eutrophication, pollution, and heavily exploited fisheries resulted in an overall decline of biological resources, the diversity of species and landscapes, and of the aesthetic and recreational values of the Black Sea.

### Main drivers of change

- **Land-based sources of pollution**

There appears to be a decreasing trend of nutrient loads stemming from land-based sources into the northern Black Sea, however there is an increasing trend in dissolved inorganic nitrogen concentrations in the western Black Sea. In terms of sea-based pollution there is a high risk of oil spills from offshore platforms.

- **Overfishing**

Fishing in the Black Sea region has fluctuated greatly since 1960, with peak catches observed in the 1980's. In recent years (2000-2008), the major threat to fish resources appears to be illegal fishing and the use of destructive harvesting techniques, as well as the lack of regional cooperative management of fisheries and eutrophication. The majority of fish stocks are highly exploited or collapsed, but there is a recent and a rapidly increasing trend in rebuilding stocks.

- **Physical Destruction and Alteration of Habitats**

The region has put considerable stress on coastal habitats mainly through industrial development, unsustainable fishing practices, including aquaculture and coastal development for tourism.

- **Marine Invasive Species**

In the last decade shipping has steadily increased in the Black Sea, reflecting the economic recovery following the crisis in the 1990's. Both the number and size of ships have grown, leading to an increased pollution and the introduction of alien species such as the comb jelly (*Mnemiopsis leidyi*) which heavily altered the balance of the marine ecosystems in the region.

## POLICY RESPONSES

The Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea adopted in 2009. Main policy measures of the Black Sea Commission (BSC) are focused on: pollution reduction from rivers, pollution sources, and vessels using regulatory and legal tools; conservation of biological diversity, expansion of protected territories, promotion of responsible fisheries, ecologically sound technologies, public involvement in environmental decision making, green tourism and sustainable livelihood.

### Policy platforms

- **Protocol of the Bucharest Convention Concerning the Protection of the Black Sea Marine Environment Against Pollution from Land Based Sources**

In all Black Sea contracting parties, there is a lack of common methodology in the region to assess the level of their contribution to the pollution of the Black Sea. All Black Sea contracting parties have implemented National Programmes of Action, and all have signed and ratified the land-based sources protocol.

- **Protocol of the Bucharest Convention Concerning Combating Pollution of the Black Sea Marine Environment by Oil and Other Harmful Substances in Emergency Situations**

The Protocol was adopted in 1992 and entered into force in 1994. The Protocol provides a platform for collaboration between contracting parties in cases of grave and imminent danger to the marine environment of the Black Sea due to the presence of massive quantities of oil or other harmful substances resulting from accidental causes or from accumulation of small discharges.

- **Protocol on The Protection of The Black Sea Marine Environment Against Pollution by Dumping**

The Protocol was adopted in 1992 and entered into force in 1994. The Protocol provides a platform to contracting parties to address transboundary movement of hazardous wastes and to cooperate in combating their illegal traffic.

- **United Nations Convention on the Law of the Sea**

All contracting parties except Turkey have signed and ratified the Convention. However, compliance with the FAO Code of Conduct on Responsible Fisheries remains low. Furthermore, a draft legally binding instrument for fisheries of the Black Sea was developed in 1992, and as of 2010 it remains under discussion.

- **International Convention for the Control and Management of Ships Ballast Water**

None of the Black Sea contracting parties have signed the Convention, though the introduction of alien species via ballast waters is a recognized problem. However, national regulations have been established and are implemented in most Black Sea countries.

**Table 1**  
State of the Marine Biodiversity in the Black Sea Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	N/A	●	●	N/A
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●*	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention)

## INTRODUCTION

The Wider Caribbean Region (WCR) covers 36 States and Territories, 28 of which are UN member states, and vary in their stages of development. Many are Small Island Developing States with a heavy reliance on their coastal areas and marine environment for economic activities within tourism and fisheries sectors. The unique biodiversity of the WCR and the fragile ecosystems supporting many livelihoods are threatened, not only by stresses from untreated sewage and agricultural run-off, overfishing, shipping and increasing coastal development, but also from natural disasters exacerbated by climate change.

## DRIVERS OF CHANGE

The coastal areas of many CAR Member States feature some of the world's major tourist destinations such as Aruba, Belize, and the Bahamas. In addition, the CAR region includes major ports which facilitate international trade – key to their economic development, but also at risk of receiving alien marine species. Many cities in this region have limited wastewater infrastructure with sewage often entering coastal areas untreated.

### Main drivers of change

- **Land and Sea-based sources of pollution**  
Nitrogen and phosphorous loading for the Caribbean region reflect an increase in total loading of these two nutrients over the past 15 years. The single largest source of nutrient pollution comes from domestic/urban sewage. Similarly, the region is high risk for oil spills from shipping vessels and off-shore oil platforms.
- **Overfishing**  
Fish catches in the Wider Caribbean Region indicates a growth in fisheries production that averaged at 11% per year initially, but since 1970s catches have been constant despite a growing fleet. However, per capita supply of fish for the region between 1985 and 2005 showed a 2.7% decline.
- **Physical alteration and destruction of habitats**  
Socio-economic development in the Wider Caribbean region has put severe pressure in the conversion of habitats to other uses. Main pressures come from the development of coastal tourism infrastructure and unsustainable fishing practices.
- **Climate change**  
Sea surface temperature in the Wider Caribbean Region show a 0.4-0.6°C increase from 1985-2006. In the past decade, no where have changes in the sea surface temperature had a stronger influence than in this region. April-June 2010 has been documented as the warmest on record. Elevated sea surface temperature pose risks to shallow water coral reef ecosystems where coral colonies cannot tolerate significant increases in temperature.

- **Marine Invasive Species**

The Wider Caribbean Region with its major ports has seen a high increase in total shipping traffic since 1950 and in the past 10 years alone, total shipping traffic has almost double. This represents a high risk in the introduction of marine invasive species into the region.

## POLICY RESPONSES

The Caribbean Action Plan adopted a legal framework in 1983, the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention). The Oil Spills the Special Protected Areas and Wildlife (SPA) and Land Based Sources of Pollution (LBS ) Protocols operationalize the Convention. Many member states have also responded to the need to address many of the issues of protecting and managing marine biodiversity and the services it provides as described below.

### Policy platforms

- **Protocol of the Cartagena Convention Concerning the Prevention, Reduction, and Control of Land-based Sources and Activities**

The Protocol provides common standards on wastewater discharges for its member states. This Protocol was adopted in 1999. In October 2010, at the 14th Intergovernmental Meeting on the Action Plan; 11th Meeting of the Contracting Parties (COP) the ninth member state ratified the Protocol, therefore paving the way for its entry into force.

- **Protocol of the Cartagena Convention Concerning Co-operation in Combating Oil Spills**

The Protocol was adopted in 1983 and entered into force in 1986. It provides a platform to strengthen national and regional preparedness and response capacity of the nations and territories of the region. The Protocol also serves to foster and facilitate co-operation and mutual assistance among the nations and territories in cases of emergency in order to prevent and control major oil spill incidents.

- **United Nations Convention on the Law of the Sea (UNCLOS)**

The Bahamas, Barbados, Costa Rica, Panama, and Trinidad and Tobago have acceded to the Fish Stocks Agreement. However, overall compliance by the CAR countries to the FAO Code of Conduct for Responsible Fisheries has been low.

- **Protocol of the Cartagena Convention Concerning Specially Protected Areas and Wildlife**

Since the first marine protected area was established in the Caribbean region by Puerto Rico in 1918, there are currently 280 documented marine protected areas covering an area of 158,000 km<sup>2</sup>. About 14% of these marine protected areas are determined to have partially or fully effective management.

- **International Convention for the Control and Management of Ships Ballast Water**

Within the Caribbean region, St. Kitts and Nevis acceded to the Convention in 2005. Since then, Antigua and Barbuda, Barbados, and Mexico have acceded. Additionally, France and the Netherlands acceded to the Convention in 2008 and 2010 respectively, meaning that their Caribbean territories are also included. Additionally, the region counts with a Regional Ballast Water Management Strategy.

**Table 1**  
**State of the Marine Biodiversity in the Wider Caribbean Region**

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	N/A
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	<b>Red List*</b>	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

\*This data is misinforming due to the high number of bony fish listed in the region that are of least concern.

