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Ecosystem-Based Management in Multilateral Environmental Agreements:
Progress towards Adopting the Ecosystem Approach in the International Management of Living Marine Resources

By Duncan E.J. Currie

EXECUTIVE SUMMARY

Introduction

This paper examines various multilateral environmental agreements which are concerned with the management of living marine resources in order to elicit the way in which ecosystem-based management and the ecosystem approach are addressed in these instruments or applied in the decisions and recommendations made under the conventions. It is particularly concerned with the meaning, scope, and implications of the ecosystem approach for the management of marine ecosystems, particularly within multilateral environmental agreements. It is also concerned with the implications of the ecosystem approach for the management of predators such as whales, as well as the management of associated and dependent species and species at different trophic levels, i.e. at different levels in the food chain.

The paper examines the meaning of ecosystem-based management (EBM) and the ecosystem approach, their definition and implications. In so doing, it discusses the linkages between EBM, the ecosystem approach and the ecosystem approach to fisheries, as well as the meaning of sustainability. The recent promotion of the ecosystem approach within the United Nations General Assembly, including its ICP (informal consultative process on oceans and the law of the sea) and its Sustainable Fisheries and Oceans resolutions and the framework of the Law of the Sea Convention and the Fish Stocks Agreement is described, as is the role of the Food and Agriculture Organization (FAO) and its various instruments. A brief survey of the adoption of the ecosystem approach in Regional Fisheries Mamagement Organisations (RFMOs) follows. A number of multilateral environmental agreements concerned with the international management of living marine resources are examined, including the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Ramsar Convention, the Convention on Migratory Species (CMS), conventions related to Antarctica, international watercourse conventions and the International Convention for the Regulation of Whaling.

Definition of Ecosystem Approach

This analysis shows that the internationally understood definition and implication of the ecosystem approach is as follows. The ecosystem approach emphasises a holistic, participatory and integrated approach and is contrasted with a more narrowly focused biological and usually single species-oriented

approach. It aims to manage human interactions with ecosystems and all associated organisms, rather than only individual species. As the term ecosystem-based management shows, it is management based on the properties of the relevant ecosystem(s), rather than a single species. The focus of management is maintaining the natural structure and function of ecosystems, including the biodiversity and productivity of natural systems and identified important species. In the fisheries context, the ecosystem approach recognises that fisheries need to be managed so as to avoid harm to the ecosystem. The ecosystem approach has implications across the environmental spectrum, from fisheries to marine conservation in the broader sense, through to the goals of sustainable development. The decline of diversity in the oceans shows the importance and urgency of the implementation of the ecosystem approach.

The ecosystem approach has a multi-species focus: the top predator species, the target species of the fishery, and associated and dependent species are all to be considered. The removal of top predators can have implications for stability of ecosystems, species removals or additions can invoke major shifts in community structure and dynamics, and the collapse of a prey species has been associated with mortality of mammals, birds and predatory fishes.

The ecosystem approach therefore has implications for the management of whales. There are sometimes suggestions that whales compete with commercially fished fish species, and that whales should be managed, or culled, to protect fisheries. However the ecosystem approach requires an integrated and adaptive approach to management, rather than intervention or manipulation aimed at single species. The ecosystem approach requires the management of fisheries to avoid harm to natural populations, rather than the management of marine mammal populations to attempt to avoid harm to fisheries. In fact, over-fishing tends to lead to a decline in large predators, and lower-level marine life being increasingly used for human consumption, to the detriment of higher predators.

None of the elements of the ecosystem approach developed by the FAO, or most recently by ICP, mandate an *ad hoc* approach to marine conservation, still less manipulation of the marine environment or top predator populations. Instead, a holistic, ecosystem-based precautionary approach is mandated aimed at conserving ecosystem integrity.

WWF has produced detailed guidance on both policy and operational implementation for ecosystem-based management in Ward *et al*'s *Policy Proposals and Operational Guidance for Ecosystem-Based Management of Marine Capture Fisheries*,[1] and Grieve *et al*'s *Implementation of Ecosystem-Based Management in Marine Capture Fisheries, Case Studies from WWF's Marine Ecoregions*.[2] These elaborate that EBM provides a comprehensive approach enabling marine ecosystems, extractive industries and the communities and livelihoods that rely upon them to thrive.

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[1] Trevor Ward et al, *Policy Proposals and Operational Guidance for Ecosystem-Based Management of Marine Capture Fisheries* (2002) ('WWF EBM Guidance '). Available at http://assets.panda.org/downloads/WWF_EBMFisheries_FullDoc.pdf.

[2] Chris Grieve and Katherine Short, *Implementation of Ecosystem-Based Management in Marine Capture Fisheries, Case Studies from WWF's Marine Ecoregions* (2007) ("Grieve et al"). Available at http://panda.org/about_wwf/what_we_do/marine/publications/index.cfm?uNewsID=94920.

Incorporation of the Ecosystem Approach in Multilateral Environmental Instruments

The development of the ecosystem approach can be traced to the 1972 UN Conference on Human Environment, but international institutional development has been slow. While there was some progress in the 1980s, notably with the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) and the 1982 Law of the Sea Convention, development accelerated in the 1990s, and in particular the 1992 Rio Declaration and Agenda 21, the FAO Code of Conduct and the 1995 UN Fish Stocks Agreement were important cornerstones in the development of the approach. This decade, the institutional development of the ecosystem approach can be traced to the 2000 CBD Decision V/6, which laid down principles for guidance in applying the ecosystem approach, and the 2001 Reykjavik Declaration, which recognised the importance of interactions between fishery resources and all components of the ecosystem, and the need to conserve marine environments. The Johannesburg Programme of Implementation (JPOI) in the same year called for the application of the ecosystem approach by 2010.

RFMOs that incorporate the ecosystem approach are few, but progress is being made. CCAMLR is the signal example of the systematic implementation of the ecosystem approach, and is especially notable considering its early adoption in 1980. The Convention for the Conservation and Management of Fisheries Resources in the South East Atlantic Ocean (SEAFO) and the South Indian Ocean Fisheries Agreement (SIOFA) are two recent examples from this decade of RFMOs that incorporate the ecosystem approach, and the Inter-American Tropical Tuna Commission's (IATTC) new 2003 Antigua Convention takes account of it also. The Convention on Future Multilateral Co-operation in North-East Atlantic Fisheries (NEAFC) and the Northwest Atlantic Fisheries Organisation (NAFO) are in the process of amending their constituent conventions to take account of the ecosystem approach, as well as the precautionary approach. The International Council for the Exploration of the Sea (ICES) started implementing the ecosystem approach as the basis for its advice in 2004. The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) and HELCOM's 2003 Bremen Statement was an important declaration of the ecosystem approach and notice of intent to focus on the approach.

From this brief survey of RFMO instruments it can be seen that with the principal exception of CCAMLR, the adoption of the ecosystem approach is a function of the date of conclusion of the instrument, and it follows that the earlier instruments which did not incorporate the ecosystem approach, like NAFO and NEAFC, need to amend their Conventions to adopt the approach.

Among multilateral environmental agreements, the 1992 CBD, with its focus on biodiversity, is a leader in the adoption of the ecosystem approach. It adopted the ecosystem approach in 1995 and has since elaborated it, and continues to promote and implement it, including in the Jakarta Mandate and Intergrated Marine and Coastal Area Management (IMCAM). The CITES Convention refers to the role of a species in its ecosystem, and practice within CITES takes account of the ecosystem approach, and synergies between CITES and the CBD are being pursued. Parties under the 1971 Ramsar Convention have endorsed the ecosystem approach. The 1979 CMS or Bonn Convention does take into account ecosystems in assessing conservation status and thus considers migratory species in their ecosystem context, and there are a number of references to the importance of ecology and sound ecological principles.

Other outstanding examples of the application of the ecosystem approach are to be found in the Antarctic conventions. In the 1991 Madrid Protocol, Parties commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems, and establish a comprehensive system of environmental impact assessment to that end. CCAMLR defines its application by reference to the Antarctic Convergence, itself an ecological boundary. The prevention of irreversible changes in the marine ecosystem is one of its principles, and conservation measures are to include measures concerning the effects of harvesting and associated activities on components of the marine ecosystem other than the harvested populations. Another Antarctic convention, the Albatross and Petrels Convention, implements many elements of the ecosystem approach and, similar to the CMS, assesses conversation status in terms of diverse influences acting on the species that may affect its long-term distribution and abundance, including habitat, and measures are to be taken to conserve and restore habitats.

The International Whaling Commission (IWC)'s constituent instrument, the International Convention on the Regulation of Whaling (ICRW), is a very early convention, having been adopted in 1946. The ICRW in itself does not incorporate the ecosystem approach, which was developed decades after the conclusion of the Convention. The Convention is oriented towards safeguarding whale stocks for later exploitation, with a strong focus is on the future of the whaling industry. The stated goal is to achieve the optimum level of whale stocks as rapidly as possible, without causing widespread economic and nutritional distress. Thus ecosystem approach considerations such as whale habitat, prey depletion, marine ecosystem integrity, are not specifically incorporated. It has been recognized since the Reykjavik Declaration, the CBD's Decision V/6 and the JPOI that an ecosystem approach to management should be adopted and that single-species management, such as management of whales alone, is inadequate. An IWC resolution in 2001 on whale-fish interaction decided to prioritize the study of interactions between whale and fish stocks and agreed for studies to be holistic and balanced. However since then, the Conservation Committee has been divided and unable to break an impasse on many significant issues.

The 59th Annual Meeting of the IWC last year adopted a controversial resolution termed the "St Kitts and Nevis Declaration." This Declaration stated that 'ecosystem management' has now become an international norm, and that the issue of management of whale stocks must be considered in a broader context of ecosystem management. The Declaration stated that Commissioners cited the need for science-based policy and rulemaking that are accepted as the world standard for the management of marine resources. However, the St. Kitts and Nevis Declaration erroneously uses the term ecosystem management to refer to the culling of whale stocks to increase fish stocks. The above analysis shows this is contrary to international norms. The ecosystem approach as shown in this paper with relation to marine mammals requires its implementation in its entirety, including the importance of predator diversity, predator-prey relationships, the abundance of predators and species competing for the same trophic resources, allocation of some of the potential yield of a prey species to the predator rather than all being allocated to the fishery targeting the prey species, the ecosystem effects of the loss of predators at high trophic levels, the role of habitat, and other impacts on whales such as climate change, entanglement, and pollution, as well as other aspects of ecosystem-based management. Furthermore, the term ecosystem management in itself is a misnomer. Humans can not manage ecosystems; they can only manage human actions with consequent results for ecosystems. The term 'ecosystem management' is thus outmoded, and the term 'ecosystem approach' is now the internationally accepted norm. Statements in the Declaration attempt to use the ecosystem approach in a way that is contrary to agreed international norms, and run contrary to the considerable progress that

has been made by many governments, institutions and multilateral agreements to build international consensus and understanding of this concept. Also as is noted in this paper, as fish catches increase, the primary production available to marine mammals may decrease, raising the possibility that RFMOs may need to take into account the indirect effect of fish catches on other species such as marine mammals when setting total allowable catches (TACs.)

Conclusion

As noted in this paper, there are a number of international declarations, decisions and documents explaining what the ecosystem approach is and what it entails. It is clear that there is now an internationally agreed and accepted definition and understanding of the ecosystem approach and its application to fisheries.

However there are still some instances of erroneous uses of the term ecosystem approach, particularly relating to marine mammal management. Guidance from expert international fora concerned with the marine environment is important to ensure that statements in resolutions contrary to international practice are not made in the future.

The analysis demonstrates that now is the time to build on the global understanding and acceptance of the ecosystem approach that has been achieved to date by providing appropriate resources, capacity and expertise to allow full and widespread application of the ecosystem approach in management of the marine environment across the globe.

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The paper examines the meaning of ecosystem-based management (EBM) and the ecosystem approach, their definition and implications. In so doing, it discusses the linkages between EBM, the ecosystem approach and the ecosystem approach to fisheries, as well as the meaning of sustainability.
The recent promotion of the ecosystem approach within the United Nations General Assembly, including its ICP (informal consultative process on oceans and the law of the sea) and its Sustainable Fisheries and Oceans resolutions and the framework of the Law of the Sea Convention and the Fish Stocks Agreement is described, as is the role of the Food and Agriculture Organization (FAO) and its various instruments. A brief survey of the adoption of the ecosystem approach in RFMOs follows. A number of multilateral environmental agreements concerned with the international management of living marine resources are examined, including the Convention on Biological Diversity (CBD), CITES, the Ramsar Convention, the Convention on Migratory Species (CMS), conventions related to Antarctica, international watercourse conventions and the International Convention for the Regulation of Whaling.

THE MEANING OF ECOSYSTEM-BASED MANAGEMENT AND THE ECOSYSTEM APPROACH

The Definition of the Ecosystem Approach

The ecosystem approach has no formal definition, and is evolving. Simply put, it requires consideration of the whole system rather than individual components.[3] Most descriptions[4] focus on holistic fishery management focusing on habitats and system integrity, and on an objective aimed at the health and integrity of the ecosystem.[5] The FAO has developed Technical Guidelines,[6] which say that "the Ecosystem Approach to Fisheries strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecological meaningful boundaries."[7] While more of a description than a definition, this is a useful description in the context of fisheries management, and in proscribing ecological meaningful boundaries, can be said to endorse ecosystem-based management.
The ecosystem itself has been well defined. In 1994 the International Law Commission (ILC) observed[8] that an ecosystem has a precise and legal meaning,[9] referring to an ecological unit consisting

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[3] J.Brunée and S. Toope, "Environmental Security and Freshwater Resources: A Case for International Ecosystem Law," 5 *Yearbook of International Environmental Law* (1994), 41, 53.

[4] See comparison in Christensen, N.L., Batuska, A.M., Brown, J.H., Carpenter, S., Dantonio, C., Francis, R., Franklin J.F., Macmahon, J.A., Noss, R.F., Parsons, D.G., Peterson, C.H., Turner, M.G. & Woodmansee, N.G. 1996. *The report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management. Ecological Applications*, 6(6): 665- 691 at http://www.esa.org/pao/esaPositions/Papers/ReportOfSBEM-MainText.php. The Report finds that Ecosystem Management must include the following: 1. long-term sustainability as fundamental value, 2. clear, operational goals, 3. sound ecological models and understanding, 4. understanding complexity and interconnectedness, 5. recognition of the dynamic character of ecosystems, 6. attention to context and scale, 7. acknowledgment of humans as ecosystem components, and 8. commitment to adaptability and accountability.

[5] See discussions of terminology in FAO**,** *The ecosystem approach to fisheries: issues, terminology, principles, institutional foundations, implementation and outlook*, by S.M. Garcia, A. Zerbi, C. Aliaume, T. Do Chi & G. Lasserre. FAO Fisheries Technical Paper No. 443. Rome,2003, at http://www.fao.org/docrep/006/y4773e/y4773e00.htm., at 4.

[6] FAO Technical Guidelines for Responsible Fisheries 4, Supplement 2, Fisheries Management: The ecosystem approach to fisheries (2003), ("FAO Guidelines"), at http://www.fao.org/documents/pub_dett.asp?lang=en&pub_id=127549.

[7] FAO Guidelines, page 14 and Executive Summary, page 6.

[8] International Law Commission, Report of the International Law Commission of its Forty-Sixth Session, 2 May – 22 July 1994, Page 118, UN Doc. A/49/10, at http://untreaty.un.org/ilc/documentation/english/A_49_10.pdf, and in II(2) *Yearbook of the ILC* (1994).

[9] The ILC referred to the work of the Economic Commission for Europe (ECE), including "Ecosystems approach to water management", ENVWA/WP.3/R.7/Rev.1 and a number of case studies. ILC, *op. cit.* 118.

of living and non-living components that are interdependent and function as a community.[10] The ecosystem has been defined in the CBD[11] as "a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit."[12] CCAMLR defines the Antarctic marine ecosystem as "the complex of relationships of Antarctic marine living resources with each other and with their physical environment."[13] The health of ecosystems is essential both to the environment and to the existence and development of human society. Human beings affect the structure and function of ecosystems, which for their part affects human habitats as well as human health and socio-economic development.[14] Marine ecosystems, for their part, are extremely valuable for the health and development of the planet, and are under growing pressure.[15]

A 1998 CBD workshop described the ecosystem approach as follows: "The ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes and interactions amongst organisms and their environment. The ecosystem approach recognizes that humans are an integral component of ecosystems."[16] The twelve Malawi Principles[17] developed in the same workshop observed that a key feature of the ecosystem approach includes conservation of ecosystem structure and functioning,[18] and the CBD's Decision V/6 in 2000 stated that the conservation of ecosystem structure and functioning should be a priority target of the ecosystem approach.

The objectives of the ecosystem approach were more helpfully stated in the OSPAR and HELCOM Joint Ministerial Meeting, which defined the ecosystem approach as "the comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity".[19] The goal is thereby stated: the sustainable use of ecosystem goods and services and the maintenance of ecosystem integrity.

As noted later in this paper, ecosystem integrity as a goal has been growing in importance and was emphasised most recently in the 2006 Oceans Resolution.[20] The ecosystems approach is in fact closely related to, and builds upon,[21] the concept of integrated management, which is featured in particular in the CBD as the integrated management of marine and coastal areas (IMCAM).[22] Integrated management recognises multiple uses and interactions and involves a set of interacting objectives. It

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[10] ILC 1994 report, note 8, 118.

[11] Convention on Biological Diversity, concluded at Rio de Janeiro on 5 June 1992, entered into force 29 December 1993, at 31 ILM 818, ("CBD") at http://www.biodiv.org/convention/default.shtml.

[12] CBD article 2.

