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Draft report on Implementation of the Programme of Work on Marine and Coastal Biodiversity

DRAFT REPORT ON IMPLEMENTATION OF THE PROGRAMME OF WORK ON MARINE AND COASTAL BIOLOGICAL DIVERSITY

BACKGROUND

1. The Conference of Parties to the Convention on Biological Diversity indicated, in annex I to decision VII/5, that the elaborated programme of work on marine and coastal biodiversity would be effective for a six-year time period (2004-2010) at which point its implementation would be reviewed in depth, and the programme of work revised, as necessary.

2. In the annex to decision VII/31, the Conference of the Parties decided to undertake the in-depth review of the programme of work on marine and coastal biological diversity at its tenth meeting. The review will be undertaken in accordance with guidelines provided in annex III to decision VIII/15.

3. In order to facilitate this review, the CBD Secretariat, with kind support from the UNEP Division of Environmental Policy Implementation (DEPI), has prepared this document based on compilation and synthesis of information submitted by Parties, other governments and organizations through national and voluntary reports, as well as from other appropriate sources. Upon the completion of the peer-review process and further revision, this document will be used for the preparation of a pre-session document on the in-depth review of progress made in the implementation of the programme of work on marine and costal biodiversity to be submitted to the fourteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 14), scheduled for May 2010. The full final document will be submitted as an information document.

4. The present document is organized in three main sections. The first section provides a brief update on the global status and trends of marine and coastal biodiversity, focusing on selected ecosystems and species. This section also summarizes the status of the global 2010 sub-targets related to marine and coastal biodiversity. The second section reviews the implementation of the programme of work at the national, regional and global levels. It summarizes actions taken by Parties, other governments and regional and international organizations to implement the programme of work. The section is organized in six chapters corresponding to the programme elements of the programme of work on marine and coastal biological diversity. These chapters are (i) implementation of integrated marine and coastal area management (IMCAM); (ii) marine and coastal living resources; (iii) marine and coastal protected areas; (iv) mariculture; (v) invasive alien species; and (vi) general. The third and final section reviews main barriers to implementation of the programme of work and priorities for capacity building to address these barriers.

GLOBAL STATUS AND TRENDS OF MARINE AND COASTAL BIODIVERSITY

5. In order to understand whether activities in the programme of work on marine and coastal biological diversity are having the desired effect, it is essential to assess the status and trends of biodiversity in the world's coasts and oceans. The first section of this chapter will summarize status and trends for selected ecosystems and species, while the second section will focus on the 2010 sub-targets related to marine and coastal biodiversity.

Status of coastal areas

Estuaries and other coastal areas

6. Worldwide, there are about 1,200 major estuaries covering some 500,000 km^2. Some idea of their status can be obtained from a study[1] of the magnitude and causes of ecological change in 12 estuaries and coastal seas[2] in Europe, North America, and Australia from the onset of human settlement to the present day, using paleontological, archaeological, historical and ecological records to trace changes in important species, habitats, water quality parameters and species invasions. The primary cause of estuarine damage is human exploitation, which has caused 95% of species depletions and 96% of extinctions, often in combination with habitat destruction. Most mammals, birds and reptiles in estuaries were depleted by 1900 and had declined further by 1950. Among fish, salmon and sturgeon were depleted first, followed by tuna and sharks, cod and halibut, herring and sardines. Oysters were the first invertebrate resource to degrade due to their value and accessibility as well as destructive harvesting methods. Human impacts have also destroyed over 65% of seagrass and wetland habitat, degraded water quality and accelerated species invasions.

7. Some species, notably some shorebirds and seals, are recovering, with the majority of recoveries due to reduction of human activities in coastal waters, including resource exploitation, habitat destruction and pollution. Conservation efforts have led to partial recovery of upper trophic levels, but have so far failed to restore former ecosystem structure and function. These trends suggest that estuaries may have passed the low point and are on the path to recovery, at least in countries where population growth pressures are not rising. In the coming years, invasive species and climate change may play a larger role in stressing estuarine resources.

Mangroves

8. Global mangrove cover is estimated at 15.2 million ha, with the largest areas in Asia and Africa followed by North and Central America. Twenty percent, or 3.6 million ha have been lost from the 18.8 million ha covering the planet in 1980. The rate of net loss appears to have slowed recently but is still very high: about 185,000 ha were lost every year in the 1980s, but annual rate of loss in the years 2000-2005 was about 102,000 ha[3]. The major causes of mangrove decline are conversion to aquaculture, agriculture, and urban, residential and tourism development.