# Framework Convention for the Protection of the Marine Environment of the Caspian Sea

## INTRODUCTION

The 1000km-long Caspian Sea is the largest enclosed body of water on Earth. It is a remnant of the ancient ocean Tethys, which around 50 million years ago connected the Atlantic and Pacific. Today it has no connection to these oceans and its waters are only slightly saline.

Some 130 large and small rivers feed into the Caspian, the largest being the Volga. The long history and isolation of the Sea has left it with impressive biodiversity and more than 400 endemic species. For instance, the Caspian seal is one of only three freshwater seal species in the world. Extensive coastal wetlands offer a popular stop-off during migrations leading to a profusion of birdlife and avid eco-tourists who gather to watch it.

## DRIVERS OF CHANGE

The Caspian Sea suffers from an enormous burden of pollution from oil and gas extraction and refining, offshore oil fields, agricultural production, radioactive wastes and huge volumes of untreated sewage and industrial waste introduced to a large part by the Volga River. Similarly, the region suffers from over-exploitation of fish stocks and rapid destruction of coastal habitats.

### Main drivers of change

- **Land-based sources of pollution**

The Volga River represents the largest source of nutrient pollution to the Caspian. Nutrient loading of organic nitrogen and phosphorous decreased from 1978 until 2001, when there was a sharp increase in the region. The main factor governing concentrations and amounts of nutrient loading were the biological and hydro-chemical processes in the upstream water reservoirs on the Volga River. Furthermore, pollution from oil and gas extraction and refining, as well as from large volumes of untreated sewage and industrial waste have significantly harmed the Caspian Sea.

- **Overfishing**

Fish catches (in tons) from the Caspian Sea have been declining steadily since the early 1970's. Up until 1991, the Russian Federation was the dominant fishing country (as part of the USSR), when fish catches for the country declined due to the independence of Azerbaijan, Kazakhstan, and Turkmenistan. The I.R. of Iran is now the largest fishing nation in the Caspian region. The decline in fish catches reflects the decrease of number offish populations such as sturgeons and salmonids, roach, and breams.

- **Physical Destruction and Alteration of Habitats**

The development of oil and gas infrastructure and coastal urbanization have put significant pressure on coastal habitats in the region. Furthermore, a larger concentration of nutrients has altered habitats and eutrophication is visible in the northern part of the Caspian Sea.

● **Marine Invasive Species**

The opening of the Volga-Don canal in 1952 allowed ships from other oceans to travel to the Caspian Sea. However, it also exposed the area to unwanted marine invasive species. The North American comb jelly is one of these unwanted arrivals. It was first found in the Caspian Sea in the late 1990s and came by way of the Black Sea and quickly spread throughout the region. This jellyfish has contributed significantly to the declining production of phytoplankton and thus consequently fish production, affecting the food security and livelihoods of many coastal communities.

**POLICY RESPONSES**

To address the environmental problems the Caspian littoral countries, Azerbaijan, I.R. of Iran, Kazakhstan, Russian Federation and Turkmenistan, launched the intergovernmental Caspian Environment Program (CEP) in 1998. They further demonstrated their commitment to protect and restore the Caspian marine environment by signing and ratifying the Framework Convention for the Protection of the Marine Environment of the Caspian Sea, also called the Tehran Convention, which entered into force on 12 August 2006. A Strategic Action Programme was developed under the CEP, which forms building the basis for the Strategic Convention Action Programme (SCAP) adopted by the second Conference of the Parties to the Tehran Convention as a comprehensive, long-term agenda and framework for the implementation of the Convention and its future protocols over a period of ten years. The Caspian littoral States confirmed their intention to implement the SCAP through National Caspian Convention Action Plans.

**Policy platforms**

● **Land-based Sources of Pollution**

There are about 15 International Conventions/Protocols for the Caspian countries that have a connection to the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities. All five Caspian littoral countries signed and ratified the Framework Convention for the Protection of the Marine Environment of the Caspian Sea. This Convention provides for a Protocol for the pProtection of the Caspian Sea against Pollution from Land-Based Sources and Aactivities. National Caspian Action Plans exist in all member countries, but are, however, are not legally binding.

● **United Nations Convention on the Law of the Sea and United Nations Fish Stock Agreement**

There are no signed Fish Stock agreements in the Caspian region. However, Azerbaijan, Kazakhstan, the Russian Federation, and Turkmenistan have agreed to establish a Commission on Aquatic Bioresources (CAB) which was later joined by the I.R. of Iran also. The main function of the CAB is to recommend total catch quotas of various commercial fish species, but it also acknowledged the need for an intergovernmental Agreement on Fisheries Management.

● **Ballast Water Management**

The Astrakhan port (and adjunct port Olya) situated on the Lower Volga River is the only port directly opened to international/inter-basin shipping operations. Any vessel transiting in or out of the Caspian Sea travels through the Astrakhan port. The by-laws for the maritime merchant ports of Astrakhan and Olya require all vessels proceeding from the sea to the ports of Astrakhan and Olya to change their ballast of seawater, as directed by the laws of the Russian Federation. There are no other international conventions/agreements for the Caspian on ballast water regulation. An “Action Plan for Ballast Water Management” for the Caspian Sea was approved by the Steering Committee of the CEP as a guidance document for voluntary adherence of the countries in 2008.

**Table 1**  
**State of the Marine Bio-diversity in the Caspian Region**

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	N/A
Temperature	●	-	●	N/A
Acidification	N/A	●	●	N/A
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	N/A
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# The Antarctic

## INTRODUCTION

Antarctica is surrounded by a vast, unbroken and dynamic body of water known as the Southern Ocean, which constitutes about 15% of the world's total ocean surface. It is the only continent on Earth to be completely governed by its very own international agreement. The Antarctic Treaty was signed in 1959 by the 12 nations present in Antarctica at that time. A further 34 nations signed the Treaty after it came into force in 1961, and it is still open to any member of the United Nations. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) was established in 1982 to manage the marine living resources of the Southern Ocean.

## DRIVERS OF CHANGE

The long history of resource harvesting in the Antarctic region has placed many threats on the fragile environment. In many cases the intense level of exploitation resulted in the severe depletion of harvested stocks, as was the case for fur and elephant seals in the 19th century and whales and finfish in the 20th century.

### Main drivers of change

- **Overfishing**

Total fish catches in the CCAMLR region peaked in the period prior to the Convention coming into force in 1982. The reduction in the level of krill fishing after 1991 resulted from the economic changes in the former USSR and was not directly related to any changes in stock size. However, the current state of previously exploited fish stocks indicates limited recovery/rebuilding.

- **Climate change**

In the last 60 years, the Antarctic region has experienced some of the fastest rates of temperature increase than anywhere else on the globe. However, there are quite distinct regional differences in the rate and magnitude of these changes. In general, the most rapid temperature rises have occurred in the Southwest Atlantic, while changes in the other areas have been smaller, and in some cases an apparent cooling has been recorded for some areas.

## POLICY RESPONSES

The aim of the Commission is to conserve marine living resources in the Southern Ocean. Although these marine resources specifically exclude whales and seals, these are the subject of other conventions with which CCAMLR cooperates closely. The member states have responded to the need to address many of the issues of protecting the marine environment as described below.

### Policy platforms

- **Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)**

Within the Antarctic region the CCAMLR Convention is the relevant international agreement with relevance to fisheries management.

- **Marine Protected Areas**

CCAMLR has committed to implementing a network of marine protected areas. To this end, CCAMLR has implemented a work programme, with agreed milestones, including a process of bio-regionalisation and identification of priority areas. Within these priority areas the use of spatial planning tools has been applied to determine potential locations of marine protected areas. The first such area was designated in 2009 on the southern shelf of the South Orkney Island.

**Table 1**  
State of the Marine Biodiversity in the Antarctic Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	N/A	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	N/A
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# Coordinating Body on the Seas of East Asia (COBSEA)

## INTRODUCTION

East Asia's astonishing variety of political, economic and social systems is matched by its environment: ship-crowded straits, island groups, wide gulfs, shallow estuaries and some of the most heavily populated countries in the world, where millions rely on fish for much of their protein. In this sense, marine biodiversity of the Seas of East Asia is key to development, food security, and the livelihoods of many coastal communities. Yet, these Seas of East Asia and their biodiversity are under multiple threats and pressures resulting in changes in the state of many of the services provided by the marine and coastal ecosystems such as storm protection, fisheries and aquaculture.

## DRIVERS OF CHANGE

The coastal areas of many COBSEA member states are densely populated with some of the world's mega cities such as Manila, Bangkok and Jakarta. Many cities in Asia have limited wastewater infrastructure with sewage often entering coastal areas untreated. These mega-cities are also important ports, which facilitate international trade - key to their economic development, but also at risk of receiving alien marine species. The waters of COBSEA are also important to the food security of the region. Behind many of these densely populated areas are intense agricultural systems.