[13] Convention on the Conservation of Antarctic Marine Living Resources**,** done at Canberra, 20 May 1980, entered into force 7 April 1982 (CCAMLR); see below note 413.

[14] Secretary-General, Oceans and the Law of the Sea, 9 March 2006, UN Doc. A/61/63, ("2006 Secretary-General's Report"), para. 114, at http://www.un.org/Depts/los/general_assembly/general_assembly_reports.htm.

[15] Secretary-General's 2006 Report, para. 115.

[16] "Report of the Workshop on the Ecosystem Approach, Lilonge, Malawi, 26-28 January, 1998," 20 March 1998, UNEP/CBD/COP/4/Inf.9, Para. 8 at http://www.biodiv.org/doc/meetings/cop/cop-04/information/cop-04-inf-09-en.pdf.

[17] Ibid. Malawi Principles at http://www.fao.org/docrep/006/Y4773E/y4773e0e.htm,

[18] Malawi Principles, Principle 5.

[19] Statement on the Ecosystem Approach to the Management of Human Activities by first Joint Ministerial Meeting of the Helsinki and Ospar Commissions, "Towards an ecosystem approach to the management of human activities," Bremen, 25-26 June 2003, at http://www.helcom.fi/stc/files/BremenDocs/JointEcosystemApproach.pdf.

[20] See page 16.

[21] See Secretary-General's 2006 Report, para. 117.

[22] See discussion of IMCAM on page 36.

involves comprehensive planning and regulation of human activities towards a complex set of interacting objectives and aims at minimizing user conflicts while ensuring long-term sustainability.[23] The ecosystem approach can be seen as an evolution of integrated management, taking it a step further in focusing on the ecosystem.[24] The OSPAR and HELCOM definition defines the ecosystems approach in terms of integrated management, with a view to the twin goals of the sustainable use of ecosystem goods and services and maintenance of ecosystem integrity.

Eight principles of ecosystem management have been cited in scientific literature:[25]

1. long-term sustainability as fundamental value,
2. clear, operational goals,
3. sound ecological models and understanding,
4. understanding complexity and interconnectedness,
5. recognition of the dynamic character of ecosystems,
6. attention to context and scale,
7. acknowledgment of humans as ecosystem components, and
8. commitment to adaptability and accountability.

With respect to the application of the ecosystem approach in international environmental governance, in an often cited Decision, the CBD cited 12 principles of the ecosystem approach in its Decision V/6:[26]

1. The objectives of management of land, water and living resources are a matter of societal choice.
2. Management should be decentralized to the lowest appropriate level.
3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
4. Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context.
5. Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8. Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9. Management must recognize that change is inevitable.
10. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

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[23] FAO Technical Paper 443, note 5, page 7.

[24] Secretary-General's 2006 Report, para. 117. See discussion of IMCAM and the ecosystem approach on page 36, below. The FAO has described the ecosystem approach as a subset or alias of integrated management. Technical Paper 443, page. 7.

[25] Norman L. Christensen, Ann M. Bartuska, James H. Brown, Stephen Carpenter, Carla D'Antonio, Rober Francis, Jerry F. Franklin, James A. MacMahon, Reed F. Noss, David J. Parsons, Charles H. Peterson, Monica G. Turner, and Robert G. Woodmansee, "The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management," 6:3 *Ecological Applications* (1996) 665–691, at http://links.jstor.org/sici?sici=10510761%281996%293%3C665%3ATROTES%3E2.0.CO%3B2-x&origin=ESA.

[26] CBD Decision V/6, the Ecosystem Approach, Part B, at http://www.biodiv.org/decisions/default.asp?lg=0&m=cop-05&d=06.

11. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.
12. Information from all sources is critical to arriving at effective ecosystem management strategies.

Important similarities and synergies can be seen in the two lists of principles. A longer list of principles was developed at ICP.[27] WWF has identified twelve operational components, or steps, for implementing EBM in fisheries.[28]

Implications of the Ecosystem Approach

Ecosystem-based management (EBM) has been evolving over several decades and experienced a significant boost in Johannesburg in 2002, where the World Summit on Sustainable Development's[29] Johannesburg Plan of Implementation (JPOI) endorsed the ecosystem approach for fisheries, biodiversity protection and sustainable development and called for its implementation by 2010.

As the WWF EBM Guidance paper notes, EBM has evolved in response to two properties, being the effect of the environment on the resource being exploited and the effect of resource exploitation on the environment. Exploited natural resources are highly connected to their surrounding ecosystems, and this connectivity can have major effects on their productivity. The exploitation of natural resources can have effects on other resources and on other species and aspects of the ecosystems where the resources occur, and these direct and indirect effects can have very major consequences for related or dependent species.[30]

The importance and urgency of the implementation of the ecosystem approach is seen in a report[31] which shows that predator diversity shows a pattern signaling ecosystem-wide changes linked to climate and fishing. Diversity declined between 10 and 50% in all oceans, a trend that coincided with increased fishing pressure and climate factors.

A more recent study[32] emphasises the correlation between ecosystems and fish stocks. The study found that rates of resource collapse increased and recovery potential decreased exponentially with declining diversity, whereas restoration of biodiversity increased productivity fourfold and decreased variability on average by 21%. The paper suggests that at current rates of diversity loss, that there will be no more viable fish available to fisheries by 2050. An earlier paper had warned that removing functional groups of species, or removing whole trophic levels can increase the likelihood of regime shifts, particularly when combined with impacts on ecosystems such as through emissions of waste and pollutants and climate change.[33] The Millennium Ecosystem Assessment has recently issued similar warnings.[34]

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[27] See discussion on page 14.

[28] WWF EBM paper, page 6, and see Grieve et al, page 6. The Grieve paper illustrates the 12 steps using case studies from WWF's marine ecoregions.

[29] World Summit on Sustainable Development, Johannesburg Plan of Implementation, A/Conf.199/20, (JPOI), paras. 29, 31, and 64. See note 85 below.

[30] WWF EBM Guidance, 10.

[31] B, Worm et al, "Global Patterns of Predator Diversity in the Open Oceans", 309:5739 *Science* (26 August 2005), 1365 – 1369.

[32] B. Worm et al, "Impacts of Biodiversity Loss on Ocean Ecosystem Services", 314: 5800 *Science(* 3 November 2006), 787 - 790.

[33] Carl Folke et al, "Regime Shifts, Resilience, and Biodiversity in Ecosystem Management," 35 *Annual Review of Ecology, Evolution, and Systematics*, (2004), 557-581, at http://arjournals.annualreviews.org/doi/abs/10.1146/annurev.ecolsys.35.021103.105711?journalCode=ecolsys, and see M. Scheffer et al, "Catastrophic shifts in ecosystems", 413 *Nature* (2001), 591-596, at http://www.nature.com/nature/journal/v413/n6856/abs/413591a0.html, observing that loss of resilience usually paves the way for a switch to an alternative state and suggesting that strategies for sustainable management of such ecosystems should focus on maintaining resilience. See also T. P. Hughes et al, "New paradigms for supporting the resilience of marine

There are some suggestions that whales compete with commercially fished fish species for prey, with the implication that whales should be managed – or in effect culled – to protect fisheries.[35] This suggestion is seen as the opposite of the ecosystem approach, which suggests that fisheries need to be managed to avoid harm to natural populations, rather than the other way around.[36] Fisheries management increasingly has a multi-species focus: the top predator species, the target species of the fishery, and associated and dependent species should all be considered.[37] One consequence is that assessing the response of fisheries to a cull of top predators would require an immense experiment to test the effects throughout an ecosystem.[38] This is one reason that the ecosystem approach requires an integrated and adaptive approach to management rather than intervention or manipulation aimed at single species: the variables involved are numerous and interactions are complex.

The collapse of a prey species, whether caused by fisheries, climate or other effects, has been associated with mortality of mammals, birds and predatory fishes.[39] One example is the dramatic decline over thirty years of the Steller sea lions in the Bering Sea and Gulf of Alaska, which according to some hypotheses, is linked to the fishing of Pollock, a major food of the sea lions,[40] leading to a US government biological opinion that the fisheries jeopardize Steller sea lions and adversely modify their critical habitat, due to competition for prey and modification of their prey field.[41] Also in Alaska, killer whales may have begun to prey on sea otters, due to the decline of other prey, marine mammals such as

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ecosystems," 20 *Ecology and Evolution* (2005) 380-386, at http://www.jcu.edu.au/school/mbiolaq/ind_labs/Bellwood/pdfs/Hughes%20etal%202005(TREE).pdf, concluding that distortions of food webs induced by selectively removing highly interactive top predators or major herbivores have undermined the resilience of many marine systems. A 2006 study of Pacific predators such as tuna found substantial, though not catatrophic, impacts of fisheries on top-level predators, but observed that fishing all species in an ecosystem at mortality rates yielding single-species MSY may lead to the erosion of trophic structure. Single-species assessment models were criticised in that they do not include the effects of changes in the abundance of one species on the abundance of another, and multi-species assessments would yield more certainty. John Sibert, John Hampton, Pierre Kleiber, and Mark Maunder, Biomass, Size, and Trophic Status of Top Predators in the Pacific Ocean, 314 *Science* (2006), 1773-1776, 1774-1775.

[34] See discussion on page 340, below.

[35] For example, see Joji Morishita, "Multiple analysis of the whaling issue: Understanding the dispute by a matrix," 30 *Marine Policy* (2006), 802-808, 804, and T. Tamura, "Competition for food in the ocean: man and other apical predators," paper given to Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem (2001), argues that since Bryde's whales feed on Japanese anchovy, which is also the prey of skipjack, the results suggest that Bryde's whale and skipjack tuna compete over anchovy as prey. Page 1.

[36] See Peter Yodzis, "Must top predators be culled for the sake of fisheries," 16 Ecology & Evolution (2001), 78, at http://cat.inist.fr/?aModele=afficheN&cpsidt=985741,

[37] Peter Yodzis, note 36, page 79.

[38] Peter Yodzis, note 36, page 83.

[39] See P. Cury et al., "The functioning of marine ecosystems", paper presented to the Reykjavik Conference on Responsible Fisheries (2001), page 8, at http://marine.rutgers.edu/courses/expl_oceans/07Cury.PDF.

[40] Research is ongoing. The United States District Court in May 2006 ordered the United States National Marine Fisheries Service to prepare an environmental impact assessment into the effects of research on the sea lions in Humane Society of the United States v. Department of Commerce, 2006 U.S. Dist. LEXIS 34006, at http://www.dcd.uscourts.gov/Opinions/2006/Huvelle/2005-CV-1392~14:45:7~5-26-2006-b.pdf. A recent settlement is to allow non-invasive research to continue: see settlement agreement at http://www.fakr.noaa.gov/protectedresources/stellers/litigation/rsrchsettlement063006.htm.

[41] Biological Opinion for Listed Species In the BSAI Groundfish FMP and the GOA Groundfish FMP - November 2000 Endangered Species Act - Section 7 Consultation, November 30, 2000, page 12, at http://www.fakr.noaa.gov/protectedresources/stellers/plb/default.htm.

seals, causing, in turn, effects on urchins and kelps.[42] Another example is the collapse of the Peruvian anchovy stock causing a dramatic decrease in seabirds.[43]

The removal of top predators can have implications for stability of ecosystems. Predator diversity is linked to ecosystem stability,[44] and species removals or additions (as with invasions), can invoke major shifts in community structure and dynamics.[45]

Another effect of over-fishing is the reverse of the 'whales eat fish' argument. As the UN Secretary-General noted in a recent report, over-fishing tends to lead to a decline in large predator fish so that relatively large numbers of low trophic level small fish and invertebrates can increase. This also leads to 'fishing down marine food webs': second-level marine life preyed on by fish at the top of the trophic levels are increasingly used for human consumption, causing further disruptive effects on the food chain.[46]

Ecosystem-Based Management and the Ecosystem Approach

As a question of terminology, EBM is both a broader paradigm and a clearer way of stating the overarching management framework than is the term 'ecosystem approach'. The ecosystem approach is then used as part of that framework, as a method of working towards the goal of ecological sustainability. Indeed, EBM can be applied in integrated oceans management to fisheries, marine pollution, tourism, aquaculture, all leading to the goal of sustainability. It can be seen from the causes of degradation of marine ecosystems, including not only fishing, but also pollution, physical habitat destruction, outbreaks of disease, species introductions and climate change,[47] that the ecosystem approach would need to encompass all these causes in order to be implemented. The ecosystem approach does entail a paradigm shift[48] from individual species to ecosystems,[49] from a short-term to a long-term time perspective,[50] from a perspective which recognizes that humans are an integral component of many ecosystems,[51] and from static or linear management to adaptive management.[52] It is understandable that EBM and the ecosystem approach are sometimes used interchangeably in international discourse, and properly applied, with a focus of sustainability of ecosystems, both are pointers to the same concepts, where the goal of the ecosystem approach is properly stated to be long-

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[42] Cury, note 39, page 14. Sea otters predate on urchins, which graze on kelp, thus the decrease in otters results in an increase in urchins and therefore decrease in kelp.

[43] See Peter Yodzis, note 36, page 79.

[44] See D.L. Finke and R.F. Denno, "Predator diversity dampens trophic cascades", 429 *Nature* (2004), 407–410, at http://www.nature.com/nature/journal/v429/n6990/abs/nature02554.html;jsessionid=37FCE86A4623AC324FCCDCB8828ACAE6 and B. Halpern et al, "Predator effects on herbivore and plant stability," 8 *Ecology Letters* (2005), 189, at http://www.blackwell-synergy.com/links/doi/10.1111/j.1461-0248.2004.00712.x/abs/, E. Thébault, "The relationship between biodiversity and ecosystem functioning in food webs," 21 *Ecological Research,* 17-25.

[45] K. McCann, "The diversity-stability debate," 405 *Nature* 228-233, 233, at http://discuss.santafe.edu/files/paleofoodwebs/McCann2000Nature.pdf.

[46] Secretary-General's report, *Oceans and the Law of the Sea*, *Addendum,* conservation and sustainable use of marine biological diversity, 15 July 2005, UN Doc. A/60/63/Add.1, para. 134, at http://www.un.org/Depts/los/general_assembly/general_assembly_reports.htm.

[47] Jackson et al, "Historical Overfishing and the Recent Collapse of Coastal Ecosystems", 293:5530 *Science* (2001) 629-637, 635.

[48] See Kenneth Sherman, "The Large Marine Ecosystem Approach to Marine Resources Assessment and Management," presentation to the Bergen Conference on Implementing the Ecosystems Approach to Fisheries, Bergen, 26-28 September 2006, at http://cieaf.imr.no/presentations.

[49] See CBD Decision V/6 Principle 5.

[50] See CBD Decision V/6, Principle 8.

[51] See CBD Decision V/6, Para. A.2.

[52] See CBD Decision V/6, Principle 9 and Para. A.4.

term sustainability, provided that the sustainability is of the ecosystem, rather than simply of a single stock.[53] Correctly focused, then, management under the ecosystem approach is indeed ecosystem-based. It is important, however, that the goal of ecosystem sustainability not be forgotten, lest management not be based on the ecosystem. The concept of EBM carries within it the paradigm of the ecosystem as the fundamental object of management, whereas the ecosystem approach may, if misunderstood, be focused on a narrower goal.

Ecosystem-Based Management and the Ecosystem Approach to Fisheries

Ecosystem-based management and the ecosystem approach are broader concepts than the ecosystem approach to fisheries, including a focus on biodiversity protection as well as sustainable development, and the ecosystem approach therefore increasingly has a wider focus than fisheries. Thus ecosystem based management and/or the ecosystem approach include the ecosystem approach to fisheries (often abbreviated to EAF).

It is important to carefully identify and describe the ecosystem approach when discussing fisheries. EAF should be used with caution, since the scope of an ecosystem approach is wider than fisheries. The ecosystem approach to fisheries is sometimes used to describe a single species approach to fisheries minimizing the impacts of fishing such as reducing bycatch rather than a true ecosystem approach which fully addresses dynamic ecosystem issues. Rather than drawing upon the traditional single species approach, the ecosystem approach properly applied to fisheries properly should be derived from the ecosystem approach for biodiversity conservation. This is elaborated by WWF in Ward *et al*'s WWF EBM Guidance.[54] Under this approach, biodiversity and ecosystems, rather than the allocation of fish, are the focus. The goal of the ecosystem approach is to restore and sustain the functions of ecosystems.[55] In relation to fisheries, the goal of the ecosystem approach to fisheries has been said to contribute to long-term food security and to human development and to assure the effective conservation and sustainable use of the ecosystem and its resources.[56] This has been described simply as achieving ecosystem well-being,[57] including the maintenance of diversity in terms of the variety of ecosystems, species and genetic variability within species.[58] The FAO Code of Conduct states a goal of ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity.[59]

The Meaning of Sustainability

The use of the term 'sustainability' merits some discussion. Twenty years ago, the Brundtland Report[60] in defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." However, a more specific scientifically based definition of sustainability is needed for purposes of oceans governance.

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[53] Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach. See principle 5 of the 12 Principles developed in CBD Decision V/6. See note 320 below. The FAO Guidelines noted that the Ecosystem Approach to Fisheries applies an integrated approach to fisheries within ecological meaningful boundaries: FAO Guidelines, Page 14. See *FAO Guidelines*, note 6 above, and see discussion on page 21 below.

[54] See note 1.

[55] Secretary-General's 2006 Report, para. 118.

[56] Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, October 2001, preamble, at http://www.fao.org/docrep/meeting/004/Y2211e.htm.

[57] FAO Technical Paper 443, page 29.

[58] FAO Technical Paper 443, page 32.

[59] FAO Code of Conduct for Responsible Fisheries, at http://www.fao.org/fi/agreem/codecond/ficonde.asp. Introduction.