9. Attention to this ecosystem has grown since the 2004 tsunami, which raised awareness of the value of mangroves, particularly in terms of shore protection. The 2007 global review by FAO identified 2900 national and subnational data sets on the extent of mangrove forests. Extensive replanting programmes have been initiated, particularly in South East Asia, which should lead ultimately to increased extent and reduction in the rate of loss but not necessarily to the full associated biodiversity contained in original mangrove forests.

10. Additional global information on mangroves should be available in 2009 when UNEP-WCMC releases the revised edition of the World Atlas of Mangroves.

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1 Duarte, C.M. (2002). The future of seagrass meadows. Environmental Conservation 29: 192-206

2 Lotze, H.K., Lenihan, H.S., Bourque, B.J., Bradbury, R.H., Cooke, R.G., Kay, M.C., Kidwell, S.M., Kirby, M.X., Peterson, C.H., Jackson, B.C. (2006) Depletion, degradation and recovery potential of estuaries and seas. Science 23 (312) 5781: 1805-1809.

3 FAO (2007) The World's Mangroves 1980-2005. FAO Forestry Paper 153, FAO, Rome

Status of marine shallow water areas

Coral reefs

11. According to the Global Coral Reef Monitoring Network (GCRMN), estimates assembled through the expert opinions of 372 coral reef scientists and managers from 96 countries are that the world has effectively lost 19% of the original area of coral reefs; 15% are seriously threatened with loss within the next 10-20 years; and 20% are under threat of loss in 20-40 years. The latter two estimates have been made under a "business as usual" scenario that does not consider the looming threats posed by global climate change or that effective future management may conserve more coral reefs. However, 46% of the world's reefs are regarded as being relatively healthy and not under any immediate threats of destruction, except for the "currently unpredictable" global climate threat. These predictions carry many caveats.

12. 2005 was the hottest year in the Northern Hemisphere since 1998 and this resulted in massive coral bleaching and hurricanes throughout the wider Caribbean in 2005 killing many corals and further damaging their reefs.

13. However, coral reefs in the Indian Ocean, especially in the Seychelles, Chagos and the Maldives, and Palau in the Western Pacific, have continued to recover from the devastating bleaching of 1998.

14. Degradation of coral reefs near major human population centres continues, with losses of coral cover, fish populations and probably biodiversity in general.

15. There is increasing evidence that global climate change is having direct impacts on more and more coral reefs with clear evidence that rising ocean acidification will cause greater damage into the future.

16. Coral reef declines will have alarming consequences for approximately 500 million people who depend on coral reefs for food, coastal protection, building materials and income from tourism. This includes 30 million who are virtually totally dependent on coral reefs for their livelihoods or for the land they live on (atolls)4.

17. These findings are consistent with an earlier (2006) report by UNEP-WCMC and UNEP GRID Arendal5, highlighting new findings which indicate that the ability of coral reefs to survive in a globally-warming world may crucially depend on the levels of pollution to which they are exposed.

Seagrasses

18. Seagrasses cover approximately 0.1 – 0.2% of the global ocean, and are of major importance for biodiversity as habitat for fish, birds and invertebrate species; as a major food source for endangered species such as dugong, manatee and green turtle; and for nutrient cycling and stabilizing sediments. The services seagrasses provide in the form of nutrient cycling are valued at an estimated $1.9 trillion per year, while their support for commercial fisheries is estimated to be worth as much as \$3500 ha^{-1} yr^{-1}6

19. A recent comprehensive global analysis of the change in areal extent of seagrass populations demonstrates that, since the earliest records in 1879, seagrass meadows have declined in all areas of the globe where quantitative data are available, including both high and low latitudes. The study found that

4 Wilkinson, C. (2008) Status of coral reefs of the world: 2008. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia, 296 p.

5 UNEP (2006) Our Precious Coasts - Marine Pollution, Climate Change and the Resilience of Coastal Ecosystems. http://www.unep-wcmc.org/resources/PDFs/Corals/vitalcoastreport_lr.pdf

6 Waycott, M. et al (2009) Accelerating loss of seagrasses across the globe threatens coastal ecosystems. PNAS vol. 106 no. 30 12377-12381.

seagrasses have been disappearing at a rate of 110 km^2 yr^{-1} since 1980 and that 29% of the known areal extent has disappeared since seagrass areas were initially recorded in 1879. Furthermore, rates of decline have accelerated from a median of 0.9% yr^{-1} before 1940 to 7% yr^{-1} since 1990. Seagrass loss rates are comparable to those reported for mangroves, coral reefs, and tropical rainforests and place seagrass meadows among the most threatened ecosystems on earth[7].