### Main drivers of change

- **Land-based sources of pollution**  
Nitrogen outflows from countries neighboring the South China Sea in the COBSEA region have increased significantly in the last 20 years. Water quality and ultimately species survival, reproduction, and growth have been affected by the increased nutrients.
- **Overfishing**  
Fish catches in the Exclusive Economic Zones (EEZs) of the COBSEA waters have increased steadily, reaching 22 million tonnes in 1999. By 2006 fish catches in the COBSEA waters made up 23% of the world's total catches.
- **Physical alteration and destruction of habitats**  
Socio-economic development in the COBSEA region has put severe pressure on the conversion of habitats to other use, particularly in mangroves. Main pressures come from the development of coastal tourism and aquaculture.
- **Climate change**  
Sea surface temperatures for the COBSEA region have risen steadily in the past 30 years, although the East China Seas are warming faster. This poses a significant problem for marine organisms that are unable to tolerate higher sea temperatures.

● **Marine Invasive Species**

Shipping activity has increased steadily over the past 20 years, which corresponds with rapid economic growth in the region, much of it in China. The growth is based on international trade and shipping is spread globally, increasing the risk of introducing alien species from different regions.

POLICY RESPONSES

The Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region is managed by COBSEA, which faces the challenge of steering the Action Plan through utilizing the goodwill of the member states to comply with international treaties and conventions, as there is no regional convention in place. Nevertheless, many member states have responded to the need to address many of the issues of protecting and managing marine biodiversity and the services it provides as described below.

**Policy platforms**

● **Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region**

Development and implementation of National Programmes of Action (NPAs) with the GPA1 framework is limited in the COBSEA region. Only Australia and the Republic of Korea have produced NPAs to address major impacts from Land-Based Activities.

● **United Nations Convention on the Law of the Sea (UNCLOS) and United Nations Fish Stocks Agreement**

All COBSEA member states are parties to UNCLOS. Five COBSEA Members States are party to the Fish Stocks Agreement: Australia, China, Indonesia, Philippines, and the Republic of Korea. However, compliance with the FAO Code of Conduct for Responsible Fisheries is low in all countries except Australia.

● **International Convention for the Control and Management of Ships Ballast Water**

The Republic of Korea has recently acceded to the Convention. Many countries in the region are moving towards ratification after risk assessments take place. All countries in general appear to have import controls for invasive species that limit the entry of alien species at the country's borders.

**Table 1**  
State of the Marine Biodiversity in the COBSEA Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

1 Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)

# Convention for the Protection of the Marine Environment and Coastal Area of the Southeast Pacific (CPPS)

## INTRODUCTION

The Southeast Pacific region spans the entire length of the Pacific coast of South America from Colombia to Cape Horn, encompassing tropical, sub-tropical, temperate and sub-Antarctic ecosystems, which sustain an astounding biodiversity. The region comprises two Large Marine Ecosystems (LMEs), that are dominated by the cold, nutrient-rich Humboldt Current, the largest up-welling system in the world and supporting one of the world's most productive fishing grounds; and that of the Eastern Equatorial Pacific.

However, the region is under threat from coastal and marine degradation by land-based and marine-based sources of pollution and other forms of environmental degradation. In addition, the region is regularly disrupted by the El Niño-Southern Oscillation (ENSO) phenomenon, which originates in the equatorial Pacific, producing dramatic upheavals in local – and ultimately global – climatic conditions. El Niño influences everything from the weather to marine ecosystems to human livelihoods, and its enormous social and economic impacts are felt around the world.

## DRIVERS OF CHANGE

The CPPS region spans the entire length of the Pacific coast of South America from Panama to Cape Horn, encompassing tropical, sub-tropical, temperate and sub-antarctic systems. Drivers of change in the marine environment include land and sea-based sources of pollution, the overexploitation of wild-caught fishery stocks, impacts to coastal environments from aquaculture, and other forms of overexploitation and the transformation of coastal resources.

### Main drivers of change

- **Land-based sources of pollution**

Nutrient dynamics for the CPPS region are highly influenced by coastal upwelling of cold nutrient-rich waters from the Humboldt Current. The largest contribution of dissolved inorganic nitrogen to the region is from agriculture runoff carried to the marine environment by rivers. Marine aquaculture within the region also contributes to nutrient loading leading to nearshore pollution. In Chile, for example, there is concern over salmon farms adding to the nutrient loading.

- **Overfishing**

Over the years, the fisheries in the CPPS region have been characterized by peaks and troughs in landings, assumed to be largely due to the climatic variations due to the El Niño Southern Oscillations which influence the variations in population dynamics of the main pelagic species. In reported landings, Chile has seen a significant rise in landings of pelagic fish. Peru and Chile have dominated the region in terms of total catch (tonnes).

## POLICY RESPONSES

The Convention for the Protection of the Marine Environment and Coastal Areas of the Southeast Pacific is a maritime alliance of strategic importance to member states. The Action Plan for the Convention is composed of five member states committed to wisely managing and developing the marine and coastal environment, including marine biodiversity, to secure the region's sustainability for future generations.

### Policy platforms

- **Protocol of the Lima Convention Concerning the Protection of the South East Pacific Against Pollution from Land- Based Sources**

All CPPS member states have developed a National Programme of Action (NPA) to implement the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). While most CPPS states appear to have developed Action Plans and have made similar progress in this regard, most have yet to develop demonstration projects to guide national implementation to address the needed legislation or regulation to urgently stem land-based sources of pollution.

- **United Nations Convention on the Law of the Sea**

Of the CPPS member states, only Panama (although only an observer to the Convention) is party to the United Nations Agreement Relating to the Conservation and Agreement of Straddling Fish Stocks and Highly Migratory Fish Stocks.

**Table 1**  
State of the Marine Biodiversity in the CPPS Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# Helsinki Commission of the Baltic Region (HELCOM)

## INTRODUCTION

The Baltic is a young sea, and one of the world's most extraordinary for the beauty and variety of the marine environment and its surrounding landscapes. Since the last Ice Age these waters have at different times been a wide strait, a large bay, a lake and now an inland sea connected to the open ocean only by narrow straits. Water exchange with the open ocean is slow, and salinity varies considerably both between north and south and over time.

The Baltic is nevertheless home to many species of plants, animals and micro-organisms in a great variety of different habitats. Most of these are at risk from human activity, and many Baltic fish populations are now thought to be dangerously low.

## DRIVERS OF CHANGE

Key threats to the marine region are excessive nutrient loading, pollution by hazardous substances, maritime transportation, fishing pressure and habitat destruction.

### Examples of drivers of change:

- **Land-based sources of pollution**

The largest share of nutrient loading in the region comes from agricultural activities which lead to a rapid growth of eutrophication. Nutrient concentrations in offshore areas have increased during most of the 20th century but stabilized during the 1980's. In response to improved water quality management between 1990 and 2006, waterborne loads of nitrogen and phosphorus have decreased by 30% and 45%, respectively.

- **Overfishing**

In the HELCOM region, industrial fisheries using modern boats and gear began developing in the 1940's, with steadily increasing catches of cod and herring until the end of the 1970's. Since the 1980's, catches of cod declined drastically, while other fisheries for sprat and herring developed.

- **Marine Invasive Species**

The traffic volume has been increasing steadily globally, and this is also reflected in the increasing number of ships entering and sailing within the Baltic Sea. Shipping activity poses threats to the marine biodiversity of the area not only from pollution (ex. oil spills), but also from the introduction of alien species. It is estimated that 45% of introduced alien species in the Baltic Sea were brought by maritime traffic.

## POLICY RESPONSES

The Convention on the Protection of the Marine Environment of the Baltic Sea Area is governed by HELCOM, which is based in Helsinki, Finland. The Convention covers the entire Baltic Sea area, including Kattegat and inland waters as well as the water of the sea itself and the sea-bed. Measures are also taken in the whole catchment area of the Baltic Sea to reduce land-based pollution. HELCOM relies on the inter-governmental cooperation of its Member States and the European Union and addresses the issues of protecting and managing marine biodiversity and the services it provides as described below.