[60] World Commission on Environment and Development, Our Common Future, Oxford: Oxford University Press, (1987), page 43, at http://www.ringofpeace.org/environment/brundtland.html.

One approach is that developed after the Brundtland Report by Swedish scientist Karl-Henrik Robért[61] who postulated four first-order system conditions, which since then evolved into a final set of System Conditions known as The Natural Step Framework. These have been stated as being that the sustainable society, nature is not subject to systematically increasing:

1. concentrations of substances extracted from the Earths crust;
2. concentrations of substances produced by society;
3. degradation by physical means; and
4. in that society, people are not subject to conditions that systematically undermine their capacity to meet their needs

Correlative sustainability objectives, are with respect to the third condition, to

> "Eliminate our contribution to the systematic physical degradation of nature through over-harvesting, introductions and other forms of modification. This means drawing resources only from well-managed eco-systems, systematically pursuing the most productive and efficient use both of those resources and land, and exercising caution in all kinds of modification of nature."[62]

These four steps have been said to have the scientific basis to offer a robust and independent framework upon which policy and practice relative to sustainability can be developed and tested.[63]

A TIMELINE OF THE DEVELOPMENT OF THE ECOSYSTEM APPROACH

In terms of international instruments, the Law of the Sea Convention, Johannesburg Program of Action, the Reykjavik Declaration, CBD decisions V/6 and VII/11 and other CBD decisions, the FAO guidelines, the UN Fish Stocks Agreement and the FAO Code of Conduct are principal instruments in laying out the application of the ecosystem approach.

The evolution of the ecosystem approach is seen in the following timeline. The ILC noted in 1994 that numerous declarations and resolutions even then were evidence of a recognition by States of the necessity of protecting essential ecological processes.[64] Declarations and resolutions to that point and since then include the following:

1972: The Stockholm Declaration[65] required that the natural resources of the earth including the flora and fauna must be safeguarded for the benefit of present and future generations through careful planning or management,[66] and that States shall co-operate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem.[67]

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[61] K. –H Robèrt et al., "Tools and concepts for sustainable development, how do they relate to a general framework for sustainable development, and to each other?", 8 Journal of Cleaner Production (2000) 243-254,251. Available at http://www.naturalstep.ca/articles/3c%20Tools%26Concepts.pdf and K.-H. Robért, B. Schmidt-Bleek, J. Aloisi de Larderel, G. Basile, J.L. Jansen, P. Kuehr, P. Price Thomas, M. Suzuki, P. Hawken, M. Wackernagel, "Strategic sustainable development - Selection, design and synergies of applied tools," 10:3 Journal of Cleaner Production (2002), 197-214, at 198-199. Available at http://www.naturalstep.ca/articles/3d%20Strategic%20SD.pdf.

[62] Robért et al (2002), 199.

[63] Paul Johnston, Mark Edward, David Santillo and Karl-Henrik Robert, "Reclaiming the Definition of Sustainability," 14:1 Env. Sci. Poll. Res. 60-66 (2007), page 66.

[64] ILC, note 8, 120-121.

[65] Stockholm Declaration on the Human Environment of the United Nations Conference on the Human Environment, 16 June 1972, 11 I.L.M. 1416 (1972), ("Stockholm Declaration"), Principle 2. At http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503.

[66] Stockholm Declaration Principle 2.

[67] Stockholm Declaration Principle 7.

1982: The Law of the Sea Convention provided a comprehensive framework including requiring coastal states to take into account effects on associated or dependent species.[68]

1982: The World Charter for Nature[69] declared the need to preserve species and ecosystems for the benefit of present and future generations,[70] and provided that ecosystems and organisms shall be managed to achieve and maintain optimum sustainable productivity, but not in such a way as to endanger the integrity of those other ecosystems or species with which they coexist.[71]

1985: The ASEAN Agreement on the Conservation of Nature and Natural Resources[72] included as a fundamental principle the need to adopt measures necessary to maintain essential ecological processes and life-support systems, as well as to preserve genetic diversity, and to ensure the sustainable utilization of harvested natural resources under their jurisdiction in accordance with scientific principles and with a view to attaining the goal of sustainable development,[73] and required Parties aim at maintaining the ecological relationship between harvested, dependent and related populations of living resources of the ecosystem, preventing irreversible changes in the ecosystem.[74]

1986: The WCED Experts Group on Environmental Law[75] stated that States shall maintain ecosystems and ecological processes essential for the functioning of the biosphere.

1988: The ECE Declaration on Conservation of Flora, Fauna and their Habitats[76] stated that member States agreed to conserve living natural resources in the interests of present and future generations by maintaining essential ecological processes and life-support systems, preserving genetic diversity and ensuring sustainable utilization of species and ecosystems.

1989: The Draft American Declaration on the Environment[77] provided that States, communities and persons have a duty to co-operate toward the preservation and conservation of the environment.

1989: The Hague Declaration on the Environment[78] spoke of the fundamental duty to preserve the ecosystem.

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[68] United Nations Convention on the Law of the Sea. Signed at Montego Bay, Jamaica, 10 December 1982, entered into force 16 November 1994 ("Law of the Sea Convention"). At http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm. Article 61(4).

[69] World Charter for Nature, General Assembly Resolution 37/7 on the World Charter for Nature, A/RES/37/7, 28 October 1982. At http://www.un.org/documents/ga/res/37/a37r007.htm.

[70] World Charter for Nature, Preamble.

[71] World Charter for Nature, General Principle I.4.

[72] Agreement on the Conservation of Nature and Natural Resources, Kuala Lumpur, 9 July 1985, between Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore and Thailand, at http://www.aseansec.org/6080.htm.

[73] ASEAN Agreement, Article 1.

[74] ASEAN Agreement, Article 4.

[75] "Our Common Future, Annexe 1: Summary of Proposed Legal Principles for Environmental Protection and Sustainable Development", in A/42/427. Our Common Future: Report of the World Commission on Environment and Development, WCED Experts Group on Environmental Law At http://www.un-documents.net/ocf-a1.htm.

[76] ECE (Economic Commission for Europe) Declaration on the Conservation of Flora, Fauna and their Habitats, adopted by ECE at its 43rd session in 1988, Decision E(43), para. 1, E/ECE/1172-ECE/ENVWA/6, at http://www.aseansec.org/6080.htm.

[77] Draft American Declaration on the Environment, OAS Doc. CJI/RES.II-2/89, 1989.

[78] The Hague Declaration on the Environment, 11 March 1989, 28 ILM (November 1989), 1308. Copy at http://www.earthaction.org/en/archive/97-05-envinst/haguedecl.html.

1990: The Bergen Ministerial Declaration on Sustainable Development in the ECE Region[79] noted the symbiotic nature of economy and the environment

1992: The Rio Declaration and Agenda 21[80] emphasised multi-species management and other approaches that take into account the relationships among species. The Cancún Declaration took a broad view of responsible fisheries management.

1993: The FAO Compliance Agreement in 1993[81] led to the FAO Code of Conduct on Responsible Fisheries.

1995: The FAO Code of Conduct for Responsible Fisheries required conserving, protecting and safeguarding ecosystems,[82] and laid down principles and international standards of behaviour to ensure the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity.

1995: The United Nations Fish Stocks Agreement concluded, implementing the ecosystem approach in Articles 5 and 6.

2000: The Conference of Parties to the Convention on Biological Diversity (CBD) Decision V/6[83] provided guidance for applying the ecosystem approach.

2001: The Reykjavik Declaration declared that States will individually and collectively work on incorporating ecosystem considerations, including predator-prey relationships, into fisheries management.[84] The FAO was asked to develop draft guidelines on the ecosystem approach.

2002: The Johannesburg Plan of Implementation (JPOI) at the World Summit on Sustainable Development (WSSD) called for the application of the ecosystem approach to fisheries management by 2010[85] and called for development and facilitation of the ecosystem approach.[86] In the context of biodiversity protection, the achievement by 2010 of a

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[79] UN Doc. A/CONF.151/PC/10 (1990).

[80] Chapter 17, Protection of the ocean and all kinds of seas, including enclosed and semi enclosed seas, and coastal areas and the protection, rational use and development of their living resources, Agenda 21, Chapter 17, para. 17.74.

[81] FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. Rome, 24 November 1993. Copy at http://www.fao.org/waicent/faoinfo/fishery/agreem/complian/complian.htm.

[82] FAO Code of Conduct, 6.1, 6.5, 6.6, 7.2.2(d) and 12.10.

[83] Decision V6 Ecosystem Approach, at http://www.biodiv.org/decisions/default.aspx?m=COP-05&id=7148&lg=0. That decision described the ecosystem approach as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Thus, the application of the ecosystem approach will help to reach a balance of the three objectives of the Convention: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

[84] Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, October 2001, at http://www.fao.org/docrep/meeting/004/Y2211e.htm. The Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem included 59 FAO members.

[85] World Summit on Sustainable Development, Plan of Implementation, A/Conf.199/20, (JPOI) para. 29 noted that "Oceans, seas, islands and coastal areas form an integrated and essential component of the Earth's ecosystem and are critical for global food security and for sustaining economic prosperity and the well-being of many national economies, particularly in developing countries," and therefore stated that "Ensuring the sustainable development of the oceans requires effective coordination and co-operation, including at the global and regional levels, between relevant bodies, and actions at all levels to: (d) Encourage the application by 2010 of the ecosystem approach, noting the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem and decision 5/6 of the Conference of Parties to the Convention on Biological Diversity."

[86] JPOI, para. 31(c) called on States to "In accordance with chapter 17 of Agenda 21, promote the conservation and management of the oceans through actions at all levels, giving due regard to the relevant international instruments to:(c) Develop and facilitate the use of diverse approaches and tools, including the ecosystem approach, the elimination of destructive fishing practices, the establishment of marine protected areas consistent with international law and based on scientific information, including representative networks by 2012 and time/area closures for the protection of nursery

significant reduction in the current rate of loss of biological diversity requires action to promote the wide implementation and further development of the ecosystem approach, as being elaborated in the ongoing work of the Biodiversity Convention.[87] In the context of sustainable development in Africa, the JPOI called for the promotion of ecosystem conservation according to the ecosystem approach.[88]

An FAO expert consultation[89] formulated guidelines on EAF, and FAO study of the State of the World's Fisheries[90] observed that the traditional approach to managing fisheries is insufficient. The Study observed that extending the number of RFMOs with a mandate for adopting an ecosystem approach will facilitate the effective implementation of EAF in fisheries.[91]

The North Sea Ministers in the 2002 Bergen Declaration[92] agreed to implement an ecosystem approach by identifying and taking action on influences which are critical to the health of the North Sea.

2003: The Bremen Statement[93] was issued, defining the ecosystem approach and setting out detailed plans of implementing the approach by HELCOM and OSPAR.

2006: Ministers at the St John's Conference on the Governance of High Seas Fisheries and the UN Fish Agreement declared that they will work within RFMOs to incorporate ecosystem considerations in fisheries management.[94]

The ICP (Open-ended Informal Consultative Process on Oceans and the Law of the Sea) focused on the ecosystem approach; an *Ad Hoc* Open-Ended Informal Working Group on Marine Biological Diversity was held; the Oceans Resolution emphasised the ecosystem approach and ecosystems integrity.

It can then be seen that the ecosystem approach has involved in a number of parallel but related institutional streams: in the law of the sea, through the Law of the Sea Convention, the UN Fish Stocks Agreement, ICP and the General Assembly; in the FAO, through the Code of Conduct, COFI, expert consultations and the Reykjavik Declaration; in the CBD; and from the Stockholm Declaration through the United Nations Conference on Environment and Development (UNCED)'s Agenda 21 and the Rio Declaration and the JPOI.

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grounds and periods, proper coastal land use; and watershed planning and the integration of marine and coastal areas management into key sectors."

[87] JPOI, para. 42(e).

[88] JPOI para. 64(b).

[89] See Report of the Expert Consultation on Ecosystem-Based Fisheries Management - Reykjavik, Iceland, 16-19 September 2002, FAO Fisheries Report No. 690, at http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y4491T/y4491t01.htm and ftp://ftp.fao.org/docrep/fao/005/Y4491t/y4491t00.pdf.

[90] The State of World Fisheries and Aquaculture 2002: Selected issues facing fishers and aquaculturists: Implementing the Ecosystem Approach to Capture Fisheries Management, ("FAO Study") at http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/005/y7300e/y7300e06.htm.

[91] FAO Study. ICES, CCAMLR, and the International Baltic Sea Fishery Commission (IBSFC) as a fisheries institution were cited.

[92] Ministerial Declaration of the Fifth International Conference on the Protection of the North Sea, Bergen, Norway, 20-21 March 2002, at http://www.dep.no/filarkiv/156076/Engelsk.pdf.

[93] Statement on the Ecosystem Approach to the Management of Human Activities by first Joint Ministerial Meeting of the Helsinki and Ospar Commissions, "Towards an ecosystem approach to the management of human activities," Bremen, 25-26 June 2003, at http://www.helcom.fi/stc/files/BremenDocs/JointEcosystemApproach.pdf.

[94] Declaration at Conference on the Governance of High Seas Fisheries and the UN Fish Agreement, May 1-5,2005, at http://www.dfo-mpo.gc.ca/fgc-cgp/conf_report_e.htm.

MANAGEMENT OF FISHERIES AND THE ECOSYSTEM APPROACH UNDER THE LAW OF THE SEA CONVENTION AND THE GENERAL ASSEMBLY

The United Nations General Assembly

The General Assembly has played an increasing role in recent years in global fisheries governance. In 2006 alone, an *ad hoc* open-ended informal working group on marine biological diversity met to discuss threats to marine biodiversity beyond national jurisdiction, the Open-ended Informal Consultative Process on Oceans and the Law of the Sea (ICP) focus was on the ecosystem approach and the fisheries and oceans resolutions contained numerous references to the ecosystem approach.

The *Ad Hoc* Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction

This Working Group which was held in 2006 reported[95] that the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction should be based on the precautionary and ecosystem approaches using the best available science, and prior environmental impact assessments.[96] The Working Group noted calls for long-term time-series studies of marine biological diversity beyond areas of national jurisdiction to evaluate natural variability and understand the resilience of deep-sea ecosystems to the impacts of anthropogenic stresses,[97] and noted knowledge gaps on the ecology of marine species and their behaviour that determines their vulnerability to human activities.[98] This reflects the Secretary-General's report, which noted that species diversity helps increase the capacity of an ecosystem to be resilient in the face of a changing environment.[99]

The Open-ended Informal Consultative Process on Oceans and the Law of the Sea (ICP)

The Open-ended Informal Consultative Process on Oceans and the Law of the Sea (ICP) at its meeting in June 2006[100] agreed some consensual elements. The goal of the ecosystem approach was clearly stated: Ecosystem approaches to oceans management should be focused on:

- managing human activities in order to maintain and, where needed, restore ecosystem health to sustain goods and environmental services,
- providing social and economic benefits for food security,
- sustaining livelihoods in support of international development goals, including those contained in the United Nations Millennium Declaration, and
- conserving marine biodiversity.[101]

It was noted that States should be guided in the application of ecosystem approaches by a number of existing instruments: UNCLOS, its Implementing Agreements, CBD, and the WSSD (JPOI).[102] States were to co-operate and coordinate their efforts and take measures to address impacts on marine

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[95] Report of the *Ad Hoc* Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction, A//61/65, 20 March 2006, Annex I: Summary of Trends, at http://www.un.org/Depts/los/biodiversityworkinggroup/biodiversityworkinggroup.htm. See also Secretary-General's report, *Oceans and the Law of the Sea*, *Addendum,* conservation and sustainable use of marine biological diversity, UN Doc. A/60/63/Add.1, at http://www.un.org/Depts/los/general_assembly/general_assembly_reports.htm.

[96] *Ad hoc* report, Annex I, para. 5.

[97] *Ad hoc* report, Annex II, para. d.

[98] *Ad hoc* report, Annex II, para. w(iv).

[99] Secretary-General's report Addendum 1, note 95, para. 7.

[100] Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its seventh Meeting, July 17 2006, Part A of the Report, A/61/156, at http://www.un.org/Docs/journal/asp/ws.asp?m=A/61/156 ('ICP Report').

[101] ICP Report Para. 4.

[102] ICP Report, Para. 5(a).

ecosystems in areas within and beyond national jurisdiction, taking into account the integrity of the ecosystems concerned.[103]

It was acknowledged that there is no universally agreed definition of an ecosystem approach, which is interpreted differently in different contexts, so a number of elements were suggested. Those elements, (a) through (n), include

- emphasising conservation of ecosystem structures and their functioning and key processes in order to maintain ecosystem goods and services;
- application within geographically specific areas based on ecological criteria;
- emphasising the interactions between human activities and the ecosystem and among the components of the ecosystem and among ecosystems;
- taking into account factors originating outside the boundaries of the defined management area that may influence marine ecosystems in the management area;
- assessing risks; and
- apply the precautionary approach.

Other elements are seeking to restore degraded marine ecosystems where possible, assessing the cumulative impacts of multiple human activities on marine ecosystems, taking into account ecological, social, cultural, economic, legal and technical perspectives, and seeking the appropriate balance between, and integration of, conservation and sustainable use of marine biological diversity.[104]

None of these elements mandate an *ad hoc* approach to marine conservation, still less manipulation of the marine environment or top predators. Instead, a holistic, ecosystem-based and precautionary approach is mandated.

Methods of implementation were suggested,[105] including sectoral approaches and integrated management and planning on a variety of levels, including across boundaries, in accordance with international law, effective integrated management across sectors, and assessments of marine activities likely to have a significant impact on the environment. Again, this cross-sectoral approach does not permit a single species or manipulative approach. Integrated management of human uses of the oceans were emphasised,[106] together with other steps towards the application of an ecosystem approach such as targeted action to address root causes of activities that can undermine the conservation and integrity of marine ecosystems.