20. The declining trends have also been recorded by two global seagrass monitoring programmes: SeagrassNet (www.seagrassnet.org) and Seagrass Watch (www.seagrasswatch.org), as well as in the 2003 UNEP-WCMC World Atlas of Seagrasses. Additionally, smaller scale studies have shown that seagrass beds are undergoing significant declines in both extent and health[8], and these losses are expected to accelerate, particularly in South-East Asia and the Caribbean, as human pressures on the coastal zone grow[9].

21. Seagrass decline is attributed to the immediate impacts of coastal development, dredging activities and growing human populations, including as a result of deteriorating water quality. Storm damage, episodes of wasting disease, ecological degradation and climate change also impact seagrasses. Seagrass losses disrupt important linkages between seagrass meadows and other habitats, and their ongoing decline is likely producing much broader and long-lasting impacts than the loss of the meadows themselves. Improved water quality and habitat remediation have been shown to be effective in restoring the health and extent of seagrass meadows[10].

Shellfish reefs

22. Just as coral reefs are critical to tropical marine habitats, bivalve shellfish are the ecosystem engineers of bays and estuaries, creating habitats for a diversity of plants and animals. Shellfish reefs also provide important services to people and nature by filtering water, providing food and habitat for fish, crabs and birds, and serving as natural coastal buffers from boat wakes, sea level rise and storms[11].

23. Centuries of intensive fisheries extraction exacerbated by more recent coastal degradation have put oyster and other shellfish reefs near or past the point of functional extinction worldwide. Oyster reefs are one of, and likely the most, imperiled marine habitat on earth: oyster reefs are in poor condition, having declined more than 90% from historic levels, in 70% of bays and 63% of the world's marine ecoregions. Even more troubling, oyster reefs are functionally extinct (>99% loss of reefs) in 37% of estuaries and 28% of ecoregions. Globally, an estimated 85% of oyster reefs have been lost—even greater than the losses reported for other important habitats including coral reefs, mangroves, and seagrasses. Although oyster reefs are beginning to receive some conservation attention, they remain an obscure ecosystem component and still are vanishing at sometimes alarming rates[12].

24. Many factors have contributed to the profound loss of reefs around the world. These threats continue largely unabated today. They include destructive fishing practices and overfishing that directly alter the physical structure of reefs and health of oyster populations; the increase, incidence and severity of disease and parasite outbreaks due to the translocation of shellfish and introduction of non-native

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7 Waycott, M. et al (2009) Accelerating loss of seagrasses across the globe threatens coastal ecosystems. PNAS vol. 106 no. 30 12377-12381

8 T.J.T. Murdoch, A.F. Glasspool, M. Outerbridge, S. Manuel, J. Ward, J. Gray, A. Nash, K. A. Coates, J. Pitt, J.W. Fourqurean, P.A. Barnes, M. Vierros and S.R. Smith (2006) Sustained, catastrophic mortality in the offshore seagrass meadows of Bermuda. *Marine Ecology Progress Series.*

9 Duarte, C.M. (2002) The future of seagrass meadows. *Environmental Conservation* 29:192-206.

10 Waycott, M. et al (2009) Accelerating loss of seagrasses across the globe threatens coastal ecosystems. PNAS vol. 106 no. 30 12377-12381

11 Shellfish Reefs at Risk: A Global Analysis of Problems and Solutions www.nature.org/shellfish

12 Shellfish Reefs at Risk: A Global Analysis of Problems and Solutions www.nature.org/shellfish

shellfish; coastal development activities such as filling ("land reclamation") and dredging of shipping channels; and upstream activities such as altered river flows, dams, poorly managed agriculture and urban development that impact the quality and quantity of water and sediment. Shellfish reefs and beds are essential to the health of marine ecosystems, yet they are almost always solely managed as fisheries rather than in an ecosystem approach context. Replacement of wild species with non-native shellfish also threatens the biodiversity and viability of shellfish reefs13.