### Policy platforms

- **HELCOM Baltic Sea Action Plan (BSAP)**

In 2007 the coastal States of the Baltic Sea and the European Union adopted the HELCOM Baltic Sea Action Plan (BSAP), based on an ecosystem approach to management. To combat nutrient pollution from land-based sources the BSAP includes explicit pollution reduction targets. In 2010 the Ministers of the Baltic Sea coastal countries and the high-level representative of the European Union agreed to review the progress made in implementing the BSAP through respective national implementation programmes. The HELCOM countries also agreed to establish a Forum for enhanced dialogue between environmental and agriculture authorities to facilitate further reduction of nutrient inputs from agriculture.

- **European Union Common Fisheries Policy and Joint Baltic Sea Fisheries Committee**

Since eight of the nine HELCOM countries are members of the European Union (EU), the Common Fisheries Policy regulates all aspects of fishing within the EU, and Member States have limited freedom to introduce national regulations. The EU Council (consisting of agriculture and fisheries Ministers of the EU Members) adopts fisheries regulations in the Baltic Sea, in consultation with the European Parliament. In 2009 the EU and the Russian Federation concluded a new agreement on fisheries and living marine resources of the Baltic Sea and established the Joint Baltic Sea Fisheries Committee. Since 2008 the regional HELCOM Fisheries-Environment Forum has provided for joint meetings for both fisheries and environment officials from the HELCOM Contracting Parties to discuss environmental effects of fisheries in the Baltic Sea.

- **International Convention for the Control and Management of Ships Ballast Water**

The HELCOM Road Map on harmonized implementation and ratification of the Ballast Water Management Convention (BWMC) in the Baltic Sea Area is an overall regional strategy adopted by the nine HELCOM countries and EU to address the transfer of alien species via ships' ballast water and sediments. The Baltic Sea countries agreed to ratify the Convention by 2010, and by 2013 at the latest. Sweden, as the first country in the Baltic Sea region, had already ratified the Convention by 2009.

**Table 1**  
State of the Marine Biodiversity in the HELCOM Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	N/A	●	●	N/A
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# Mediterranean Action Plan (MAP)

## INTRODUCTION

Over the years, going back to Phoenician times, the people of the Mediterranean have managed to overcome various threats to their survival from major conflicts in the region. A new threat is now endangering their well-being and those of future generations, primarily from activities that are causing pollution to the marine environment, the source of life for both human beings and a large variety of marine living resources in the region. Compounding this danger is the fact that apart from the flow of surface water through the Strait of Gibraltar and the Dardanelles, precipitation and river run-off, the Mediterranean is an almost enclosed sea taking over a century to be fully renewed.

## DRIVERS OF CHANGE

Human pressures on the Mediterranean environment are many and growing. In 2000, the combined Mediterranean coastal population is greater than 150 million. Projected demographic changes in the region will have significant effects on the Mediterranean environment, as demand for natural resources will dramatically increase in the south. Visitor populations (tourists) are also growing. The loss, fragmentation and degradation of habitats as a direct or indirect result of human activities are the main threat to Mediterranean marine species. Urbanization, industrialization and tourism development, are some of the main causes of this degradation. Infrastructure development is significantly affecting some of the most fragile habitats. Other crucial environmental pressures in the region include pollution, eutrophication, harmful algal blooms, invasive species spread, over-exploitation of marine resources and fisheries-related impacts on ecosystem processes.

### Main drivers of change

- **Physical alteration and destruction of habitats**  
Pressure through urban development in the coastal areas of the Mediterranean and unsustainable fishing practices such as bottom trawling has significantly affected marine and coastal habitats in the region. Furthermore, exponential growth of the tourism industry is also contributing to loss of marine and coastal habitats.
- **Overfishing**  
Total fish catch in the Mediterranean Sea area increased quickly to the mid 80s reaching around 1 million tons, and continued to fluctuate at this level. Since 2000 there has been a decline in catches. This may be a result of weak fisheries management. The number of fisheries that are rebuilding are increasing, but many stocks are fully exploited and a few stocks have collapsed.
- **Land and Sea-based sources of pollution**  
Nitrogen loads (tonnes) to the Mediterranean Sea from land-based sources are estimated at 500,100 – 750,000 tonnes per year, and has seen a steady increasing trend from pre-industrial times to present day. Over the period 1960–2000 river water discharge to the Mediterranean Sea decreased by at least 20%, with no major

differences between the eastern and western basins. During the same period river fluxes of nitrogen increased while phosphorus fluxes, after an increase in 1960-1980, declined, because of control measures achieved mainly in European pollution point sources.

- **Climate change**

Sea surface temperature of the Mediterranean Sea since 1957 has consisted of two major periods, firstly, cooling until the all-time minimum in 1978, then rapid warming to the present day at a rate of 1.2°C in 28 years. It is predicted that significant fluctuations in climate will have profound effects on marine organisms that are less tolerant of annual changes in the physical environment.

- **Marine Invasive Species**

Maritime transport in the Mediterranean reported significant growth between 1997 and 2006, with a 50% rise in the capacity in the Mediterranean. A shift from 2,565 to 3,815 million Dead Weight Transport (DWT) occurred and a 58% rise in transit, from 312 million to 492 million DWT. This growth is due mainly to ship traffic and to an increase in the size of ships. The number of calls of port has increased by 14% (from 220,665 to 252,538) and that of transit by 20% (from 8,169 to 9,812 passages) for a ship size which increased by approximately 30%. As a consequence of this rapid growth, the introduction of invasive species is a serious threat to endemic species in the region, especially in the western basin. On the other hand, in the eastern Mediterranean basin penetration via the Suez Canal is the main mode of introduction of invasive species.

## POLICY RESPONSES

Management initiatives to respond to the eroding state of biodiversity are being strengthened through the development of legislative and regulatory instruments, species identification and protection, and the creation of protected areas. A consistent, shared and regularly upgraded framework strengthens countries ability to address issues affecting marine biodiversity ranging from climate change adaptation to fisheries management. It is precisely to develop this framework that the Mediterranean Action Plan has, since 1975, spared no efforts through its legal instruments, the Barcelona Convention on the Protection of the Mediterranean Marine and Coastal Environment, and its Protocols.

### Policy platforms

- **United Nations Convention on the Law of the Sea (UNCLOS) and UN Fish Stocks Agreement**

Eight Mediterranean member states, or 38% of the total, have ratified the UN Fish Stocks Agreement. Three member states, or 14% of the total, are signatories to the UN Fish Stocks Agreement. For twelve member states, around 52% of the total, the Convention Provisions are being partially implemented.

- **Protocol of the Barcelona Convention on the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (LBS Protocol)**

All Mediterranean countries have signed or ratified the Protocol and 16 countries have accepted the LBS amendments adopted in 1996, which came into force in 2008. All Mediterranean countries have National Programmes of Action in place to address pollution from land based sources and activities.

- **Protocol of the Barcelona Convention Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA and Biodiversity Protocol)**

Marine protected and managed areas in the Mediterranean cover approximately 4% of the Mediterranean. Excluding the Pelagos Sanctuary, the area covered by coastal MPAs amounts to only 0.4% of the total surface of the Mediterranean Sea. No-take areas have been reported to account for 0.01% of the total surface of the Mediterranean.

- **International Convention for the Control and Management of Ships Ballast Water**

Six Mediterranean countries are parties to the International Convention for the Control and Management of Ships' Ballast Water and Sediments and three countries, one of which is party to the Ballast Water Management Convention, have national legislation in place for the management of ballast water.

● **Protocol of the Barcelona Convention on Integrated Coastal Zone Management in the Mediterranean**

The Protocol was adopted in 2008 with the objective to: facilitate, through the rational planning of activities, the sustainable development of coastal zones; preserve coastal zones for the benefit of current and future generations; ensure the sustainable use of natural resources, particularly with regard to water use; ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology; prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities; achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone. This Protocol is not yet in force.

**Table 1**  
**State of the Marine Biodiversity in the Mediterranean Seas**

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	N/A
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
Shipping/Ballast water	●	-	●	-

# Convention for the Protection, Management and Development of the Marine and Coastal Environment of Eastern Africa (Nairobi Convention)

## INTRODUCTION

The Eastern African region, also referred to as the Western Indian Ocean (WIO), has some of the world's most valuable coastal and marine ecosystems. The region's mangrove forests, seagrass beds, seashores, lagoons and coral reefs provide essential habitats for a rich biodiversity of species. It is conservatively estimated that the region supports more than 11,000 species of plants and animals, 15% of which are found nowhere else on Earth. More than 20% of the world's tropical inshore fish species are found exclusively in the region, as are nesting sites for 70% of the world's marine turtles. The livelihood and recreation needs of 30 million people depend on these resources. The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention) and its two Protocols are designed to combat environmental pressures from human activities.