The conclusions of the *Ad Hoc* Open-ended Informal Working Group on marine biological diversity in areas beyond national jurisdiction were endorsed.[107]

The 2006 Sustainable Fisheries Resolution

The ecosystem approach featured strongly in both the 2006 Sustainable Fisheries Resolution[108] and the 2006 Oceans Resolution.[109]

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[103] ICP Report, Para. 5(b).

[104] ICP Report, Para. 6.

[105] ICP Report, Para. 7.

[106] ICP Report, Para. 8.

[107] ICP Report, Para. 9.

[108] General Assembly Resolution A/RES/61/105, Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments. Adopted without a vote on 8 December 2006. At http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/61/PV.71&Lang=E.

[109] General Assembly Resolution A/RES/61/222, Oceans and the law of the sea, adopted by 157 votes to 1, with 3 abstentions on 20 December 2006 ("2006 Oceans Resolution). Will be available at http://www.un.org/Depts/dhl/resguide/r61.htm.

The 2006 Sustainable Fisheries Resolution recognised the importance of applying ecosystem approaches to oceans management and the need to integrate such approaches into fisheries conservation and management and welcomed the ICP report. The resolution also acknowledged the biological importance of sharks in the marine ecosystem. The resolution called upon all States, directly or through RFMOs and arrangements, to apply widely, in accordance with international law and the Code, the precautionary approach and an ecosystem approach to the conservation, management and exploitation of fish stocks, including straddling fish stocks, highly migratory fish stocks, and discrete high seas fish stocks. The resolution also specifically encouraged States to apply the precautionary approach and an ecosystem approach in adopting and implementing conservation and management measures addressing, *inter alia*, by-catch, pollution, over-fishing, and protecting habitats of specific concern, taking into account existing guidelines developed by the FAO. Serious concern was expressed at the threat posed by IUU fishing to marine ecosystems.

The resolution specifically urged signatory and States with a real interest to SIOFA to agree on and implement interim measures to ensure the conservation and management of the fisheries resources and their marine ecosystems and habitats. RFMOs in general were urged to incorporate an ecosystem approach to fisheries management and biodiversity considerations to ensure that they effectively contribute to long term conservation and management and sustainable use of marine living resources.

The resolution encouraged States to apply by 2010 the ecosystem approach, noted the Reykjavik Declaration and CBD decision VII/11 and other relevant CBD decisions, noted the FAO guidelines and noted the importance to this approach of relevant provisions of the Fish Stocks Agreement and the Code.

With respect to vulnerable marine ecosystems, the resolution called upon States to take action immediately, individually and through RFMOs and arrangements, and consistent with the precautionary approach and ecosystem approaches, to sustainably manage fish stocks and protect vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals, from destructive fishing practices, recognizing the immense importance and value of deep sea ecosystems and the biodiversity they contain. A suite of measures were laid out to address the impacts of bottom fishing on vulnerable marine ecosystems accordingly.

The 2006 Oceans Resolution

Ecosystem integrity was a significant focus of the 2006 Oceans and the law of the sea resolution. The resolution noted the Millennium Ecosystem Assessment Synthesis reports and the urgent need to protect the marine biodiversity expressed in them. The resolution included specific references to the ICP agreed consensual elements relating to ecosystem approaches and oceans[110] and noted that continued environmental degradation in many parts of the world and increasing competing demands require an urgent response and the setting of priorities for management interventions aimed at conserving ecosystem integrity.[111] The goal of management interventions is clearly stated: conserving ecosystem integrity. Furthermore, the goals of the ecosystem approach agreed at ICP were endorsed, being managing human activities in order to maintain and, where needed, restore ecosystem health to sustain goods and environmental services, provide social and economic benefits for food security, sustain livelihoods in support of international development goals, and conserve marine biodiversity.[112] The role of UNCLOS, its implementing agreements, CBD and WSSD were recalled.[113] States were

[110] 2006 Oceans Resolution para. 119.
[111] 2006 Oceans Resolution para. 119(a).
[112] 2006 Oceans Resolution para. 119(b).
[113] 2006 Oceans Resolution para. 119(c).

encouraged to co-operate and coordinate their efforts and take all measures to address impacts on marine ecosystems in areas within and beyond national jurisdiction, taking into account the integrity of the ecosystems concerned.[114]

The Oceans Resolution also specifically addressed marine biodiversity, reaffirming its role relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction.[115] A further meeting of the working group is to take place in 2008 to consider, inter alia, the environmental impacts of anthropogenic activities on marine biological diversity beyond areas of international jurisdiction.[116]

The resolution raises concerns with adverse impacts if destructive fishing practices on marine biodiversity and ecosystems, calling upon States and international organizations to urgently take action to address destructive practices that have adverse impacts on marine biodiversity and ecosystems, including seamounts, hydrothermal vents and cold water corals.

The Law of the Sea Convention

The 1982 Law of the Sea Convention put into place what was for its time a comprehensive regime governing the world's oceans and seas. The Convention strongly emphasises co-operation between states and sets out rights and duties for the conservation of the marine living resources and the study, protection and preservation of the marine environment. It requires States to co-operate on a global and regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended practices and procedures for the protection and preservation of the marine environment.[117] The Convention regulates fishing primarily within exclusive economic zones (EEZs) which generally extend 200 nautical miles from the shorelines, but developments such as new regional fisheries management organizations (RFMOs)[118] are beginning to establish effective regulation over fishing in the high seas. The Convention provides that States also have a duty to take, or to co-operate with other States in taking, such measures for their nationals for the conservation of the living resources of the high seas,[119] and to co-operate with each other in the conservation and management of living resources in the areas of the high seas.[120]

The Convention provides for the general obligation to protect and preserve the marine environment and requires[121] measures to be taken to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life. The Convention requires coastal states to take into account effects on associated or dependent species,[122] and specifically protects highly migratory species, requiring co-operation with a view to ensuring conservation and promoting the objective of optimum utilization of such species.[123] Similarly, it requires co-operation with a view to the conservation of marine mammals.[124] These duties of co-operation were given more specificity in the context of straddling and highly migratory fish stocks in the Fish Stocks Agreement in 1995.

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[114] 2006 Oceans Resolution para. 119(d).
[115] 2006 Oceans Resolution para. 89.
[116] 2006 Oceans Resolution para. 91(a).
[117] Law of the Sea Convention, Article 197.
[118] See discussion of RFMOs such as the WCPFC, SIOFA, SEAFO and others, below, note 28.
[119] Law of the Sea Convention, Article 117.
[120] Law of the Sea Convention, Article 118.
[121] Law of the Sea Convention, Article 194(5).
[122] Law of the Sea Convention, article 61(4).
[123] Law of the Sea Convention, article 64.
[124] Law of the Sea Convention, article 65.

States fishing on the high seas are required to co-operate to establish subregional or regional fisheries organizations to take measures for the conservation of the living resources,[125] while coastal States and competent international organizations must co-operate to ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation.[126] RFMOs have responsibilities for information sharing,[127] co-ordination management of straddling[128] and highly migratory[129] stocks as well as anadromous stocks.[130] The Law of the Sea Convention thus laid down the framework for the development of the ecosystem approach. The obligations set out in the Convention were comprehensively delineated and specified in the Fish Stocks Agreement in 1995.

The 1995 Fish Stocks Agreement

Regional Fisheries Management Organisation, or RFMOs, provide the primary mechanism for co-operation by States in fisheries management and conservation. The 1995 Fish Stocks Agreement gave RFMOs competence to regulate straddling and migratory high seas stocks.[131]

Article 5 of the Fish Stocks Agreement (FSA)[132] introduced some specific requirements implementing the EAF that both coastal States and States fishing on the high seas are required to follow in giving effect to their duty to co-operate under the FSA.[133] These include adopting measures to ensure the long-term sustainability of straddling fish stocks and highly migratory fish stocks and promote the objective of their optimum utilization, ensuring that such measures are based on the best scientific evidence available, and that the interdependence of stocks is taken into account, apply the precautionary approach, assess the impacts of fishing on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks, adopt conservation and management measures for species belonging to the same ecosystem or associated with or dependent upon the target stocks, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened. They must also minimize waste, discards, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species, in particular endangered species, through measures including the development and use of selective, environmentally safe and cost-effective fishing gear and techniques, and protect biodiversity in the marine environment.

Article 6 contains an express and detailed implementation of the precautionary approach. This includes that States are required to take into account uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities on non-target and associated or dependent species, as well as existing and predicted oceanic, environmental and socio-economic conditions.[134]

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[125] Law of the Sea Convention, article 118. See also article 197, which required co-operation on a regional basis as appropriate.

[126] Law of the Sea Convention, article 61(2).

[127] Law of the Sea Convention, article 61(5).

[128] Law of the Sea Convention, article 63.

[129] Law of the Sea Convention, article 64.

[130] Law of the Sea Convention, article 66(5).

[131] See Fish Stocks Agreement Articles 2 and 3.

[132] Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, entered into force 11 December 2001, 1542 A/CONF.164/37, 34 *International Legal Materials 1542* ("FSA"), at http://www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm.

[133] Fish Stocks Agreement, article 5.

[134] FSA Article 6(3)(c).

Where the status of target stocks or non-target or associated or dependent species is of concern, States shall subject the stocks and species to enhanced monitoring in order to review their status and the efficacy of conservation and management measures. States shall also revise those measures regularly in the light of new information.[135]

Significantly, non-fishing impacts are also addressed. If a natural phenomenon has a significant adverse impact on the status of straddling fish stocks or highly migratory fish stocks, States are to adopt conservation and management measures on an emergency basis to ensure that fishing activity does not exacerbate such adverse impact.[136]

The FSA introduced express mandate of RFMOs and arrangements. The FSA requires States fishing on the high seas to enter into consultations in relation to straddling fish stocks and highly migratory fish stocks for RFMOs or arrangements.[137] Where an RFMO or arrangement is in place, State parties must belong to the RFMO or arrangement or agree to apply its conservation and management measures in order to participate in the fishery.[138] Article 10 of the FSA sets out functions RFMOs should carry out.

The FSA then represents one of the more advanced and specific implementations of the ecosystem approach. However, FSA is implemented through RFMOs and arrangements, and few RFMO explicitly recognise the ecosystem approach to fisheries in their conventions,[139] so lack the institutional framework to implement the ecosystem approach, though some have amended them or are in the process of doing so.[140] As well as institutional changes, on a functional level, RFMOs will need to update their procedures and staff in order to implement the ecosystem approach.[141]

The FSA Review Conference

In May 2006, the four year review conference of the Fish Stocks Agreement was held.[142] The participants agreed that a number of challenges remain in achieving full implementation of the FSA, particularly with respect to the application of the precautionary approach and ecosystem approaches to fisheries management.[143] Regional efforts to implement an ecosystem approach to fisheries management, beyond addressing non-target and associated and dependent species, have increased in recent years with a number of RFMOs undertaking information and data gathering initiatives to assess the need for and scope of additional management measures or other initiatives. However, participants agreed that accelerated progress in this area is needed.[144]

The Review Conference recommended that States individually and collectively through RFMOS enhance understanding of ecosystem approaches and commit themselves to incorporating ecosystem considerations in fisheries management, including actions to conserve associated and dependent

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[135] FSA Article 6(5).

[136] FSA Article 6(7).

[137] Fish Stocks Agreement, article 8(2).

[138] Fish Stocks Agreement, article 8(3) and (4).

[139] FAO Guidelines, note 6 above, Executive Summary, 8.

[140] See discussion on page 32.

[141] See FAO Guidelines, 21 and 60 and Executive Summary, 8.

[142] See Report of the Review Conference on the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 5 July 2006, A/CONF.210/2006/15, at http://www.un.org/depts/los/convention_agreements/review_conf_fish_stocks.htm and report at http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/CONF.210/2006/15&Lang=E.

[143] FSA Review Conference Report para. 7.

[144] FSA Review Conference Report para. 13.

species and to protect habitats of specific concern, taking into account existing FAO guidelines, and request FAO to continue its work on the subject, as appropriate.[145]
Thus the Conference agreed that actions to conserve associated and dependent species and the protection of habitats of specific concern were of particular significance.

THE FAO

The Food and Agriculture Organization (FAO) embraced the ecosystem approach after the 2001 Reykjavik Declaration, and has promoted the approach through its Committee on Fisheries (COFI) and development of documentation including technical guidelines. Its various instruments have contributed to its development and will be described below.

The Reykjavik Declaration

In 1992, the outcome of a conference on responsible fishing, the Cancún Declaration,[146] took a broad view of responsible fisheries management, and while it did not adopt the ecosystem approach by name, adopted many elements of an ecosystem approach. It called for adoption of effective fisheries planning and management standards which, within the context of sustainable development, will promote the maintenance of the quantity, quality, diversity and economic availability of fisheries resources. Geographic and climatic characteristics were to be taken into account in fisheries science. The Declaration said that States should systematically assess the impacts of fishing, aquaculture and other activities affecting the marine environment, particularly in coastal areas.
However, it was nearly ten years later that the ecosystem approach was explicitly called for in the key 2001 Reykjavik Declaration.[147] The participants recognised that sustainable fisheries management incorporating ecosystem considerations entails taking into account the impacts of fisheries on the marine ecosystem and the impacts of the marine ecosystem on fisheries,[148] and said that the objective of including ecosystem considerations in fisheries management is to contribute to long-term food security and to human development and to assure the effective conservation and sustainable use of the ecosystem and its resources.[149] The participants also recognized that certain non-fishery activities have an impact on the marine ecosystem and have consequences for management, including land-based and sea-based activities which affect habitat, water quality, fisheries productivity, and food quality and safety.[150]
The participants affirmed that

> "[I]ncorporation of ecosystem considerations implies more effective conservation of the ecosystem and sustainable use and an increased attention to interactions, such as predator-prey relationships, among different stocks and species of living marine resources; furthermore that it entails an understanding of the impact of human

[145] FSA Review Conference Report para. 18(d). As a proposed means of strengthening the Agreement, the Review Conference agreed to recommend that States individually and collectively through RFMOs continue on an urgent basis to strengthen the mandates of, and measures adopted by, RFMOs to implement modern approaches to fisheries management as reflected in the FSA and other relevant international instruments, including relying on the best scientific information available and application of the precautionary approach, and incorporating an ecosystem approach into fisheries management. FSA Review Conference Report para. 32(a).
[146] Declaration of the International Conference on Responsible Fishing, Cancún, Mexico, 6-8 May 1992. Copy at http://www.fao.org/DOCREP/003/V5321E/V5321E11.htm#ch9.5.
[147] Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, paragraph 5, at http://www.fao.org/docrep/meeting/004/Y2211e.htm.
[148] Reykjavik Declaration, preamble.
[149] Ibid.
[150] Ibid.

> activities on the ecosystem, including the possible structural distortions they can cause in the ecosystem."[151]

The operative part of the declaration stated that in an effort to reinforce responsible and sustainable fisheries in the marine ecosystem, participants will individually and collectively work on incorporating ecosystem considerations into that management to that aim.

To that end, participants said they will advance the scientific basis for developing and implementing management strategies that incorporate ecosystem considerations and which will ensure sustainable yields while conserving stocks and maintaining the integrity of ecosystems and habitats on which they depend,[152] and identify and describe the structure, components and functioning of relevant marine ecosystems, diet composition and food webs, species interactions and predator-prey relationships, the role of habitat and the biological, physical and oceanographic factors affecting ecosystem stability and resilience.[153]

As the FAO has noted, "the Declaration recognised the importance of interactions between fishery resources and all components of the ecosystem, including the environment, and the need to conserve marine environments."[154] It also recognised the goals of ensuring sustainable yields while conserving stocks and maintaining the integrity of ecosystems and habitats on which they depend.

The Reykjavik Declaration was followed by an expert consultation[155] which itself led to the development of technical guidelines on the ecosystem approach.

The FAO Technical Guidelines

The FAO Technical Guidelines[156] provide support for the implementation of the FAO Code of Conduct for Responsible Fisheries. The FAO Technical Guidelines observe[157] that the ecosystem is a functional unit, and comprises dynamic complexes of plants, animals (including humans), micro-organisms and the non-living environment. The ecosystem approach to fisheries "strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecological meaningful boundaries."[158] EAF requires greater reliance on the precautionary approach, since uncertainties will be more diverse than under single-species fisheries management.[159]

The FAO Guidelines draw the link between the EAF and sustainable management and noted that there is a need to improve the approach used in fisheries management so that potential social and economic benefits can be achieved.[160]

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[151] Ibid.

[152] Reykjavik Declaration, Paragraph 5(a).

[153] Reykjavik Declaration, Paragraph 5(b).

[154] FAO,Committee on Fisheries, 25th Session,Rome,24-28 February 2003, Implementation of Ecosystem Approach to Fisheries Management to achieve Responsible Fisheries and to Restore Fisheries Resources and Marine Environments,COFI/2003/10,at http://www.fao.org/DOCREP/MEETING/005/Y8083E.HTM, para.5.

[155] See Report of the Expert Consultation on Ecosystem-Based Fisheries Management - Reykjavik, Iceland, 16-19 September 2002, FAO Fisheries Report No. 690, at http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y4491T/y4491t01.htm and ftp://ftp.fao.org/docrep/fao/005/Y4491t/y4491t00.pdf.

[156] See note **Error! Bookmark not defined.** above.

[157] FAO Guidelines, Executive Summary, 8.

[158] FAO Guidelines, Page 14 and Executive Summary, 6.

[159] FAO Guidelines, 22.

[160] FAO Guidelines, 12.