Status of deep sea ecosystems

Cold water coral reefs

25. Cold water corals are a taxonomically and morphologically diverse collection of organisms distinguished by their occurrence in deeper and colder oceanic waters. They can form large reefs, or occur singly or in tree-like thickets, and are fragile and easily damaged. Although the entire global extent of cold water coral reefs is not known, they are estimated to cover 284,300 km^2, mainly on the edge of continental shelves or on seamounts. They provide habitat for many fishes and invertebrates and enhance biological diversity of deepwater ecosystems14. Radioactive dating techniques have shown that some living banks and reefs are up to 8000 years old, and geological records indicate that cold-water coral reefs have existed for millions of years. Major reef-forming species include *Lophelia pertusa*, *Madrepora oculata*, *Solenosmila variabilis* and *Oculina varicosa* (ivory tree coral). It is estimated that more than a hundred deep-sea coral and sponge species live in the North Pacific off Alaska, at least 34 of which are corals. Researchers estimate that roughly 800 species of stony corals alone have yet to be discovered15.

26. Many cold water coral reefs have been damaged by bottom fishing activities, but the extent of this damage has not been quantified. Most of the reefs studied thus far show physical damage from trawling activities.Because of their vulnerability to damage from bottom trawling, and their very slow rate of recovery (decades to centuries as most cold water coral reefs grow slowly), most recent conservation efforts have focused on preventing fisheries damage, although damage from other activities on the ocean bottom (for example energy exploration) and climate change. In recent years there has been rapidly increasing awareness about these communities, as well as increase in research and action to protect them16.

27. Ocean acidification presents a potentially serious future threat to cold water coral reefs. Increase in atmospheric carbon dioxide CO2) can increase the acidity of seawater through increased CO2 dissolution. Acidic water de-saturates aragonite in water, making conditions unfavourable for corals to build their carbonate skeletons. Current research predicts that tropical coral calcification would be reduced by up to 54% if atmospheric carbon dioxide doubled. Because of the lowered carbonate saturation state at higher latitudes and in deeper waters, cold-water corals may be even more vulnerable to acidification than their tropical counterparts. Also, the depth at which aragonite dissolves could become shallower by several hundred metres, thereby raising the prospect that areas once suitable for cold-water coral growth will

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13 Shellfish Reefs at Risk: A Global Analysis of Problems and Solutions www.nature.org/shellfish

14 Hourigan, T.F. (ed) (2008) The Status of Cold-Water Coral Communities of the World: A Brief Update. In: Wilkinson, C. Status of coral reefs of the world: 2008. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia.

15 Secretariat of the Convention on Biological Diversity (2008). Synthesis and Review of the Best Available Scientific Studies on Priority Areas for Biodiversity Conservation in Marine Areas beyond the Limits of National Jurisdiction. Montreal, Technical Series No. 37, 63 pages.

16 Hourigan, T.F. (ed) (2008) The Status of Cold-Water Coral Communities of the World: A Brief Update. In: Wilkinson, C. Status of coral reefs of the world: 2008. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia.

become inhospitable in thefuture.[129] It is predicted that 70% of the 410 known locations with deep-sea corals may be in aragonite-undersaturated waters by 2099[17].

Seamounts

28. Our knowledge of seamounts and their fauna is still very limited, with only a very small fraction of them sampled and virtually no data available for seamounts in large areas of the world, such as the Indian Ocean. Although seamount biodiversity is still poorly understood on a global scale due to lack of sampling and exploration, available research results suggest that seamounts are often highly productive ecosystems that can support high biodiversity and special biological communities, including cold-water coral reefs, as well as abundant fisheries resources. Some evidence suggests high levels of endemic species on seamounts, although these levels may vary between individual seamounts, regions and taxa, and may, in some cases, be limited to species with low dispersal ability[18].

29. Seamounts are often linked with cold water coral reefs and they also support populations of deep-sea fish. They may be vulnerable because of their geographical isolation, which for some species may indicate genetic isolation. Seamount fish are particularly vulnerable to exploitation due to the fact that they are long-lived, slow to mature, and produce only a few offspring. Research has shown that seamount fisheries collapse faster and recover slower than non-seamount fisheries. The fisheries on many known seamounts are already overexploited, with the benthic communities seriously damaged by the impact of heavy bottom trawling and other fishing gear. Catches of seamount species rapidly increased in the 1970s and peaked by the early 1990s, by which time it is likely that almost all productive seamounts were accessible to fisheries. It has been suggested that the apparent increase in catch was sustained by serial depletions of previously unexploited and inaccessible stocks[19].