## DRIVERS OF CHANGE

A variety of human activities including unplanned urbanization, discharge of untreated municipal waste water and industrial effluent, destructive fishing practices, overexploitation of resources, physical alteration and habitat destruction, are rapidly degrading the marine and coastal environment of the WIO region. These problems are attributed in part to low economic growth rates, poverty, rapid population growth and poor resource management.

### Main drivers of change:

- **Land and Sea-based sources of pollution**  
Five main sources of pollution in the WIO region are: microbial contamination, high suspended solids, chemical pollution, solid waste and eutrophication. The highest pollutant loads entering the WIO originate from the mainland states and Madagascar, with South Africa and Tanzania contributing approximately 80% of the overall loading of nutrients and organic matter. Pollution is mainly concentrated around specific hotspot areas that include: Mombasa, Dar es Salaam, Maputo, Durban, Tuléar, Port Luis and Port Victoria. Pollution from these hotspots affects some of the most productive areas of the coastal and marine environment such as estuaries and near-shore waters.
- **Overfishing**  
In the early 1980's industrial tuna fisheries began to exploit the seemingly unlimited tuna stocks of the region. Several species of tunas are now considered over-fished and this is likely to cause regional collapses of both tuna stocks and industrial fisheries. One of the biggest challenges faced by fisheries managers in the WIO region is the rise of illegal unreported and unregulated (IUU) fishing, which is also contributing to the overfishing in the region.
- **Physical alteration and destruction of habitats**

Physical alteration and destruction of habitats in the WIO region is caused by a range of human induced factors such as coastal erosion, removal of vegetation cover (forests, mangroves and seagrasses) and coral reef degradation. Eventually these factors lead to an overall decline in the productivity of coastal and marine ecosystems which further reduce their capability of providing expected ecosystem services.

- **Climate change**

Current assessments indicate that climate change in the WIO region is increase environmental variability, with ramifications for weather, fisheries and biodiversity. Impacts from increased sea surface temperatures on coral reef ecosystems have led to the destruction of approximately 50% of corals in the past decade. While many corals have recovered, the communities have changed considerably, particularly in the northern Indian Ocean.

- **By-catch and Illegal Harvest of Species**

The tuna fisheries industry is the largest contributor to by-catch of species such as seabirds, sea turtles, dolphins, whales, and other marine mammals. Much of the data for by-catch is limited for the region.

## POLICY RESPONSES

The Nairobi Convention is a partnership Convention. It recognizes that success in the protection, management and development of coastal and marine environments of the WIO region will depend on effective partnerships built on strategic linkages between governments, NGOs and the private sector. The Convention offers a legal framework and coordinates the efforts of the countries of the region to plan and develop programmes that strengthen their capacity to protect, manage and develop their coastal and marine environment sustainably. Many member states have also responded to the need to address many of the issues of protecting and managing marine biodiversity and the services it provides as described below.

Policy platforms

- **Nairobi Convention**

The Nairobi provides a mechanism for regional cooperation, coordination and collaborative actions. The Work Programme for the Nairobi Convention 2008-2012 will promote an ecosystem-based, multi-sector approach in policy and management, taking into consideration, whole ecosystems rather than individual components and focusing on systems integrity.

- **United Nations Convention on the Law of the Sea (UNCLOS)**

All countries of the region have ratified the framework convention for UNCLOS.

- **Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities**

This Protocol was adopted in 2010 to respond to the danger posed by various land-based sources and activities to the marine and coastal environment, affecting, among others, its rich heritage of biological diversity, coastal tourism, ports and harbors, human health and other natural and human-made endowments and resources.

- **International Convention for the Prevention of Pollution from Ships**

All countries of the region have ratified the International Convention for the Prevention of Pollution from Ships.

**Table 1**  
State of the Marine Biodiversity in the Eastern Africa Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	N/A	-

# Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (NEP)

## INTRODUCTION

The Central American coastline of the North-East Pacific hosts a variety of tropical and subtropical habitats including mangrove swamps, productive fishing grounds, and species-rich forests that extend to the water's edge. Millions of people depend on these ecosystems and their resources for food, construction materials and income from tourism-related industries. In some places using the resources of those ecosystems constitutes the only economic activity.

Over 70% of the population of Central America lives on this Pacific side, and so it is here where environmental pressures are greatest. Forest clearance, over-exploitation of resources, expanding maritime trade, rapid development, poverty, the high risk of impacts from natural events, and limited capacity to counteract those effects are some of the main challenges faced by the region. The result has been widespread loss of plant and animal species, degraded and eroded soils, destruction of biodiversity-rich mangrove areas and pollution of both coastal and inland waters.

Pollution from the land is made potentially even more damaging in the region because of the numerous sheltered bays and gulfs where the natural dispersal of oil and toxic chemicals such as agrochemicals is limited.

## DRIVERS OF CHANGE

The region is an important shipping route for vessels sailing from Panama to Alaska, and much of the oil transported from Alaska to the east coast of America transits the Panama Canal or the Laguna de Chiriqui oil pipeline. Furthermore, coastal development in the last 15-20 years is adding considerable pressures to coastal habitats. Untreated municipal wastewater remains a key challenge affecting the region.

### Main drivers of change

- **Land and Sea-based sources of pollution**  
Nutrient loading in the region has increased steadily since the pre-industrial times. As economic growth in the past 15-20 years has significantly increased, there is a growing trend in the conversion of coastal areas into agricultural land. Consequently, run-off nutrients into rivers and the marine environment have sharply increased.
- **Overfishing**  
Fish catches (tonnes) increased steadily until they peaked in the late 1980's. After which, they declined until the early 1990's from when their fish catches have remained steady.
- **Physical alteration and destruction of habitats**  
Socio-economic development in the Wider Caribbean region has put severe pressure in the conversion of habitats into other uses. Main pressures come from the development of coastal tourism infrastructure and unsustainable fishing practices.

- **Climate change**

Sea surface temperature is significantly influenced by the El Niño/Southern Oscillation events within the region. The year 2010 is now reported as the warmest on record. Recent SST data for the region shows clearly elevated temperatures, especially among near shore coastal ocean waters.

- **Marine Invasive Species**

Total shipping traffic through the major ports of the region indicate a steadily increasing flow of traffic. Furthermore, the region counts with the Panama Canal which is one of the most transited canals in the world, connecting the Atlantic Ocean and the Pacific Ocean. The risk of alien species is particularly high in the region.

## POLICY RESPONSES

The Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (NEP) encompasses eight member countries committed to the sustainable use and conservation of the marine and coastal ecosystems. Ecologically, the area hosts a variety of tropical and subtropical habitats including mangrove swamps, productive fishing grounds, and species-rich forests that extend to the water’s edge.

### Policy platforms

- **Global Programme of Action for the Protection of Marine Environment from Land-based Activities**

The NEP’s Antigua Convention specifically references land-based sources of pollution and the need to protect the coastal and marine environment from such threats. However, progress in the preparation of National Programmes of Action (NPAs) to implement the Global Programme of Action for the Protection of Marine Environment from Land-based Activities has been limited in the NEP. Costa Rica and Colombia signed the Wider Caribbean Region’s Land-Based Sources Protocol in 1999 and 2000, respectively, and Panama ratified the LBS Protocol in 2003.

- **United Nations Convention on the Law of the Sea (UNCLOS) and United Nations Fish Stock Agreement**

All NEP member countries are party to the United Nations Convention on the Law of the Sea (UNCLOS), with the exception of El Salvador and Colombia. All countries except El Salvador are signatories to the UN Fish Stock Agreement. Only Costa Rica and Panama have issued a Declaration. Compliance to the FAO Code of Conduct for Responsible Fisheries was only calculated for Mexico, which showed an overall compliance of 41%. All countries in the NEP region are also parties to the Convention of Biological Diversity (CBD) which shares several goals with the FAO Code of Conduct for Responsible Fisheries. Five countries have prepared a 4th National Report and three (Nicaragua, El Salvador, and Colombia) have prepared a 3rd National Report on the CBD. All countries in the region have prepared a National Biodiversity Strategy and Action Plan.

- **International Convention for the Control and Management of Ships Ballast Water**

In the NEP region, only Mexico has ratified the International Convention for the Control and Management of Ships’ Ballast Water and Sediments.

- **Marine Protected Areas**

The NEP region has approximately 50 MPAs among all member countries, which accounts for about 3.8% of the region.