The Guidelines address population manipulation measures such as restocking and stock enhancement,[161] culling and intentional introductions, from the point of view of biodiversity and ecosystem protection. The Guidelines note with respect to culling that[162]

> This measure usually aims to reduce the abundance of predators or species that compete for the same trophic resources in order to increase the yields of target species or to maintain the balance of the trophic structure. owever, such food-web manipulation needs to be carried out with caution to ensure that it produces only the desired effect and does not result in unwanted changes in abundance of other important components of the ecosystem or threaten the survival of the species culled. An adaptive approach is needed, which may benefit from planned experimentation in some cases. onsideration should first be given to the rebuilding of target species populations through other, more conventional fisheries management measures. arge-scale culling should be conducted only after the full implications of the manipulation have been thoroughly investigated.

Where one fishery targets one or more prey species of a predator fished by another fishery, the Guidelines advocate that there must be an institution or arrangement to coordinate the management actions of both fisheries, including the reconciliation of the different objectives of the two fisheries.[163] Similarly, EAF in allocation implies explicit recognition of predator-prey relationships requiring allocation of some of the potential yield of a prey species to the predator rather than all being allocated to the fishery targeting the prey species.[164]

The FAO's Committee on Fisheries (COFI)

The FAO's Committee on Fisheries (COFI)[165] has met biennially since 1997 to review the programmes of work of FAO in the field of fisheries and aquaculture and their implementation, and to conduct periodic general reviews of international fishery and aquaculture problems and possible solutions. The next meeting, COFI-27, is to be held in Rome from 5-9 March 2007,[166] and is to discuss implementing the ecosystem approach in fisheries.[167]

A number of meetings during 2006 addressed EAF, including an Expert Consultation on the economic, social and institutional (SEI) considerations of applying the EAF in June,[168] intended to set parameters for a technical paper on the topic, and a Conference in Bergen in September 2006.[169] It was observed at that Conference that goals of the ecosystem approach are to maintain ecosystem integrity, improve human well-being and the equitable sharing of ecosystem services.[170] These involve consideration of the effects of fisheries on the ecosystem as well as the effect of the ecosystem on fisheries.[171]

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[161] Stock enhancement supplies additional stocks to harvest, while restocking aims to rebuild a stock to viable levels. FAO Guidelines, 36.

[162] FAO Guidelines, 37.

[163] FAO Guidelines, 61.

[164] FAO Guidelines, 62.

[165] Website at http://www.fao.org/fi/body/cofi/cofi.asp.

[166] See meeting website at ftp://ftp.fao.org/FI/DOCUMENT/COFI/COFI_27/Default.htm.

[167] See agenda at ftp://ftp.fao.org/docrep/fao/meeting/011/j8725e.pdf.

[168] FAO, Report of the Expert Consultation on the Economic, Social and Institutional Considerations of Applying the Ecosystem Approach to Fisheries Management. Rome, 6–9 June 2006. FAO Fisheries Report. No. 799. Rome, FAO. 2006, at ftp://ftp.fao.org/docrep/fao/009/a0673e/a0673e00.pdf ("FAO SEI Consultation").

[169] The Bergen Conference on Implementing the Ecosystems Approach to Fisheries, Bergen, 26-28 September 2006, Presentations at http://cieaf.imr.no/presentations.

[170] See Synopsis and Commentary by Ad-hoc Working Group, 3, at http://cieaf.imr.no/presentations.

[171] Ibid.

At COFI-24[172] in 2001, an important paragraph on the ecosystem approach in the context of marine mammals, paragraph 39, read that:

> 39. Many Members requested FAO to conduct studies on the relationship between marine mammals and fisheries. Other Members, however, commented on the issues and complexity of ecosystem-based fisheries management, urging that caution be exercised in drawing definitive conclusions with respect to the impact of predator/prey relationships on fisheries as a number of environmental and human factors also contributed to the status of particular fisheries. The Committee agreed that such studies and reviews by FAO should be conducted to encompass these characteristics in particular interaction between marine mammals and fisheries.

The report of the 2005 COFI-26[173] encouraged Members and RFMOs to consider introducing and implementing the ecosystem approach to fisheries overcoming the obstacles that it might present in practice.[174] It also urged Members, by fulfilling their flag State responsibilities, to ensure their vessels were regulated effectively and operated in a manner consistent with the ecosystem approach to fisheries, in particular by ensuring that fishing vessels flying their flags reported fully data regarding their fishing activities.[175] This recommendation was made in the context of deep-water fisheries.

The secretariat in its paper for COFI-27[176] noted developments in EAF and included modest recommendations, including to consider in what areas FAO should take or reinforce action and identify financial resources, which could be expanded upon.[177]

The FAO Compliance Agreement

The FAO Compliance Agreement in 1993[178] observes in its preamble that under Agenda 21, States commit themselves to the conservation and sustainable use of marine living resources on the high seas. Parties call upon States to join or enter into understandings with organizations and arrangements with a view to achieving compliance with international conservation and management measures.[179] The Compliance Agreement is aimed primarily at abuse of flagging of fishing vessels, by reinforcing flag

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[172] FAO, Report of the twenty-fourth session of the Committee on Fisheries, Rome,26 February – 2 March, 2001, at ftp://ftp.fao.org/docrep/fao/005/y2161e/y2161e00.pdf.

[173] FAO Fisheries Report No. 780, Report of the Twenty-sixth Session of the Committee on Fisheries, Rome, Italy, 7-11 March 2005, COFI/2007/Inf.5, at ftp://ftp.fao.org/docrep/fao/008/a0008e/a0008e00.pdf ("COFI 26 report").

[174] COFI 26 Report, Matters requiring the attention of Council, para. IX and see Report para. 14, which stated that:

> 14. Many Members referred to the need to adopt widely the ecosystem approach to fisheries management in a timely and appropriate manner, recognizing that fishing impacts not only the target resources but also the ecosystem itself and vice versa. It was pointed out that implementing an ecosystem approach is an evolutionary process that need not await complete or perfect information. It was also noted, however, that while there was general recognition of the value and importance of this approach to management, there still needs to be greater understanding on how it should be applied in practice. The Committee encouraged Members and RFMOs to consider introducing and implementing the ecosystem approach to fisheries overcoming the obstacles that it might present in practice.

[175] COFI 26 Report, para.vii and see Report para. 87.

[176] Implementing the Ecosystem Approach to Fisheries, Including Deep-Sea Fisheries, Biodiversity Conservation, Marine Debris and Lost or Abandoned Fishing Gear (2007), at COFI/2007/8, at ftp://ftp.fao.org/docrep/fao/meeting/011/j8993e.pdf.

[177] Op. cit, para. 58: "58. Based on the above, the Committee is requested to note the activities undertaken so far, consider in what areas FAO should take or reinforce action as regards promoting awareness and wider implementation of EAF, and identify the necessary financial resources to support those actions."

[178] FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. Rome, 24 November 1993. Copy at http://www.fao.org/waicent/faoinfo/fishery/agreem/complian/complian.htm.

[179] FAO Compliance Agreement, preamble.

State responsibility,[180] co-operation,[181] and exchange of information.[182] There is no definition of activities which undermine the effectiveness of international conservation and management measures,[183] but where conservation and management measures incorporate the ecosystem approach, actions which undermine those measures can be interpreted broadly so as to include the taking of species which undermine the ecosystem approach. 'Fishing vessel' is defined to mean any vessel used or intended for use for the purposes of the commercial exploitation of living marine resources, including mother ships and any other vessels directly engaged in such fishing operations.[184] So this could include whaling vessels and other vessels exploiting species other than fish. Similarly, 'international conservation and management measures' means measures to conserve or manage one or more species of living marine resources[185] – they are not limited to fish, so could include measures adopted to conserve, or manage, whales or other species. Such measures may be adopted either by global, regional or subregional fisheries organizations, subject to the rights and obligations of their members, or by treaties or other international agreements. This would include International Whaling Commission (IWC) measures, for instance.

To this end, as was observed by the IWC in the Berlin Initiative in 2003, non-compliance includes any action that undermines the effectiveness of conservation measures, regardless of whether or not the action is technically legal. "Thus, even countries which take the view that Article VIII of the ICRW legalizes all scientific takes, however excessive, cannot claim to be in compliance with the ICRW so long as they continue to ignore IWC decisions in this regard."[186]

This has two implications:

Firstly, the FAO Compliance agreement is not limited to fish, and is applicable to marine mammals.

Secondly, noncompliance is not restricted to illegal activity. Actions such as whaling activities can undermine conservation and management measures without necessarily being illegal as such, and other activities such as over-fishing prey species important to predators, or predators important to prey, can undermine conservation and management measures relevant to those species.[187]

Some practical implications could be that each Party must take measures to ensure that its flagged vessels do not engage in any activity that undermines the effectiveness of international conservation and management measures,[188] and must co-operate and exchange information, including evidentiary material, relating to activities of fishing vessels. It must do so in order to assist the flag State in identifying those flagged vessels reported to have engaged in activities undermining international conservation and management measures.[189] When a vessel is voluntarily in the port of a Party other

[180] FAO Compliance Agreement, Article III on flag State responsibility and Article IV on records of fishing vessels.
[181] FAO Compliance Agreement, Article V and VII (developing States) and VIII (non-Parties).
[182] FAO Compliance Agreement, Article VI.
[183] FAO Compliance Agreement, Article III.1,III.5,V.2, VI.8 and VIII.2 and VIII.3.
[184] Compliance Agreement Article I(a).
[185] Compliance Agreement Article I(b).
[186] IWC Resolution 2003-1, The Berlin Initiative on Strengthening the Conservation Agenda of the International Whaling Commission, Annex II, IWC Conservation Work (An Annotated Compilation) (1976-2001), para. 10, at http://www.iwcoffice.org/meetings/resolutions/resolution2003.htm.
[187] Note that Japan is a Party, but Iceland is not. The United States is, as is New Zealand, Australia and the European Community. See http://www.fao.org/Legal/treaties/012s-e.htm.
[188] Compliance Agreement Article III.1(a).
[189] Compliance Agreement Article V.1.

than its flag State, that Party shall notify the flag State, where it has reasonable grounds for believing that the vessel has been used for an activity that undermines the effectiveness of international conservation and management measures.[190]

The FAO Code of Conduct

The FAO Code of Conduct for Responsible Fisheries, an example of 'soft law', was developed in 1995. The Code is to be interpreted to be consistent with the Law of the Sea Convention and the Fish Stocks Agreement, and in accordance with other applicable rules of international law, and the Rio Declaration and Chapter 17 of Agenda 21.[191] International Plans of Action (IPOAs) have been developed under the Code[192] on seabirds, sharks, managing fishing capacity, and IUU fishing.

The Code sets out principles and international standards of behaviour for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity.[193]

The Code of Conduct includes many elements of the ecosystem approach, including:

- the obligation to conserve aquatic ecosystems,[194]
- promotion of the maintenance of the quality, diversity and availability of fishery resources in sufficient quantities for present and future generations in the context of food security, poverty alleviation and sustainable development,[195]
- ensuring the conservation of species belonging to the same ecosystem or associated with or dependent upon the target species,[196]
- taking account of traditional knowledge and environmental, economic and social factors,[197]
- applying a precautionary approach,[198]
- minimizing waste, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species,[199]
- protection and rehabilitation of critical fisheries habitats,[200] and
- the need to assess the impacts of environmental factors on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks, and assess the relationship among the populations in the ecosystem.[201]

Also promoted is advance evaluation of the effects of aquaculture development on genetic diversity and ecosystem integrity,[202] and monitoring the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration.[203]

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[190] Compliance Agreement Article V.2.

[191] FAO Code of Conduct Article 3. It is also to be interpreted in the light of the 1992 Declaration of Cancun.

[192] See http://www.fao.org/fi/ipa/ipae.asp. International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries – 1999, International Plan of Action for the Conservation and Management of Sharks - 1999 and International Plan of Action for the Management of Fishing Capacity - 1999. All three of these texts can be found at: http://www.fao.org/docrep/006/x3170e/X3170E00.HTM.

[193] FAO Code of Conduct, Introduction.

[194] FAO Code of Conduct, para. 6.1.

[195] FAO Code of Conduct, para. 6.2.

[196] FAO Code of Conduct, para. 6.2.

[197] FAO Code of Conduct, para. 6.4.

[198] FAO Code of Conduct, para. 6.5.

[199] FAO Code of Conduct para. 6.6.

[200] FAO Code of Conduct, para. 6.8.

[201] FAO Code of Conduct, para. 7.2.3.

[202] FAO Code of Conduct para. 9.1.2.

FAO International Plans of Action

IPOA-Capacity

The International Plan of Action for the Management of Fishing Capacity[204] was negotiated during 1998 and endorsed by the FAO Council in 1991. It is a voluntary agreement which aims to address excessive fishing capacity, which contributes substantially to over-fishing, the degradation of marine fisheries resources, the decline of food production potential, and significant economic waste.[205] It aimed to achieve world-wide not later than 2005[206] an efficient, equitable and transparent management of fishing capacity. It aimed at doing this through measures such as conduct of assessments of capacity and improvement of the capability for monitoring fishing capacity, preparation and implementation of national plans to effectively manage fishing capacity.[207] States are to produce national plans of action to better manage capacity levels in their domestic fisheries by the end of 2002, and to "reduce and progressively eliminate all factors, including subsidies and economic incentives ... which contribute to the build-up of excessive fishing capacity."[208]

The IPOA notes that the management of fishing capacity should be designed to achieve the conservation and sustainable use of fish stocks and the protection of the marine environment consistent with the precautionary approach, the need to minimize by-catch, waste and discard and ensure selective and environmentally safe fishing practices, the protection of biodiversity in the marine environment, and the protection of habitat, in particular habitats of special concern.[209]

IPOA-IUU

The IPOA-IUU[210] aims to prevent, deter and eliminate IUU fishing.[211] Like other IPOAs, it is soft law. It does carry weight however, and was adopted by the COFI and endorsed by the FAO Council in 2001.

States are encouraged to join the Law of the Sea Convention, the Fish Stocks Agreement and the FAO Compliance Agreement[212] are reminded to implement fully and effectively all relevant international fisheries instruments to which they already are party,[213] as well as the Code of Conduct and its associated International Plans of Action.[214] The IPOA-IUU addresses national controls, such as that States should ensure that nationals subject to their jurisdiction do not support or engage in IUU fishing.[215] It also includes flag State controls, such as ensuring that only vessels authorized to do so fish on the high seas,[216] coastal State controls, such as measures to prevent, deter and eliminate IUU

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[203] FAO Code of Conduct, para. 12.5.

[204] The International Plan of Action for the Management of Fishing Capacity ("IPOA-Capacity"). Text at http://www.fao.org/docrep/006/x3170e/x3170e04.htm.

[205] IPOA-Capacity para 1.

[206] In fact the target date was 'preferably by 2003'. IPOA-Capacity para 7.

[207] IPOA-Capacity para 8.

[208] IPOA-Capacity para 26.

[209] IPOA-Capacity para 9(iv).

[210] Food and Agriculture Organization "International Plan Of Action To Prevent, Deter And Eliminate Illegal, Unreported And Unregulated Fishing", (IPOA-IUU) adopted by consensus at the Twenty-fourth Session of COFI on 2 March 2001 and endorsed by the Hundred and Twentieth Session of the FAO Council on 23 June 2001, at http://www.fao.org/DOCREP/003/y1224e/y1224e00.HTM.

[211] IPOA-IUU III, para. 8.

[212] IPOA-IUU, IV para. 11.

[213] IPOA-IUU, IV para. 12.

[214] IPOA-IUU, IV para. 14.

[215] IPOA-IUU, IV para. 18.

[216] IPOA-IUU, IV para. 44-50.

fishing in the EEZ and controlling IUU fishing through licensing of fishing boats,[217] port State controls including requiring prior permission of fishing and support vessels to enter their ports[218] and controls on landing and transshipping or fish in port,[219] and market related measures such as preventing IUU fish being traded or imported into their territories.[220]

It should be noted that the third limb of IUU fishing, unregulated fishing, can include fishing in the area of a RFMO in a manner not consistent with or contravening the conservation and management measures of that the RFMO, as well as in areas or for fish stocks where there are no applicable conservation or management measures, and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law.[221] So fishing in breach of conservation measures broader than fishing quotas can amount to IUU fishing.[222]

Action plans are to address all economic, social and environmental impacts of IUU fishing,[223] and measures to prevent, deter and eliminate IUU fishing should be consistent with the conservation and long-term sustainable use of fish stocks and the protection of the environment.[224] Authorisation to fish can be conditioned on protection of the marine environment, and conservation and management measures or provisions adopted at a national, regional or global level.[225]

IPOA-Seabirds

The IPOA-Seabirds[226] was developed to address the incidental catch of seabirds incidentally caught in longline fisheries,[227] in order to reduce the catch.[228] If a problem exists, States are to develop a Plan of Action for reducing the incidental catch of seabirds in longline fisheries (NPOA-Seabirds).[229] The ecosystem approach does not feature in the IPOA, which focuses on practical measures such as increasing the sink rate of baits, bird-scaring lines and deterrents.[230]

IPOA-Sharks

The IPOA-Sharks[231] was developed to ensure the conservation and management of sharks and their long-term sustainable use.[232] States are to adopt a national plan of action for conservation and management of shark stocks (Shark-plan) if their vessels conduct directed fisheries for sharks or if their

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[217] IPOA-IUU, IV para. 52.
[218] IPOA-IUU, IV para. 55.
[219] IPOA-IUU, IV para. 59.
[220] IPOA-IUU, IV para. 66.
[221] IPOA-IUU, para. 3.3.
[222] "Conservation and management measures" means measures to conserve one or more species of living marine resources that are adopted and applied consistent with the relevant rules of international law. IPOA-IUU para. 6.
[223] IPOA-IUU para. 9.3.
[224] IPOA-IUU para. 9.4.
[225] IPOA-IUU para. 47.7.
[226] International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds), at http://www.fao.org/docrep/006/x3170e/x3170e02.htm.
[227] IPOA-Seabirds, para. 1.
[228] IPOA-Seabirds, para. 10.
[229] IPOA-Seabirds, para. 12.
[230] See IPOA-Seabirds, Technical Note on Some Optional Technical and Operational Measures for Reducing the Incidental Catch of Seabirds in Longline Fisheries.
[231] International Plan of Action for the Conservation and Management of Sharks ("IPOA-Sharks"), at http://www.fao.org/docrep/006/x3170e/x3170e03.htm.
[232] IPOA-Sharks, para. 16.

vessels regularly catch sharks in non-directed fisheries.[233] Each Shark-plan is to, *inter alia*, ensure that shark catches from directed and non-directed fisheries are sustainable and contribute to the protection of biodiversity and ecosystem structure and function.[234] Management and conservation strategies should aim to keep total fishing mortality for each stock within sustainable levels by applying the precautionary approach.[235]

The FAO Sea Turtle Guidelines

The 1994 FAO Sea Turtle Guidelines[236] notes that the FAO Code of Conduct calls for sustainable use of aquatic ecosystems and requires that fishing be conducted with due regard for the environment. Implementation of the Guidelines is to be consistent with the Code of Conduct as well as with the Reykjavik Declaration on Responsible Fisheries.[237] The Sea Turtle Guidelines cover matters such as appropriate handling and release of sea turtles, the use of turtle extruder devices (TEDs), avoiding encirclement by purse seine trawlers, monitoring of fish aggregating devices (FADs) and gear modification and use by longline fishermen.