30. The biggest current threat to seamounts comes from unsustainable fishing activities, which may result in serial depletion and reduced genetic diversity of exploited species, as well as in damage to benthic communities from bottom fishing activities. Many scientists are cautious about the ability of seamount areas to support intensive exploitation. Other threats include the mining of deep-water corals associated with seamounts for the jewelry trade, bioprospecting, potential future seabed mining related to mineral resources of ferromanganese crusts and polymetallic sulphides (from vents, which may occur at some younger seamounts). Climate change may also present a future threat as seamount community structure may change because of differences in species' thermal preference and changes in ocean current patterns.[20]

Hydrothermal vents

31. Hydrothermal vents are found along all active mid-ocean ridges and back-arc spreading centers. The InterRidge Hydrothermal vent Database lists 212 separate known vent sites and there are likely to be more. Our knowledge about where hydrothermal vents occur, and how extensive they are, is far from

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17 Secretariat of the Convention on Biological Diversity (2008). Synthesis and Review of the Best Available Scientific Studies on Priority Areas for Biodiversity Conservation in Marine Areas beyond the Limits of National Jurisdiction. Montreal, Technical Series No. 37, 63 pages.

18 Secretariat of the Convention on Biological Diversity (2008). Synthesis and Review of the Best Available Scientific Studies on Priority Areas for Biodiversity Conservation in Marine Areas beyond the Limits of National Jurisdiction. Montreal, Technical Series No. 37, 63 pages.

19 Secretariat of the Convention on Biological Diversity (2008). Synthesis and Review of the Best Available Scientific Studies on Priority Areas for Biodiversity Conservation in Marine Areas beyond the Limits of National Jurisdiction. Montreal, Technical Series No. 37, 63 pages.

20 Secretariat of the Convention on Biological Diversity (2008). Synthesis and Review of the Best Available Scientific Studies on Priority Areas for Biodiversity Conservation in Marine Areas beyond the Limits of National Jurisdiction. Montreal, Technical Series No. 37, 63 pages.

complete, as is our knowledge about their biodiversity and ecology. It is known that vent sites support exceptionally productive biological communities in the deep sea, and vent fauna range from tiny chemosynthetic bacteria to tube worms, giant clams, and crabs. 91% of species in and around vents are endemic; micro-organisms predominate and thousands of low-abundance populations account for most of the observed diversity between phyla[21].

32. There have only been very minor known impacts to vents from scientific research. Scientific research may entail physical disturbance or disruption, or the introduction of light into an ecosystem that is naturally deprived of it. A Code of Conduct for the Scientific Study of Marine Hydrothermal Vent Sites is under development. It should be noted, though, that both the guidelines and the Code are voluntary measures[22].

33. Mining of polymetallic sulphide deposits associated with vent systems poses a future threat, which is moving closer to becoming a reality, at least within national EEZs. Because the extraction of polymetallic sulphide deposits will be relying on new technologies and methods, its impacts are as of yet unknown. It is expected that the drifting particles produced by deep-sea sulphide mining have the potential to smother, clog, and contaminate nearby vent communities. Organisms surviving these perturbations would be subject to a radical change in habitat conditions with hard substrata being replaced by soft particles settling from the mining plume. Mining could also potentially alter hydrologic patterns that supply vent communities with essential nutrients and hot water. A further problem may arise during dewatering of ores on mining platforms, resulting in discharge of highly nutrient enriched deep-water into oligotrophic surface waters, which can drift to nearby shelf areas. These impacts may extend beyond national EEZs into international waters. Because most invertebrate diversity at vents is found in rare species, habitat destruction by mining can be potentially devastating to local and regional populations[23].

Status of open ocean (pelagic) areas

Status of fisheries

34. According to the FAO, an overall review of the state of marine fishery resources confirms that the proportions of overexploited, depleted and recovering stocks have remained relatively stable in the last 10–15 years, after the noticeable increasing trends observed in the 1970s and 1980s with the expansion of fishing effort. In 2007, about 28 percent of stocks were either overexploited (19 percent), depleted (8 percent) or recovering from depletion (1 percent) and thus yielding less than their maximum potential owing to excess fishing pressure. A further 52 percent of stocks were fully exploited and, therefore, producing catches that were at or close to their maximum sustainable limits with no room for further expansion. Only about 20 percent of stocks were moderately exploited or underexploited. Most of the stocks of the top ten exploited species worldwide, which together account for about 30 percent of the