**Table 1**  
State of the Marine Biodiversity in the NEP Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# Northwest Pacific Action Plan (NOWPAP)

## INTRODUCTION

The Northwest Pacific Region is vast and features a large variety of marine and coastal ecosystems, from cold and deep water ecosystems in the north, to seagrass beds and coral reefs in the south. The region comprises semi-enclosed marginal seas situated in both the sub-polar and temperate zones. It has spectacular marine life, commercially important fishing and mariculture grounds and rich offshore mineral resources such as oil. However, some coastal areas are among the most highly populated in the world, resulting in enormous pressures and demands on the environment. Its people are particularly dependant on the sea for their food and livelihoods. Yet their health and the health of their environment are under growing threat, mainly from land-based activities and other sources of pollution.

## DRIVERS OF CHANGE

The coastal areas of many NOWPAP Member States are densely populated with some of the world's mega cities such as Tokyo, Busan, and Shanghai. Many cities in Asia have limited wastewater infrastructure with sewage often entering coastal areas untreated. These mega-cities are also important ports which facilitate international trade - key to their economic development, but also at risk of receiving alien marine species. Behind many of these densely populated areas are intense agricultural systems and in some countries aquaculture.

### Main drivers of change

- **Overfishing**  
Fish catches (in tonnes) in the Exclusive Economic Zones (EEZs) of the western and eastern NOWPAP regional waters have increased steadily since early 1950, until the late 1980s and have generally declined since then. Catches have seen irregular growth and large fish species seem to have been replaced by smaller, less valuable species such as anchovy- and sardine-like species. Almost all commercial fish stocks are exploited, over-exploited or collapsed. Only a small percentage is rebuilding.
- **Land-based sources of pollution**  
Silica and Nitrogen are contributing to the eutrophication of coastal waters and changes in phytoplankton communities.
- **Physical alteration and destruction of habitats**  
Socio-economic development in the Northwest Pacific region has put severe pressure of transformation of habitats. Main pressures come from coastal development and aquaculture.
- **Climate change**  
Sea surface temperature is increasing due to intensification of weather systems that drive water circulation in the North Pacific.

## POLICY RESPONSES

The Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the North-West Pacific Region is the main response instrument to address the pressures on marine biodiversity in the region. NOWPAP faces the challenge of directing the action plan based on the goodwill of the member states to comply with international treaties and conventions, as there is currently no convention in place for the NOWPAP region. Nevertheless, the member states have responded to the need to address many of the issues of protecting the marine environment.

### Policy platforms

- **United Nations Convention on the Law of the Sea and United Nations Fish Stock Agreement**  
All NOWPAP Member States are parties to both Conventions. However, compliance with the FAO Code of Conduct for Responsible Fisheries is low.
- **Global Programme of Action<sup>1</sup>**  
Countries in the region as progressing towards the creation of National Programmes of Action.
- **Marine Protected Areas**  
The region currently has 87 MPAs covering over 4 million hectares. However, it is below the MPA targets set by the Convention on Biological Diversity.

**Table 1**  
State of the Marine Biodiversity in the NOWPAP Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

1 Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)

# Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR)

## INTRODUCTION

The North-East Atlantic region stretches from the coast of Greenland eastward to the North Sea, and from the Arctic Circle southward to the Straits of Gibraltar. Its habitats range from tidal mud flats to steep cliffs, from shallow estuaries to the deep seabed. Its ecosystems range from kelp forests to seagrass beds to deep cold-water coral reefs. The sea is rich in marine life, and the air above includes the East Atlantic Flyway, a migratory route for millions of birds who use the coasts for feeding and nesting.

The region faces threats through pollution, from the land, shipping and offshore installations, through pressures on fish stocks from over fishing, through coastal development, exploitation of the seabed for sand and gravel, marine litter, underwater noise and climate change impacts such as warming and acidification.

## DRIVERS OF CHANGE

The intense human activity that goes on in and around the OSPAR region places tremendous pressure on the marine ecosystem. Pollution, maritime activities, together with climate change and emerging threats, nuclear energy and oil and gas extraction all have very significant impacts.

### Main drivers of change

- **Land-based sources of pollution**  
Total inputs of nitrogen into the OSPAR region from rivers and direct discharges were relatively stable until 1996, after which they decreased. Phosphorous inputs progressively declined between 1990 and 2006.
- **Overfishing**  
The majority of fish stocks are exploited and in a number of cases there is a risk of collapse. However, there are trends that some stocks starting to rebuild. Overall fisheries catches indicate that some pressure is lessening in the region, however, reduced fish catches may also imply that fish populations have been decreasing as a result of overfishing.
- **Physical alteration and destruction of habitats**  
Pressures have been identified through dredging for navigational purposes, exploration for and development of infrastructure for oil and gas, along with development of urban infrastructure linked to coastal tourism.
- **Climate change**  
Sea surface temperatures have risen faster than the global average across the OSPAR region in the past 25 years, posing serious risks to the marine environment and its organisms.

## POLICY RESPONSES

Since 1972 the regional OSPAR Convention has worked to identify threats to the marine environment and has organized programmes and measures to ensure effective national action to combat them. The OSPAR Commission is a successful mechanism to help governments cooperate with agreed goals to ensure the quality status of the seas. Contracting Parties have in many cases also responded to the need to address many of the issues of protecting and managing marine biodiversity and the services it provides.

### Policy platforms

- **United Nations Convention on the Law of the Sea (UNCLOS) and United Nations Fish Stocks Agreement**

All Contracting Parties in the OSPAR region are parties to 1982 UNCLOS as well as to the United Nations Agreement relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks that came into force in 2001. The regulation of fisheries within the OSPAR region with European Union (EU) waters in through the EU Common Fisheries Policy (CFP), as well as by national policy and regulation. Within the region, two regional fisheries management organizations manage fisheries in international waters and highly migratory stocks: the North East Atlantic Fisheries Commission (NEAFC) and the International Commission for Conservation of Atlantic Tunas (ICCAT).

- **Global Programme of Action<sup>1</sup>**

The region contributes to the implementation of the GPA through the OSPAR Convention. Specifically, OSPAR has developed, and is now implementing, a number of theme-based strategies to address the main threats that it has identified for the Northeast Atlantic: the Eutrophication Strategy, the Hazardous Substances Strategy, and the Radioactive Substances Strategy.

- **Marine Protected Areas**

OSPAR is developing an ecologically coherent network of well-managed MPAs for the Northeast Atlantic. By May 2010, the MPA network comprised 159 nationally designated MPAs. OSPAR has recently agreed to extend this network to protect deep-sea biodiversity through the addition of six MPAs in areas beyond national jurisdiction.

**Table 1**  
State of the Marine Biodiversity in the OSPAR Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

1 Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)

# Convention for the Conservation of the Red Sea and Gulf of Aden Environment (PERSGA)

## INTRODUCTION

The Red Sea and Gulf of Aden Region supports world-renowned coral reefs, lush mangroves, and fertile seagrass beds. It is home to endemic species of seabirds, reef fish and invertebrates. The region has been used for thousands of years for fishing, trading, and the transport of religious pilgrims. Today, these same waters are used by oil tankers, cargo ships, and tourism, representing potentially serious risks to marine biodiversity in this relatively pristine marine ecosystem. Coastal populations and development are increasing the threats to biodiversity if growth is not well managed. Climate change and sea level rise are also threats for low-lying areas and coral reefs.

## DRIVERS OF CHANGE

Rapid coastal development associated with growing human use of marine and coastal resources, and the increase in maritime activities through the Red Sea and Gulf of Aden as the main east-west maritime trading route, constitute the primary challenges to protection and management of the marine environment. Major challenges include habitat destruction, non-sustainable use of living marine resources, navigation risks and risks from petroleum production and transport, urban and industrial hotspots, and the rapid expansion of coastal tourism.

### Main drivers of change

- **Physical alteration and destruction of habitats**  
Widespread destruction of coastal ecosystems has taken place through land-filling and dredging. Coastal development linked to increased populations and tourism has put severe pressure on the conversion of habitats to other uses.
- **Climate change**  
The Red Sea has been classified as one of the fastest warming regional seas due to the climate of the region; high temperature/salinity and the small temporal variability is attributed to the semi-enclosed nature of the Red Sea.
- **Overfishing**  
The some fish stocks are exploited but there are indications that some stocks are starting to rebuild.
- **Land-and Sea-based sources of pollution**  
Sea-based pollution from shipping vessels is considered a high risk in the region. Terrestrial runoff is also very low and intermittent. Nutrients from human use have localized impacts at some locations along the Red Sea and Gulf of Aden coastlines, which are often associated with untreated municipal wastewater, resulting in total increase in the amount of dissolved inorganic nitrogen loads in the Red Sea.