THE ECOSYSTEM APPROACH IN RFMOS

Most RFMOs were established before the FSA, so it is not surprising that few of them explicitly incorporate the ecosystem approach in their constituent instruments. RFMOs established more recently do reflect Articles 5 and 6 of the FSA or even explicitly mention the ecosystem approach. A brief survey of the implementation of the ecosystem approach in RFMOs follows.[238]

The Pacific Ocean

The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)[239] has capacity over highly migratory fish stocks in the Western and Central Pacific Ocean, including skipjack, yellowfin, bigeye and Southern albacore tuna. Article 5(d) of the Convention[240] requires members to assess the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks. The WCPFC has established an *ad hoc* specialist working group on Ecosystem and Bycatch.[241]

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[233] IPOA-Sharks, para. 18.

[234] IPOA-Sharks, para. 22.

[235] IPOA-Sharks, para. 14.

[236] FAO Guidelines to reduce Sea Turtle Mortality in Fishing Operation (2004) Copy at http://www.intfish.net/docs/2004/faoturtles.pdf.

[237] FAO Sea Turtle Guidelines, page 1.

[238] For an overview of RFMOs concerned with straddling and highly migratory fish stocks, see Evelyne Meltzer, "Global Overview of Straddling and Highly Migratory Fish Stocks," at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer_e.htm.

[239] Convention for the Conservation and Management of Highly Migratory Fish stocks in the Western and Central Pacific Ocean, signed at Honolulu on 5 September 2000, entered into force 19 June, 2004. Text at http://www.ocean-affairs.com/pdf/text.pdf. See map at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/WCPFC.pdf.

[240] WCPFC Article 5(d) provides that members of the Commission must "assess the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks."
The precautionary approach is mandated in Article 5(c): apply the precautionary approach in accordance with this Convention and all relevant internationally agreed standards and recommended practices and procedures.

[241] See papers of the working group and report of the Scientific Committee in August 2006 at http://www.wcpfc.org/sc2/Index.htm#ecoby.

SPC is the Secretariat of the Pacific Community, and SPC (through its Oceanic Fisheries Program) is the regional lead agency for fishery ecosystem assessment and science.[242] The Forum Fisheries Agency (FFA) provides fisheries management advice and services to members and oversees the sustainable management and development of tuna resources in the western and central Pacific Ocean.[243] FFA also helps Pacific countries participate in WCPFC.

The Galapagos Agreement[244] for the Southeast Pacific is the subject of long-pending proceedings before the International Tribunal for the Law of the Sea.[245]

Negotiations are ongoing for a South Pacific RFMO to address stocks not managed by WCPFC. [246] Participants held their first meeting in Wellington in February 2006[247] and their second meeting in Hobart in November 2006.[248] Participants agreed work to establish a legally binding instrument for the conservation and management of living marine resources, other than species listed in Annex I of UNCLOS, in the high seas of the South Pacific Ocean. Participants noted that it is understood that conservation and management includes the sustainable utilisation of resources and the protection of the marine environment.

Tasman Sea

The South Tasman Rise Orange Roughy Arrangement, a bilateral arrangement between Australia and New Zealand,[249] notes the need to apply the precautionary approach widely in the conservation, management and utilisation of orange roughy stocks, but does not incorporate the ecosystem approach as such.

Southeast Atlantic: SEAFO

SEAFO,[250] agreed in 2001, was the first RMFO to be established after the FSA was adopted. SEAFO addresses stocks in the FAO's Statistical Area 47 in the high sea areas straddling the EEZs of Angola,

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[242] Memorandum of Understanding Between FFC and SPC, para. 2, at http://www.spc.int/mrd/org/FFA_SPC_MOU3.pdf.

[243] South Pacific Forum Fisheries Agency Convention, opened for signature at Honiara on 10 July 1979, entered into force 9 August 1979, at http://svc098.bne147v.server-web.com/docs/convention.1979.pdf. Web page is FFA website at www.ffa.int. Members include Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa.

[244] Framework Convention for the Conservation of Living Marine Resources on the High Seas of the Southeast Pacific. At http://www.cpps-int.org/english/galapagosagreement.html. Convention website is at http://www.cpps-int.org/english/galapagosagreement.html.

[245] Case No. 7, *Chile v EU*, Case concerning the conservation and sustainable exploitation of swordfish stocks in the Southeast Pacific Ocean, at http://www.itlos.org/cgi-bin/cases/case_detail.pl?id=6&lang=en. The case is suspended at the request of the parties; see order of 16 December 2003.

[246] See website at http://www.southpacificrfmo.org.

[247] See Meeting Report, "First International Meeting on the Establishment of the proposed South Pacific Regional Fisheries Management Organisation," Wellington, 14-17 February 2006, at http://www.southpacificrfmo.org/assets/FINAL%20Meeting%20Report.doc.

[248] See Meeting Report, Second International Meeting on the Establishment of the proposed South Pacific Regional Fisheries Management Organisation, Hobart, Australia, 6-10 November 2006, at http://www.southpacificrfmo.org/event.second-meeting.

[249] Text at http://www.dfat.gov.au/geo/new_zealand/roughy.pdf. See E.J. Molenaar, "The South Tasman Rise Arrangement of 2000 and other Initiatives on Management and Conservation of Orange Roughy," 16 *Int'l J. of Marine and Coastal Law* 77-118 (2001). See map at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/TasmanRise.pdf.

[250] Convention for the Conservation and Management of Fisheries Resources in the South East Atlantic Ocean (SEAFO Convention) signed at Windhoek, 20 April 2001. Signatories include Angola, South Africa, Namibia and the United Kingdom (on behalf of St Helena and its dependencies of Tristan da Cuhna and Ascension Island) and Iceland, Norway, Republic of Korea, United States of America and the European Community. Entered into force 13 April 2003. Text is at http://www.mfmr.gov.na/seafo/seafotext.htm. http://www.mfmr.gov.na/seafo/seafo.htm. See map at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/SEAFO.pdf.

Namibia, South Africa and the United Kingdom, and include coverage of alfonsino, orange roughy, armourhead, wreckfish, red crab and deepwater hake. The Convention does aim at safeguarding the environment and marine ecosystems in which the marine resources occur, and its general principles include the precautionary approach, the impact of fishing operations on ecologically related and associated and dependent species, the need to minimise harmful impacts on living marine resources as a whole; and protection of marine biodiversity.[251] As such, the implementation of the EAF mandates minimisation or avoidance of manipulation or human intervention of the marine environment, and aims at the promotion of ecosystem protection as well as healthy fish stocks.

Northeast Atlantic: NEAFC

NEAFC[252] has competence over the Northeast Atlantic Ocean and Arctic Ocean, except the Baltic and Mediterranean Seas.[253] NEAFC members are the EU, Denmark (in respect of the Faroe Islands and Greenland), Estonia, Iceland, Poland and Russia. Its focus is on the regulation of fisheries and is not founded on an ecosystem approach,[254] but it has said it will amend its convention in light of developments in international law with respect to biodiversity, ecosystem and precautionary approaches.[255]

North Atlantic Ocean Salmon: NASCO

The NASCO Convention[256] has the objective of being "to contribute through consultation and co-operation to the conservation, restoration, enhancement and rational management of salmon stocks" subject to the Convention.[257] NASCO has adopted the precautionary approach[258] and a plan of action for the application of the precautionary approach to the protection and restoration of Atlantic Salmon habitat,[259] and the Board in 2006 agreed to seek support from marine scientists in relation to the relevance of the Salmon at Sea Programme (SALSEA) to the ecosystem approach.[260] The SALSEA's initial research priority is to improve understanding of the migration and distribution of salmon at sea in relation to feeding opportunities and predation.[261]

Atlantic Tunas: ICCAT

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[251] SEAFO Convention Article 3.

[252] Convention on Future Multilateral Co-operation in North-East Atlantic Fisheries, signed on 18 November 1980, entered into force 17 March 1982, at http://www.neafc.org/footable/docs/Convention.pdf ('NEAFC Convention'). See map at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/NEAFC.pdf.

[253] NEAFC Convention, article 1.

[254] NEAFC Convention, article 4.

[255] See NEAFC Press Release, 21 November 2005, at http://www.neafc.org/news/docs/2005-press-release_final.pdf. NEAFC's 25th Annual Meeting is scheduled for 13-17 November, 2006 in London.

[256] Convention for the Conservation of Salmon in the North Atlantic Ocean, Opened for signature in Reykjavik on 2 March 1982, entered into force 1 October 1983 at http://www.nasco.int/pdf/nasco_convention.pdf.

[257] NASCO Convention Article 3.3.

[258] NASCO Agreement on Adoption of a Precautionary Approach, CNL (98) 46, at http://www.nasco.int/pdf/nasco_res_adoptprec.pdf.

[259] Plan of action for the application of the precautionary approach to the protection and restoration of Atlantic Salmon habitat, CNL (01) 51, at http://www.nasco.int/pdf/nasco_res_habitatpoa.pdf.

[260] Report of the 23rd Annual Meeting of the Council of NASCO, Saariselkä, Finland, 5-9 June 2006, page 101, at http://www.nasco.int/pdf/2006%20Council%20Report.pdf.

[261] See International Atlantic Salmon Research Board, The Salmon at Sea, SALSEA,Programme, at http://www.nasco.int/sas/salsea.htm.

The International Convention for the Conservation of Atlantic Tunas[262] (ICCAT) has as its objective the conservation of the resources of tuna and tuna-like fishes, and recites that Parties decided to co-operate in maintaining the populations of tuna and tuna-like fishes at levels which will permit the maximum sustainable catch for food and other purposes.[263] ICCAT has a Subcommittee on Ecosystems, to serve as the scientific cornerstone in support of an ecosystem approach to fisheries in ICCAT.[264]

Inter-American Tropical Tuna: IATTC

The Inter-American Tropical Tuna Commission (IATTC)'s 1949 Convention[265] provides that the Commission is to carry out research on the abundance, biometry and ecology of the tuna and tuna-like fishes, the oceanography of their environment; and the effects of natural and human factors upon their abundance.[266] However its objective, expressed in its preamble, for the Parties to co-operate in maintaining the populations of these fishes at levels which will permit the maximum sustainable catch for food and other purposes, does not incorporate the ecosystem approach, which can be ascribed to its early provenance. However, the 2003 Antigua Convention,[267] which will replace the 1949 Convention, does have the objective of to ensure the long-term conservation and sustainable use of the fish stocks covered by the Convention, in accordance with the relevant rules of international law.[268] The emphasis on long-term conservation and sustainable use is supplemented by a requirement for the Commission to adopt, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by the Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened.[269] Article IV requires the application of the precautionary approach. These provisions combined do represent important references to the ecosystem approach.

Southern Indian Ocean: SIOFA

The SIOFA Agreement, governing the high seas of the southern Indian Ocean[270] was signed on 11 July, 2006,[271] following several years of discussions.[272] The Agreement explicitly incorporates the ecosystem approach, providing that "measures shall be adopted on the basis of the best scientific

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[262] International Convention for the Conservation of Atlantic Tunas, Rio de Janeiro, 14 May 1966, entered into force 21 March 1969, at http://www.iccat.es/Documents/Recs/PLE-012%20ENG.pdf.

[263] ICCAT Convention, preamble.

[264] See Terms of Reference for a Subcommittee on Ecosystems, 12 December 2005, at http://www.iccat.es/Documents/SCRS/TofR%20SC_ECO_ENG.pdf.

[265] Convention for the Establishment of an Inter-American Tropical Tuna Commission, Washington, 31 May 1949, at http://www.iattc.org/PDFFiles/IATTC_convention_1949.pdfm Article I(3).

[266] IATTC Convention Article IV.1.

[267] Convention for the Strengthening of the Inter-American Tropical Tuna Commission established by the 1949 Convention between the United States Of America and the Republic Of Costa Rica, adopted June 23, 2003, in Antigua, Guatemala ("Antigua Convention"), at http://www.iattc.org/IATTCdocumentationENG.htm. The Convention will enter into force 15 months after the deposit of the seventh instrument of ratification or accession of the Parties to the 1949 Convention: Article XXXI.1. There were in February 2007 five parties stated to have ratified the Convention. See http://www.iattc.org/IATTCdocumentationENG.htm.

[268] Antigua Convention, Article II.

[269] Antigua Convention, Article VII.1(f).

[270] See map at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/SIOFA.pdf.

[271] See FAO, New agreement governing high-seas fishing in Indian Ocean, 12 July, 2006, at http://www.fao.org/newsroom/en/news/2006/1000360/index.html.

[272] See FAO Report on the fourth Intergovernmental Consultation on the establishment of a Southwest Indian Ocean Fisheries Commission, 16 July 2004, at http://www.fao.org/docrep/007/y5959b/y5959b01.htm.

evidence available to ensure the long term conservation of fishery resources, taking into account the sustainable use of such resources and implementing an ecosystem approach to their management."[273] The precautionary approach, the need to minimize the harmful impact that fishing activities may have on the marine environment, and the need to protect biodiversity are all included in its general principles. Like SEAFO, SIOFA mandates minimisation or avoidance of manipulation or human intervention of the marine environment, and aims at the promotion of ecosystem protection as well as healthy fish stocks.

Northwest Atlantic: NAFO

NAFO[274] covers fishery resources of the Northwest Atlantic Ocean area, except cetaceans managed by the IWC, salmon, tuna and marlin and sedentary species of the Continental Shelf.[275] In 2005 NAFO began discussing EAF[276] and launched a review of the NAFO Convention.[277] Some participants in a review opposed the use of the term 'ecosystem approach' on the basis that an international standard definition does not exist, while others observed that it has been included elsewhere, including in the JPOI.[278] However, following the Annual Meeting in September 2006, NAFO is now reportedly committed to an ecosystem approach which will be reflected in the Convention,[279] including an expansion of NAFO's mandate to minimize harmful impact on living marine resources and marine ecosystems and preservation of marine biodiversity. A ban on bottom trawling on four seamounts was cited as evidence of this approach.[280]

The Mediterranean: GFCM

The General Fisheries Commission for the Mediterranean (GFCM)[281] applies to all marine living resources in the Mediterranean Sea and the Black Sea.[282] The GFCM Convention as amended does not explicitly implement the EAF, although the precautionary approach is adopted,[283] but does require the Commission to take into account the need to promote the development and proper utilization of the marine living resources.[284] Its Subcommittee on the Marine Environment and Ecosystem (SCMEE)

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[273] SIOFA Agreement, Article 4(a).

[274] Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries, done at Ottawa, 24 October 1978, entered into force on 1 January 1979, at http://www.nafo.ca/About/MANDATE/Convention_2003.exe. Website is at http://www.nafo.ca. See map of coverage at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/NAFO.pdf

[275] NAFO Convention, Article I(4). Sedentary species are defined as organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or subsoil.

[276] See NAFO Press Release, 23 September 2005, 'NAFO Starts a Reform Process," at http://www.nafo.int/about/media/press/press05.pdf.

[277] See Report of the Working Group on the Reform of NAFO, 25-28 April 2006, at http://www.nafo.int/publications/meetproc/2006/gc/reformwgapr06/reformwg-apr06.pdf.

[278] NAFO Working Group report, 190.

[279] See NAFO Press Release, 22 September 2006, 'NAFO Reform in Full Swing,' at http://www.nafo.int/about/media/press/press06.pdf.

[280] Ibid. See NAFO, "Proposal on precautionary closure to four seamount areas based on the ecosystem approach to fisheries," NAFO/FC.Doc. 06/5, paper for 28th Annual Meeting, September 2006.

[281] 1949 Agreement for the establishment of a General Fisheries Council for the Mediterranean, signed at Rome 24 September 1949, entered into force 20 February 1952, as amended in 1963, 1976 and 1997. 1997 Amendment entered into force 29 April 2004 extending its application to the Black Sea. Text at http://www.fao.org/fi/body/rfb/GFCM/gfcm_basic.htm. See webpage at http://www.fao.org/fi/body/rfb/gfcm/gfcm_home.htm. See map at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/GFCM.pdf.