## POLICY RESPONSES

The regional approach addressing sustainability of the marine environment began in 1974 when the Regional Program for the Environment of the Red Sea and Gulf of Aden was launched by the Arab League Educational, Cultural, and Scientific Organization (ALECSO). This paved the way for the signing of the Regional Convention in 1982 by PERSGA member states and the development of protocols that can address some of these threats to maintain biodiversity.

### Policy platforms

- **Protocol to the Jeddah Convention Concerning Regional Co-Operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency**

The protocol was adopted in 1982 by PERSGA member countries and it entered into force in 1985.

- **Protocol to the Jeddah Convention Concerning the Protection of the Marine Environment from Land-Based Activities**

All PERSGA member states, except Somalia, have signed the Protocol with ratification proceeding in 6 countries, and two have developed final National Programmes of Action. PERSGA conducted a regional initiative in 2005-2006 which formed the “Preparatory and Fund Raising Phase” of the Regional Programme of Action for the Protection of the Red Sea and Gulf of Aden Marine Environment from Land Based Activities.

- **Protocol to the Jeddah Convention Concerning the Conservation of Biological Diversity**

PERSGA member states signed the Regional Protocol Concerning the Conservation of Biological Diversity and committed to the Establishment of a Network of Protected Areas in the Red Sea and Gulf of Aden. Eight defined marine protected areas (MPAs) in the PERSGA region cover approximately 11,000km<sup>2</sup>. There are five MPA designated sites with undefined areas, and a number of national protected areas that, as of yet, they are not included in the Network.

- **United Nations Convention on the Law of the Sea and United Nations Fish Stocks Agreement**

While no specific regional agreements on fish stocks has yet been developed, the Jeddah Convention, the Regional Action Plan, and the Regional Protocols provide a legal basis and the mechanisms for cooperation in the sustainable use of fish stocks. Of the member states only Egypt has signed the UN Fish Stocks Agreement. Djibouti, Egypt, Jordan, Somalia, Sudan, and Yemen are signatories to the United Nations Convention on the Law of the Sea.

**Table 1**  
State of the Marine Biodiversity in the PERSGA Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

# ROPME Sea Area

## INTRODUCTION

The ROPME Sea Area is endowed with valuable natural resources and considerable biodiversity of plant and animal species. The wetlands, waterfowl, mangroves, fish, marine mammals, sea turtles, corals and other forms of life are treasures of the region. There are some twenty species of dolphin and whale, all the five subtropical species of sea turtles, and more than a thousand species of fish, most of which are endemic and have high commercial value. The impacts of land-based activities on the coastal waters are significant. The regional mechanism for responding to these threats that are trans-boundary in nature is the Kuwait Convention and Action Plan which was adopted in 1978, and promotes compliance with existing international environmental agreements, including the Convention of Biological Diversity.

## DRIVERS OF CHANGE

The municipal sewage and industrial effluents from such industries as petroleum refineries, power, desalination and petrochemical plants are major contributors to pollution loads in the region. Fast development growth over the past 20 years has led to dredging and reclamation activities to become permanent features in many coastal areas with damaging effects on the marine environment. Operational and accidental oil pollution is another major challenge in the region. The operational pollution from ships and dumping of ballast water are other sources of chronic oil pollution in the region.

### Main drivers of change

- **Land-and Sea-based sources of pollution**  
Land-based uses, such as domestic and industrial discharges, are responsible for increasing nutrient enrichment in shallow coastal waters. Large amounts of industrial and desalination effluent is released into the ROPME Sea Area, with quality ranging from raw to tertiary-treated wastewater discharge. Evidence of increasing nutrient runoff in the region comes from the increasing occurrences of harmful algal blooms (HAB) in the coastal waters (also known as red tides). In terms of sea-based pollution, the ROPME Sea Area is subjected to heavy maritime traffic in its major ports, including the heaviest traffic of oil tankers in the world. Therefore, there is a continuous risk of pollution associated with maritime transportation. For example, it is estimated that roughly 2 million barrels of oil are discharged annually with ballast water in the ROPME region.
- **Physical alteration and destruction of habitats**  
Coastal tourism and development in the region has put severe pressure on the conversion of habitats to other use, mainly through dredging and reclamation activities.

- **Climate change**

Sea surface temperature indicate a rising trend. The 1990's have been recognized as the beginning of a warming period with extreme temperatures recorded in 1996 and 1998 which corresponds to almost 100% coral mortality during bleaching events. The ROPME Sea Area is expected to increase in severity and frequency, which will result in high levels of mortality in marine biota, as evidenced by previous warming episodes in the region.

## POLICY RESPONSES

With strengthening environmental governance in the region, ROPME has developed protocols through the engagement of member states, addressing the critical issues of environmental management. The Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution has related protocols that were developed in accordance with the recommendations of the Legal Component of the Kuwait Action Plan.

### Policy platforms

- **Protocol to the Kuwait Convention Concerning Regional Co-operation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency**

The protocol was adopted in 1978 by ROPME Member Countries and it entered into force in 1979.

- **Protocol to the Kuwait Convention Concerning the Protection of the Marine Environment from Land-Based Activities**

ROPME's workplans and programmes usually integrated land-based activities. member states have mainstreamed management of land-based activities in their domestic environmental policies. However, implementation has produced varying degrees of success.

- **Protocol to the Kuwait Convention Concerning the Conservation of Biological Diversity and the Establishment of Protected Areas**

The protocol is currently under negotiations by member states. However, there are more than 93 declared and proposed marine protected areas in the ROPME Sea Area. This indicates increasing conservation efforts in the region, as the number and the spatial coverage of MPAs in the area is expanding.

**Table 1**  
State of the Marine Biodiversity in the ROPME Sea Area

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	N/A		●	N/A
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
Others	-	●	●	-
Shipping/Ballast water	●	-	●	-

# South Asian Seas Programme (SASP)

## INTRODUCTION

The South Asian Seas (SAS) region can be categorised into two distinct geographical groups. While Maldives and Sri Lanka are island nations, Bangladesh, India and Pakistan are situated on the Asian mainland. The region has some of the largest and most biologically rich marine ecosystems, such as the Gulf of Mannar, Atolls of Maldives and Mangroves of Sundarbans. The presence of perennial rivers such as the Brahmaputra, Ganges, Godavari, Indus, Kelani, Magna, etc. have contributed to large networks of backwaters, estuaries, salt marshes and mangroves. The region also provides habitats for endangered marine turtles, for example the Green and Olive Ridley turtles. Some of the largest coastal lagoons of the world, such as Chilka Lake in India and Puttalam Lagoon in Sri Lanka, are located within the region. It contains some of the world's finest coral ecosystems, with atolls constituting the entire country of the Maldives. The Lakshadweep and Nicobar group of islands of India and a few regions of Sri Lanka also have fringing reefs.

## DRIVERS OF CHANGE

The coastal areas of the SAS region face many environmental challenges resulting from reduced environmental management and other human use impacts. These include loss of biodiversity, fresh water depletion and degradation, solid waste management, degradation of air quality, environmental health issues, degradation and depletion of coastal and marine resources, and natural disasters.

### Main drivers of change

- **Land-based sources of pollution**  
Agriculture and urban activities are major sources of phosphorous and nitrogen to marine ecosystems, contributing to coastal eutrophication. Nevertheless, the runoff from agricultural fields contain large amounts of nitrogen and phosphorous and residues of insecticides. This has resulted in South Asian becoming a hotspot of river export of nutrients, which can be attributed to high runoff, high relief and large human pressures.
- **Overfishing**  
The majority of fish stocks are fully exploited in the region, with a considerable number of stocks collapsed. However in the last few years, the level of catches from near-shore marine sector has declined slightly. This can be attributed to effects from the December 2004 tsunami in which thousands of fishermen lost their lives and a large number of fishing vessels were damaged or totally destroyed.
- **Physical alteration and destruction of habitats**  
Coastal tourism and development in the region has put severe pressure to convert habitats to other uses, mainly through poor land-use planning, land degradation and desertification. Clearance of mangroves for timber, fuel wood and in some areas total clearance for shrimp farming has been widespread in the region.

- **Climate change**

The sea surface temperature (SST) in the region shows a sharp seasonal variation, with a generally increasing trend. Changes in the SST can alter the physical environment and therefore impact marine biodiversity in the region, particularly those species less-tolerant changes.

## POLICY RESPONSES

The South Asian Seas Action Plan focuses on Integrated Coastal Zone Management (ICZM), oil-spill contingency planning, human resource development and the environmental effects of land-based activities. Although there is no regional convention yet, the Action Plan follows existing global environmental and maritime conventions and considers the Law of the Sea as its umbrella convention.

### Policy platforms

- **South Asian Seas Action Plan**

The Action Plan was adopted in 1995 and entered into force in 1997.

**Table 1**  
State of the Marine Biodiversity in the SAS Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
Others	-	●	●	-
Shipping/Ballast water	●	-	●	-

## Convention for the Protection of Natural Resources and Environment of the South Pacific Region (Noumea Convention)

### Secretariat of the Pacific Regional Environment Programme (SPREP)

## INTRODUCTION

The Pacific Ocean has always been an intrinsic part of life for the people from the 21 island states and territories of the Pacific. The Pacific Ocean provides food, transport, and a source of pride and identity for the five million Pacific island inhabitants.

Many Melanesian, Micronesian and Polynesian cultures have all traditionally emphasized wise resource use and environmental stewardship. However, economic development, urban drift, rapid population growth, dissatisfaction with subsistence lifestyles and increasing participation in the cash economy threaten the many ecosystems that were once largely unspoiled and sustainable. Terrestrial habitats are rapidly being destroyed by logging and agriculture with inevitable downstream effects on coastal and reef systems.

## DRIVERS OF CHANGE

The Pacific states especially islands are experiencing rapid population growth with few natural resources to base economic growth. Furthermore, long distances to markets, lack of cheap energy and access to technology add pressures to the extraction of these resources. For the region, the reliance on the marine environment for food security, income and economic development is pivotal. Consequently, the main drivers of change come from pollution from both land- and sea-based sources, fish and wildlife are over-harvested, invasive species are displacing native biota, and climate induced sea level rise threatens low-lying islands and coasts.

### Main drivers of change

- **Overfishing**  
The Pacific Islands region supports the largest industrial tuna fisheries in the world, and it is these tuna fisheries that many Pacific Island countries depend on for revenue and income generation. Coastal fisheries are also extremely important for subsistence, artisanal and semi-commercial catches, though it is widely acknowledged that most coastal fisheries in the Pacific Islands region are over-exploited. Stocks of big-eye tuna resources are not yet in an over-fished state, but are at risk of being over-fished in the next few years with regards to both total biomass and spawning biomass.
- **Land-based sources of pollution**  
Much of the SPREP region has seen high yields of all forms of nitrogen due to increased water run-off and anthropogenic activities. It is estimated that the discharge of nitrogen to surface waters will increase by 24% to 30% for the SPREP region in the next 40 years.
- **Physical alteration and destruction of habitats**  
The main pressures have been identified as poor solid waste management and land-use practices. Also the utilization of unsustainable fishing practices have contributed to the destruction of coastal habitats.

- **Climate change**

The sea surface temperature of the tropical Pacific Ocean varies spatially and temporally because more solar heat is absorbed by the ocean near the equator than at higher latitudes. However, there are some regional deviations to this large-scale pattern, due to the El Niño Southern Oscillation. In general, average SSTs are warmer in the western Pacific compared to the eastern Pacific

- **Marine invasive species**

The region has seen an increase in total shipping traffic representing a high risk in the introduction of marine invasive species into the region. Furthermore, the rate of accidental introductions is increasing, as there is more movement of people and goods around the region. Invasive species is rapidly becoming a major threat to biodiversity in many islands of the SPREP region.

## POLICY RESPONSES

The Secretariat of the Pacific Regional Environment Programme is the primary regional organization concerned with environmental management in the Pacific, and serves as the Secretariat for three Conventions. Appropriate policy and legal frameworks for action at national and regional levels are being developed and SPREP member states continue to work hard to strengthen environmental education and raising awareness so that their citizens can be empowered to safeguard their natural resources, lifestyles and economic development.

### Policy platforms

- **Regional Fisheries Management Organizations**

Regional cooperation, coordination, and harmonization for fisheries management amongst the SPREP Member Countries are well supported by the Forum Fisheries Agency. In a number of instances, regional fisheries cooperation has been formalized through regionally-adopted instruments, which aim to strengthen the conservation and management of shared fisheries in the region and to put in place arrangements that will facilitate long-term sustainable and responsible practices.

- **Protocol to the Noumea Convention for the Prevention of Pollution of the South Pacific Region by Dumping**

Many countries have not formalized a National Programme of Action for the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities.

- **Action Plan for Managing the Environment of the Pacific Islands Region**

The SPREP region has experienced remarkable proliferation of MPAs in the last decade. The approaches being developed at national levels are built on a unique feature of the region, customary tenure and resource access, and makes use of, in most cases, existing community strengths in traditional knowledge and governance, combined with a local awareness of the need for action, resulting in what have been termed Locally Managed Marine Areas.

- **International Convention for the Control and Management of Ships Ballast Water**

Of the SPREP member countries, only the Cook Islands, Kiribati, Marshall Islands, and Tuvalu have acceded to the Convention. However, in 2006, a Regional Strategy on Shipping Related Invasive Marine Pests in the Pacific with a regional action plan on marine invasive species for the SPREP region was developed. One of the activities in the regional action plan is to develop a model Ballast Water Management Act.

**Table 1**  
**State of the Marine Biodiversity in the SPREP Region**

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
<b>Water quality</b>				
Nutrients	●	-	●	●
Temperature	●	-	●	●
Acidification	●	●	●	●
<b>Marine Fauna: Fish and fisheries</b>	●	●	●	●
<b>Others</b>	-	●	●	-
<b>Shipping/Ballast water</b>	●	-	●	-

[www.unep.org](http://www.unep.org)

United Nations Environment Programme  
P.O. Box 30552 Nairobi, Kenya  
Tel.: ++254-(0)20-62 1234  
Fax: ++254-(0)20-62 3927  
E-mail: [cpinfo@unep.org](mailto:cpinfo@unep.org)



Biological diversity of the 72% of our planet covered by seawater is crucial to global resource security, ecosystem function and services, and climate dynamics.

Current and future trends in marine biodiversity remain an important element to be fully assessed by the international community. It would be valuable to understand where are the current threats to marine biodiversity and what are the potential management response to mitigate these threats.

The Marine Biodiversity Assessments and Outlook Series covered by the 18 Regional Seas Conventions and Action Plans addresses this gap by focusing on Pressure, State and Response indicators that provide an outlook into the current trends in marine biodiversity in the regions. Furthermore, by synthesizing current pressure points at the regional level there is the potential to identify the key global drivers of change for marine biodiversity and to identify suitable management responses through the engagement of policy makers.

The series includes nutrient loading data supplied by the Global NEWS group and fisheries data by the Sea Around Us Project. The background, full reports, sources of information, references and analysis of information to these reports can be found at [www.marinebiodiversityseries.org](http://www.marinebiodiversityseries.org).



Convention on  
Biological Diversity

### UNEP Regional Seas Programme

The Regional Seas Programme, launched in 1974 in the wake of the 1972 United Nations Conference on the Human Environment held in Stockholm, is one of UNEP's most significant achievements in the past 30 years.

The Regional Seas Programme aims to address the accelerating degradation of the world's oceans and coastal areas through the sustainable management and use of the marine and coastal environment, by engaging neighboring countries in comprehensive and specific actions to protect their shared marine environment. It has accomplished this by stimulating the creation of Regional Seas programmes prescriptions for sound environmental management to be coordinated and implemented by countries sharing a common body of water.

Today, more than 183 countries participate in 18 Regional Seas Programmes. Six of these programmes, are directly administered by UNEP.

### Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is an international legally binding treaty that entered into force on 29 December 1993. It has 3 main objectives:

1. The conservation of biological diversity
2. The sustainable use of the components of biological diversity
3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

The Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June

1992 and entered into force on 29 December 1993.

2010 is the International Year of Biodiversity. The Secretariat of the Convention on Biological Diversity is the focal point for the International Year of Biodiversity.

### **University of British Columbia, Fisheries Centre**

The Fisheries Centre, located at the University of British Columbia, promotes multidisciplinary study of aquatic ecosystems and broad-based collaboration with maritime communities, government, NGOs and other partners. The Fisheries Centre is the focal point for development of the widely-used Ecopath with Ecosim approach and software.

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