[282] For members accepting the 1979 Agreement.

[283] GFCM Agreement, as amended, Article III(2)

[284] GFCM Agreement, as amended, Article III(2).

held a workshop on the ecosystem approach in September 2005,[285] but it seems that the implementation of the EAF is in its early stages.

North Pacific Ocean Anadromous Stocks: NPAFC

The Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean[286] is to promote the conservation of anadromous stocks[287] in the North Pacific Convention Area.[288] The Commission[289] may consider matters related to the conservation of ecologically related species in the Convention Area.[290] 'Ecologically related species' are defined to mean living marine species which are associated with anadromous stocks found in the Convention Area, including but not restricted to both predators and prey of anadromous stocks.[291] The Commission may recommend to the Parties measures for the conservation of anadromous stocks and ecologically related species in the Convention Area.[292] The Secretariat, which is in Vancouver, is to compile and disseminate statistics and reports concerning anadromous stocks relevant to the Convention and ecologically related species.[293] Parties are to co-operate in scientific research, including on other ecologically related species.[294] Similarly, parties are to provide technical data or information related to anadromous stocks and ecologically related species.[295]

The Commission is studying the impacts of climate change on salmon production and vessels are studying salmon and associated marine fishes under the NPAFC Bering-Aleutian Salmon International Survey (BASIS).[296]

The International Council for the Exploration of the Sea (ICES)

The International Council for the Exploration of the Sea (ICES)[297] is not a RFMO but co-ordinates and promotes marine research in the North Atlantic, including adjacent seas such as the Baltic Sea and North Sea.[298] ICES started implementing the ecosystem approach as the basis for its advice in 2004, in

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[285] See SCMEE Transversal Workshop on Ecosystem Approach to Fisheries, 7-9 September 2005, at http://www.cmima.csic.es/pub/scmee/EAF_2005/EAF_2005_report.pdf.

[286] The Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean, adopted at Moscow 11 February 1992, entered into force 16 February 1993, text at http://www.oceanlaw.net/texts/npas.htm. Parties are the United States, Russia, Japan, Canada and South Korea, the primary states of origin for salmon stocks in the North Pacific. See http://www.npafc.org/new/about_convention.html. The last meeting of the Commission, the fourteenth, was held in Vancouver on 23-27 October 2006. The next meeting is in Vladivostok in October 2007. NPAFC News Release, 24th Meeting, 2006, Vancouver, BC 2006 October 23-27, at http://www.npafc.org/new/about/News_annual_meeting2006.pdf.

[287] Pink salmon accounted for 50% of the catch by weight in 2005, followed by chum, sockeye, coho, Chinook and cherry (masu) salmon. See NPAFC News Release, 24th Meeting, 2006, Vancouver, BC 2006 October 23-27, at http://www.npafc.org/new/about/News_annual_meeting2006.pdf.

[288] Article VIII.2.

[289] Website at http://www.npafc.org/new/index.html.

[290] Article VIII.3.

[291] Article II.6.

[292] Article IX.1.

[293] Article X.2(b).

[294] Article VII.1. Similarly, fishing information is to be collected for the purpose of scientific research on anadromous stocks and, as appropriate, ecologically related species. Article VII.4. See also Article IX.6, IX.8 and IX.10.

[295] Article VII.3.

[296] NPAFC News Release, 24th Meeting, 2006, Vancouver, BC 2006 October 23-27, at http://www.npafc.org/new/about/News_annual_meeting2006.pdf.

[297] Website at http://www.ices.dk/indexfla.asp.

[298] Established by the Convention for the International Council for the Exploration of the Sea, 12 September 1964, at http://www.ices.dk/aboutus/convention.asp.

response to the Reykjavik Declaration, Bergen Declaration and WSSD, among others.[299] Its latest 2005 report integrated the advice of the Advisory Committees on Fishery Management, Ecosystems and the Marine Environment, as the result of the introduction of the ecosystem approach.[300] The normative base for ICES advice is formed by the precautionary approach, which has been implemented since 1998, that marine management should be based on the ecosystem approach by 2010 and that fish stocks shall be maintained or restored to levels that can produce the maximum sustainable yield by 2015.[301] ICES has adopted a regional definition of ecosystems for its advice.[302]

OSPAR

The OSPAR Convention[303] guides international co-operation on the protection of the marine environment of the North-East Atlantic. Its mandate is to co-operate rather than regulate,[304] so is not an RFMO, but it may consider the impact of fishing on biodiversity and the marine ecosystem within its general assessments on the status of the marine environment in the North-East Atlantic. In addressing marine and coastal issues in Western Europe, OSPAR incorporates many elements of the ecosystem approach.

OSPAR participated in the 2003 Bremen Statement which declared that:

> All the components of an ecosystem, including the human component, function together and interact to form an integrated network. Ensuring the integrity of the ecosystems, thereby restoring when practicable and/or maintaining their characteristic structure and functioning, productivity and biological diversity, requires a long-term integrated management of human activities, explicitly:
>
> a. managing human activities in order to respect the capacity of ecosystems to fulfil human needs sustainably;
> b. recognising the values of ecosystems, both in their continuing unimpaired functioning and specifically in meeting those human needs;
> c. preserving or increasing their capacity to produce the desired benefits in the future.

The Statement provides a comprehensive statement of the history and importance of the ecosystem approach, and illustrates ways to minimise or avoid of manipulation of the marine environment, and aims at the promotion of ecosystem recovery as well as healthy fish stocks.

The Statement notes that HELCOM and OSPAR will focus on monitoring the ecosystems of the marine environment, in order to understand and assess the interactions between and among the different species and populations of biota, the non-living environment and humans and on assessing the impact of human activities upon biota and humans, both directly and indirectly through impacts on the

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[299] See Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, 2005, Volume I, page 1. It was discussed how ICES plans to introduce an ecosystem approach at the 13th ICES Dialogue Meeting in 2004. At http://www.ices.dk/products/AnnualRep/2005/ICES%20Advice%202005%20Volume%201.pdf.

[300] ICES 2005 Report, Volume I, preface.

[301] ICES 2005 Report, Volume I, page 1.

[302] ICES 2005 Report, Volume I, page 2.

[303] Convention for the Protection of the Marine Environment of the North-East Atlantic, opened for signature at in Paris on 22 September 1992, entered into force on 25 March 1998 (OSPAR Convention). At http://www.ospar.org/eng/html/welcome.html.

[304] OSPAR Annex V on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area, article 4.

non-living environment, together with the effects on the non-living environment itself.[305] They will also in managing human activities identify and act on issues where human activities impact directly or indirectly on the biota and threaten to undermine the health, productivity and biological diversity of the ecosystems or damage valuable features of the non-living environment itself.[306] A specific aim is identifying and controlling human activities which so affect the non-living environment and impact on biota as to threaten the health, productivity and biological diversity of the ecosystems.[307]

THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD)

The 1992 Biodiversity Convention (CBD) was the first international treaty to specifically address the conservation of biodiversity and the protection of ecosystems. The CBD and its Jakarta Mandate are leading examples of the formulation and implementation of the ecosystem approach. The CBD defines 'ecosystem' to mean "a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit."[308] The CBD emphasised the *in-situ* conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings as the fundamental requirement for the conservation of biological diversity.[309]

The ecosystem approach was adopted as the primary framework for action under the CBD at COP-2 in 1995 in Decision II/8[310] which adopted the ecosystem approach as a framework for the analysis and implementation of the objectives of the CBD. This was followed by Decision IV/1[311] of COP-4,[312] which called for further elaboration of the ecosystem approach, and which led to the developments of guidelines in 2000 in Decision V/6[313] of COP-5, when the Parties endorsed the description of the ecosystem approach and operational guidance and recommended the application of the principles and other guidance on the ecosystem approach.[314] Decision V/6 called for case studies,[315] and in response, the Secretariat has compiled a number of case studies[316] and an experts' meeting was held in Montreal in 2003.[317]

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[305] Bremen Statement, note 93 above, para. 15.

[306] Bremen Statement para. 24.

[307] Bremen Statement para. 24.

[308] CBD Article 2.

[309] CBD Preamble.

[310] CBD Decision II/8, Preliminary Consideration of Components of Biological Diversity Particularly under Threat and Action which could be taken under the Convention, para. 1, At http://www.biodiv.org/decisions/default.aspx?m=COP-02&id=7081&lg=0.

[311] CBD Decision IV/1, B., Ecosystem approach. at http://www.biodiv.org/decisions/default.aspx?m=COP-04&id=7124&lg=0.

[312] See also Decision IV/1 of SBSTTA, at http://www.biodiv.org/decisions/default.aspx?lg=0&dec=IV/1.

[313] CBD Decision V/6, the Ecosystem Approach, para. 12.

[314] CBD Decision V/6, para. 1.

[315] Decision V/6 paragraphs 3 and 4. See also Decision VI/12, paragraph 2(a).

[316] See http://www.biodiv.org/programmes/cross-cutting/ecosystem/cs.aspx.

[317] See report of the expert meeting on the ecosystem approach held at Montreal in 2003, "Ecosystem Approach: Further Elaboration, Guidelines for Implementation and Relationship with Sustainable Forest Management," at UNEP/CBD/SBSTTA/INF/4 (29 September 2003), at http://www.biodiv.org/doc/meetings/sbstta/sbstta-09/information/sbstta-09-inf-04-en.pdf ("Montreal report"). See http://www.biodiv.org/programmes/cross-cutting/ecosystem/cs.aspx#cs. A series of regional workshops on the ecosystem approach were jointly organised by UNESCO, IUCN, RAMSAR, Royal Holloway-University of London, WWF and the Secretariat of the CBD following COP-5. See http://www.biodiv.org/programmes/cross-cutting/ecosystem/cs.aspx#path. A report, R.D. Smith and E. Matby, "Using the Ecosystem Approach to implement the CBD: A global synthesis report drawing lessons from three pathfinder workshops," is at http://www.biodiv.org/doc/case-studies/esys/cs-esys-cbd-en.pdf.

Decision VI/12[318] continued the development of the ecosystem approach, and implementation of the approach, rather than revision of the principles, was emphasised in Decision VII/11 at COP 7 in 2004, and additional guidelines were included in an Annex to the decision.[319] The 12 Principles developed in Decision V/6 were reiterated.[320] The CBD has developed a user's guide on the ecosystem approach[321] which provides guidance on applying the ecosystem approach to a project or issue.

The Parties to the CBD adopted the Jakarta Mandate on Marine and Coastal Biological Diversity at COP-2 in Jakarta in 1995.[322] The Jakarta Mandate mandates a precautionary approach, and in adopting a programme of work in 1998, COP-4 mandated an ecosystem approach as a basic principle.[323] The programme of work was reviewed and updated at COP-7 in 2004.[324]

In 2006, the CBD's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)'s recommendation[325] on island biodiversity stated that implementation of the programme of work on island biodiversity should take into account the ecosystem approach of the CBD.

Integrated Marine and Coastal Area Management (IMCAM)

Integrated management was adopted at the very first meeting of the SBSTTA[326] in 1995. CBD COP-2 encouraged integrated marine and coastal area management (IMCAM) as the most suitable framework for addressing human impacts on marine and coastal biological diversity, and for implementing the principles of the ecosystem approach in promoting conservation and sustainable use of this biodiversity.[327] In 2001, COP-5 brought increased emphasis on the ecosystem approach, and endorsed further work on developing guidelines for coastal areas, taking into account decision V/6, on the ecosystem approach.[328]

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[318] Decision VI/12, Ecosystem Approach, at http://www.biodiv.org/decisions/default.aspx?lg=0&dec=VI/12.

[319] CBD Decision VII/11, the Ecosystem Approach, at http://www.biodiv.org/decisions/default.asp?lg=0&m=cop-07&d=11.

[320] CBD Decision V/6, Part B.

[321] Users' Guide on the Ecosystem Approach prepared pursuant to paragraph9(d) of decision VII/11, at http://www.biodiv.org/programmes/cross-cutting/ecosystem/sourcebook/beginner-guide.shtml and advanced guide at http://www.biodiv.org/programmes/cross-cutting/ecosystem/sourcebook/advanced-guide.shtml?reference.

[322] Adopted by the Second Conference of Parties to the CBD meeting in Jakarta in November 1995. See http://www.biodiv.org/programmes/areas/marine. Adopted in Decision II/10, Conservation and Sustainable Use of Marine and Coastal Biological Diversity, at http://www.biodiv.org/decisions/?dec=II/10 and see also SBSSTA Recommendation I/8, at http://www.biodiv.org/recommendations?rec=I/8.

[323] Decision IV/5, Conservation and sustainable use of marine and coastal biological diversity, including a programme of work, Annex, para. B.2, at http://www.biodiv.org/decisions/?lg=0&dec=IV/5. Paragraph 1.2 stated that for the programme of work on marine and coastal biological diversity, the ecosystem approach should be promoted at global, regional, national and local levels taking into account the report of the Malawi workshop (document UNEP/CBD/COP/4/Inf.9) and in accordance with Decision IV/1 B, and other paragraphs set out implementation of the ecosystem approach. http://www.biodiv.org/doc/meetings/cop/cop-04/information/cop-04-inf-09-en.pdf.

[324] See Decision VII/5, Marine and coastal biological diversity, at http://www.biodiv.org/decisions/default.aspx?m=COP-07&id=7742&lg=0. The ecosystem and precautionary approaches were reiterated as basic principles with a central role and providing the foundation for the implementation of the programme of work. Paragraph II.4.

[325] SBSTTA 10 Recommendation X/1, at http://www.biodiv.org/recommendations/?m=SBSTTA-10&id=10674&lg=0.

[326] Recommendation I/8 on Scientific, technical and technological aspects of the conservation and sustainable use of coastal and marine biological diversity, adopted by the Subsidiary Body on Scientific, Technical and Technological Advice at its first meeting (UNEP/CBD/COP/2/5), at http://www.biodiv.org/recommendations/?m=SBSTTA-01&id=6990&lg=0.

[327] See Decision II/10, para. 2, at Conservation and Sustainable Use of Marine and Coastal Biological Diversity, at http://www.biodiv.org/decisions/default.aspx?m=COP-02&id=7083&lg=0.

[328] CBD Decision V/3, Progress report on the implementation of the programme of work on marine and coastal biological diversity (implementation of decision IV/5), at http://www.biodiv.org/decisions/default.aspx?m=COP-05&id=7145&lg=0., and see Decision V/6, Ecosystem Approach, at http://www.biodiv.org/decisions/default.aspx?m=COP-05&id=7148&lg=0.

Marine protected areas (MPAs)[329] are a significant strand in implementing the ecosystem approach in the context of marine and coastal areas. A CBD technical expert group observed in 2003 that current thinking emphasises the need to integrate IMCAM with a core network of highly protected areas, which act as baselines and an insurance policy.[330]

The experts recognised that a framework for IMCAM needed to be able to fulfil the three principal objectives of the CBD: conservation of biodiversity, sustainable use of biodiversity, and the equitable sharing of the benefits derived from use of genetic resources. It is important to allow for recovery as well as preventing future losses of biodiversity, giving past stresses such as over-fishing. Three elements were stressed:[331]

- A representative network of highly protected areas where extractive uses are prevented, and other significant human pressures are removed or minimised) to enable the integrity, structure, functioning, and exchange processes of and between ecosystems to be maintained or recovered;
- An ancillary network of areas that support the biodiversity objectives of the highly protected network, where specific perceived threats are managed in a sustainable manner for the purposes of biodiversity conservation and sustainable use; and
- Sustainable management practices over the wider coastal and marine environment.

In 2005 the *Ad Hoc* Technical Expert Group on Implementation of Integrated Marine and Coastal Area Management (IMCAM) met in Montreal.[332] The Group observed that in the context of the ecosystem approach, managing whole ecosystems, including river basins and shared coastlines, requires transboundary co-operation such as regional seas programmes and action plans, bilateral arrangements and large marine ecosystem (LME) projects.[333]

At COP-8 in 2006 in Curitiba,[334] Decision VIII/9 requested SBSTTA to make use of the conceptual framework and methodologies of the Millennium Ecosystem Assessment[335] in further developing work on environmental impact assessment, strategic environmental assessment and the ecosystem approach. Decision VIII/24 on Protected areas recognised that there is a need to achieve a more integrated approach to establishing and managing marine protected areas beyond national jurisdiction, consistent with the ecosystem approach[336] and that the CBD has a key role in supporting the work of the General Assembly with regard to marine protected areas beyond national jurisdiction, by focusing on provision of scientific and, as appropriate, technical information and advice relating to marine biological

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[329] Marine and Coastal Protected Area' was defined by the experts working group to mean "any defined area within or adjacent to the marine environment, together with its overlying waters and associated flora, fauna, and historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings." See Technical Advice on the Establishment and Management of a National System of Marine and Coastal Protected Areas, Paper prepared by the *Ad Hoc* Technical Expert Group on Marine and Coastal Protected Areas, at http://www.biodiv.org/doc/meetings/esa/ecosys-01/information/ecosys-01-inf-09-en.doc, ('Technical Advice'), Page 5.

[330] Montreal report, note 317, para. 34.

[331] See Technical Advice page 16.

[332] Enhancing The Implementation Of Integrated Marine And Coastal Area Management, (IMCAM 2005), UNEP/CBD/COP/8/26/Add.1, at http://www.biodiv.org/doc/meetings/cop/cop-08/official/cop-08-26-add1-en.doc.

[333] IMCAM 2005, para. 49.

[334] See Report of the Eighth Meeting of the Parties to the Convention on Biological Diversity, UNEP/CBD/COP/8/31, 15 June 2006, at http://www.biodiv.org/doc/meetings/cop/cop-08/official/cop-08-31-en.doc.

[335] Millennium Ecosystem Assessment (2005). World Resources Institute, Washington, DC. (2005) At http://millenniumassessment.org/en/Index.aspx.

[336] CBD Decision VIII/24, Protected Areas, para. 39, at http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11038&lg=0.

diversity, the application of the ecosystem approach and the precautionary approach, and in delivering the 2010 target.[337]

The ecosystem approach was emphasised in Decision VIII/28,[338] where the Parties emphasised the ecosystem approach in the context of impact assessments, and Decision VIII/1 on Island Biodiversity[339] emphasised the ecosystem approach as the logical planning and management tool for integral island policies.

The Millennium Ecosystem Assessment

The Millennium Ecosystem Assessment[340] (MEA) was launched in June 2001 and was completed in March 2005. Coordinated by UNEP, it aimed to meet assessment needs of the CBD, Convention to Combat Desertification, the Ramsar Convention, and the CMS, among others.

It included a marine assessment[341] which noted that "historical overfishing and other disturbances have caused dramatic decreases in the abundance of large predator species, resulting in structural and functional changes in coastal and marine ecosystems, and the collapse of many marine ecosystems."[342]

In coastal environments, biodiversity is declining, beginning with the loss of large predators at high trophic levels.[343] It was noted in the 2006 Marine and Coastal Environment synthesis[344]

> With fleets now targeting the more abundant fish at lower trophic levels (called 'fishing down the food chain'), it would be expected that global catches would be increasing, rather than, as is actually occurring, decreasing….The decline in catches is largely due to the loss of large, slow-growing predators at high trophic levels; these are gradually being replaced, in global landings, by smaller, shorter-lived fish, at lower trophic levels.[345]

Other problems include that persistent organic pollutants (POPs) accumulate in marine mammals, top carnivores and predatory fish, and are passed on to humans through consumption.[346] All four scenarios posited by the Assessment predict an increase in demand for fish for food and a massive decline, if not a collapse, of the major fish stocks over the next decades.[347]

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[337] CBD Decision VIII/24, Paragraph 42.

[338] CBD Decision VIII/28.Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment, at http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11042&lg=0.

[339] Decision VIII/1 on Island biodiversity, Para. 22, at http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11013&lg=0.

[340] Millennium Ecosystem Assessment. World Resources Institute, Washington, DC (2005). Website at http://millenniumassessment.org/en/Index.aspx.

[341] Millennium Ecosystem Assessment, Ecosystems and Human Wellbeing: World Resources Institute, Washington, DC. (2005). Chapter 18: Marine Fisheries Systems, pages 477-511, by Daniel Pauly et al. At http://www.maweb.org/documents/document.287.aspx.pdf.

[342] Daniel Pauly et al, page 489, citing Jackson et al 2001.

[343] Daniel Pauly et al, page 492, citing Pauly et al, "Fishing down marine food webs," 279 *Science* (1998), 860-863 and R. A. Myers and B. Worm, "Rapid worldwide depletion of predatory fish communities," 423 *Nature* (2003),280-283. See D. Pauly et al, "Fishing down marine food web: it is far more pervasive than we thought," 76 *Bulletin of Marine Science* (2005), 197-211, at http://www.fisheries.ubc.ca/members/dpauly/journalArticles/Fishing%20Down%20Marine%20Food%20Web%20It%20is%20Far%20More%20Pervasive%20than%20we%20thought.pdf.

[344] UNEP, Marine and Coastal Ecosystems and Human Well-Being: A Synthesis report based on the findings of the Millennium Ecosystem Assessment (2006). At http://www.millenniumassessment.org/documents/document.358.aspx.pdf.

[345] Op. cit., page 37.

[346] Op. cit., page 26. POPs are stable, fat-soluble carbon-based compounds that volatilize at warm temperatures and are transported towards the poles by wind, water and wildlife.

[347] Op. cit., page 37.

The MEA observed that ecosystem approaches provide an important framework for assessing biodiversity and ecosystem services, and for evaluating and implementing potential responses.[348] The most efficient way to rebuild marine diversity is an ecosystem-focused policy. Efforts to increase the value of individual stocks and thus increasing their value for fisheries appear to result in a decline of biodiversity.[349]

CITES

CITES[350] aims at the protection of listed species of wild fauna and flora against overexploitation through international trade. Trade is regulated trade according to three appendices.[351] Parties are not to allow trade in specimens of species included in Appendices I, II and III except in accordance with CITES.[352] Appendix I includes species threatened with extinction which are or may be affected by trade, and trade in these species must only be authorized in exceptional circumstances.[353] Appendix II includes species which may become threatened unless trade in them is regulated and other 'look alike' species which need to be subject to regulation to ensure trade in the former species is under control. Appendix III includes species which are protected by one country which seeks to control trade in the species.

Criteria for listing species[354] calls for the Parties to apply the precautionary approach and to act in the best interest of the conservation of the species concerned and adopt measures that are proportionate to the anticipated risks to the species. Sperm, grey, humpback, sei, fin, bowhead, right, bryde's, pygmy, grey and the antarctic minke whales are all listed on Appendix I. A Decision[355] at CITES COP-11, amended at COP-12, addressed trade in whale meat and recommended that the Parties agree not to issue any import or export permit, or certificate for introduction from the sea, under CITES for primarily commercial purposes for any specimen of a species or stock protected from commercial whaling by the ICRW.

Article IV(3) of CITES requires that exports of CITES-listed species must be monitored so as to ensure the role of the species in its ecosystem, thus reflecting an aspect of the ecosystem approach. The Vilm report[356] recognised important synergies between CBD and CITES. CITES focuses more on a species by species analysis, whereas CBD emphasises the integral nature of sustainable development and conservation problems and solutions. CBD ecosystems principles 2[357] and 12[358] in particular take into account local actors.[359]

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[348] Millennium Ecosystem Assessment, Ecosystems and Human Wellbeing: Biodiversity Synthesis. World Resources Institute, Washington, DC. (2005), page 14, 75. At http://www.maweb.org/documents/document.354.aspx.pdf.

[349] Marine and Coastal Ecosystems and Human Well-Being, Page 41.

[350] The Convention on International Trade in Endangered Species of Wild Fauna and Flora, signed at Washington, D.C., 3 March 1973, entered into force 1 July 1975, amended at Bonn, 22 June 1979. 993 UNTS 243, copy as amended at http://www.cites.org/eng/disc/text.shtml.

[351] CITES article II.

[352] Appendices are at http://www.cites.org/eng/app/index.shtml.

[353] CITES article II(1), III.

[354] Criteria for amendment of Appendices I and II, Conf. 9.24 (Rev. CoP13) at http://www.cites.org/eng/res/09/09-24R13.shtml.

[355] Conf. 11.4 (Rev. CoP12), Conservation of cetaceans, trade in cetacean specimens and the relationship with the International Whaling Commission, at http://www.cites.org/eng/res/11/11-04.shtml.

[356] Expert Workshop Promoting CITES-CBD Co-operation and Synergy (International Academy for Nature Conservation, Isle of Vilm, Germany, 20-24 April 2004), COP 13 Doc. 12.1.1, Annex 2, at http://www.cites.org/eng/cop/13/doc/E13-12-1-1.pdf, and see http://www.cites.org/eng/notif/2005/017.pdf.

[357] Management should be decentralized to the lowest appropriate level.

[358] Information from all sources is critical to arriving at effective ecosystem management strategies.

[359] Vilm report, page 13.

CITES Decision 13.2[360] directed the Standing Committee to consider the findings and recommendations of the Vilm report and identify actions to improve synergies between CITES and the CBD, considering, *inter alia*, sustainable use and the ecosystem approach.[361]

THE RAMSAR CONVENTION

The 1971 Ramsar Convention[362] maintains a list of wetlands of international significance[363] and promotes their conservation[364] and wise use of wetlands in territories of States Parties.[365]

The ecosystem approach was endorsed in 1999 in the context of wetland restoration,[366] the recognition in the CBD decision IV/10 that incentive measures should be designed using an ecosystem approach was noted.[367] The following meeting in 2002 as a valuable approach in the context of peatland protection.[368] The ecosystem approach, as described in CBD Decision V/6 was adopted is an appropriate framework for the assessment of planned action and policies.[369] The ecosystem approach was adopted in a number of 2005 resolutions at the last COP9 in Kampala. An updated definition of 'wise use'[370] was adopted, taking into account the ecosystem approach, which was that "Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development."[371] In referring to the ecosystem approach, the resolution referred to CBD's Decision V/6 HELCOM and OSPAR's 2003.[372] WWF was invited to prepare an information paper in relation to the programme of work on the biological diversity of inland water ecosystems and the ecosystem approach.[373] A resolution on fisheries resources[374] had a strong ecosystem focus and made substantial use of the Millennium Ecosystem Assessment.

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[360] Decision 13.2, at http://www.cites.org/eng/dec/valid13/13-02_05.shtml.

[361] See SC53 Doc. 8 (Rev. 1), Synergy between CITES and the CBD, at http://www.cites.org/eng/com/SC/53/E53-08.pdf.

[362] Convention on Wetlands of International Importance Especially as Waterfowl Habitats. Adopted in Ramsar, Iran, on February 3, 1971, and opened for signature at UNESCO headquarters on July 12, 1972. Entered into force December 21, 1975. Amended by Protocol of 3 December 12 1982 and amendments of 28 May 1987.
Secretariat website at http://www.ramsar.org/. 152 Contracting parties. I.L.M. 11:963-976. Text at http://www.ramsar.org/key_conv_e.htm (as amended).

[363] See articles 2, 8.

[364] See article 3.

[365] Ramsar Convention article 3. The Conference of the Parties have defined 'wise use of wetlands' as "their sustainable utilization for the benefits of humankind in a way compatible with the maintenance of the natural properties of the ecosystem." 4th Conference of the Parties, 1987.

[366] Resolution VII.17 on wetland restoration, paragraph 12, at http://www.ramsar.org/res/key_res_vii.17e.htm.

[367] Resolution VII.15 on Incentive measures to encourage the application of the wise use principle, para. 4, at http://www.ramsar.org/res/key_res_vii.15e.htm. See CBD Decision IV/10 (1998), at http://www.biodiv.org/decisions/default.aspx?m=COP-04&id=7133&lg=0.

[368] Resolution VIII.17 Guidelines for Global Action on Peatlands, para. 9, at http://www.ramsar.org/res/key_res_viii_17_e.htm.

[369] Resolution VIII.9 on Environmental assessment, paragraph 5, at http://www.ramsar.org/res/key_res_viii_09_e.htm.

[370] A term used in Article 3(1), wherein Contracting Parties are to formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory, and Article 2(6), wherein Contracting Party shall consider its international responsibilities for the conservation, management and wise use of migratory stocks of waterfowl. See also articles 6(2) and (3).

[371] Resolution IX.1, A Conceptual Framework for the wise use of wetlands and the maintenance of their ecological character, at http://www.ramsar.org/res/key_res_ix_01_annexa_e.htm.

[372] Declaration of the First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions, Bremen, 25-26 June 2003.

[373] Resolution IX.20, para2. 4, 11.

[374] Resolution IX.4, The Ramsar Convention and conservation, production and sustainable use of fisheries resources, at http://www.ramsar.org/res/key_res_ix_04_e.htm.

Contracting Parties were called on to include an ecosystem approach consistent with the Ramsar Convention in the context of water management.[375]

THE CONVENTION ON MIGRATORY SPECIES (CMS)

The 1979 Convention on Migratory Species[376] (CMS), also known as the Bonn Convention, aims at the conservation of migratory species[377] through research, endeavouring to provide immediate protection for migratory species included in Appendix I, and endeavouring to conclude Agreements covering the conservation and management of migratory species included in Appendix II.[378]

"Conservation status" will be taken as "favourable" when, *inter alia*, population dynamics data indicate that the migratory species is maintaining itself on a long-term basis as a viable component of its ecosystems[379] and the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management.[380] "Conservation status" will be taken as "unfavourable" if any of these or other listed conditions are not met.[381]

To this extent, the CMS Convention considers migratory species in their ecosystem context. The Convention recognizes the growing value of wild animals from the ecological point of view[382] and encourages research into the ecology of migratory species[383] and measures based on sound ecological principles to control and manage the taking of the migratory species.[384]

The CMS collaborated in case studies on the ecosystem approach with the CBD.[385] One topic was the relationship between the ecosystem approach and the conservation and sustainable use of migratory species taking into consideration the migratory range approach. Case studies include incidental catches of marine turtles in the Ionian Sea[386] and other studies of marine turtles in Egypt[387] and Syria,[388] including the interaction between tourism and turtles.

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[375] Resolution IX.3, Engagement of the Ramsar Convention on Wetlands in ongoing multilateral processes dealing with water, at http://www.ramsar.org/res/key_res_ix_03_e.htm.

[376] Convention on the Conservation of Migratory Species of Wild Animals, signed in Bonn 23 June 1979, entered into in force 1 November 1983, 19 ILM (1980) 15, text at http://www.cms.int/documents/convtxt/cms_convtxt.htm and http://www.cms.int/pdf/convtxt/cms_convtxt_english.pdf. List of 97 Parties as of 1 May 2006 at http://www.cms.int/pdf/en/party_list/Partylist_eng.pdf. Japan and Iceland are not parties.

[377] CMS Article II.

[378] CMS Article II(3).

[379] CMS Article I(c)(1).

[380] CMS Article I(c)(4).

[381] CMS Article I(d).

[382] CMS Preamble.

[383] CMS Article 5(5)(c), in the context of agreements concluded with respect to individual migratory species.

[384] CMS Article 5(5)(j), likewise.

[385] See http://www.biodiv.org/other/cs.aspx. The collaboration was established by CBD Decision V/21, at http://www.biodiv.org/decisions/default.asp?dec=V/21 and CMS resolutions 4.4., 5.4. and 6.4. See the Joint Work Program at UNEP/CBD/COP/6/INF/15, available at UNEP/CBD/COP/6/INF/15, and at UNEP/CMS/Inf.7.13.

[386] http://www.biodiv.org/doc/case-studies/ms/cs-ms-gr-02-en.pdf.

[387] http://www.biodiv.org/doc/case-studies/ms/cs-ms-gr-01-en.pdf.

[388] http://www.biodiv.org/doc/case-studies/ms/cs-ms-gr-03-en.pdf.

ANTARCTICA

The Antarctic Treaty

The Antarctic Treaty,[389] having been negotiated in 1959, preceded the development of the ecosystem and precautionary approaches, but has been supplemented by the 1991 Madrid Protocol and its Annexes. The Antarctic Treaty emphasises that Antarctica shall be used for peaceful purposes[390] and for international co-operation in scientific investigation.[391] Contracting Parties are to give other Contracting notice of all expeditions to and within Antarctica by its ships or nationals and all expeditions to Antarctica organized in or proceeding from its territory.[392] There are to be meetings of Antarctic Treaty Contracting Parties[393] which can adopt measures in furtherance of the principles and objectives of the Treaty.[394]

This system of co-operation, scientific investigation, advance notice and meetings formed an important framework which is consistent with and a fore-runner of the ecosystem approach and which was given an important environmental context with the Agreed Measures in 1964,[395] the Convention for the Conservation of Antarctic Seals[396] in 1972, the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) in 1991, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) in1980 and the Agreement on the Conservation of Albatross and Petrels (ACAP)[397] in 2001.

The Scientific Committee on Antarctic Research (SCAR)[398] coordinates Antarctic research programs and encourages scientific co-operation.

The Madrid Protocol

The very first recital in the 1991 Protocol on Environmental Protection to the Antarctic Treaty ("Madrid Protocol")[399] states that Parties are convinced of the need to enhance the protection of the Antarctic environment and dependent and associated ecosystems. The preamble builds on the Antarctic Treaty's scientific principles, CCAMLR's conservation principles and concludes that Parties are convinced that the development of a comprehensive regime for the protection of the Antarctic environment and dependent and associated ecosystems is in the interest of mankind as a whole, and want to supplement the Antarctic Treaty to this end.

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[389] Antarctic Treaty, signed at Washington on 1 December 1959, entered into force 23 June 1961, 402 UNTS 71. At http://www.ats.aq/uploaded/treaty_original.pdf. Secretariat at http://www.ats.aq/.

[390] Antarctic Treaty Article I.

[391] Antarctic Treaty Article II.

[392] Antarctic Treaty Article VII.5.

[393] Antarctic Treaty Article IX(1).

[394] Antarctic Treaty Article IX(1).

[395] Agreed Measures for the Conservation of Antarctic Fauna and Flora and Annexes, at http://www.antarctica.ac.uk/About_Antarctica/Treaty/Flora_and_Fauna.html.

[396] Convention for the Conservation of Antarctic Seals, signed in London on 1 June 1972, at http://www.ats.aq/Atcm/RecAtt/Att076_original_e.pdf. Amended in London, 1988.

[397] Agreement on the Conservation of Albatrosses and Petrels, 2001.

[398] SCAR meets every two years. Website at http://www.scar.org.

[399] Protocol on Environmental Protection to the Antarctic Treaty, opened for signature on 4 October 1991,entered into force 14 January 1998, at 30 ILM 1461 (1991), (Madrid Protocol) at http://www.ats.aq/uploaded/PROTOCOL.pdf and annexes, and copy at http://www.antarctica.ac.uk/About_Antarctica/Treaty/protocol.html.
See DR Rothwell, "Polar environmental protection and international law: the 1991 Antarctic Protocol," European Journal of International Law 2000 11(3):591-614, Duncan French, "Sustainable Development and the 1991 Madrid Protocol to the 1959 Antarctic Treaty: The Primacy of Protection in a Particularly Sensitive Environment," 2:3 Journal of International Wildlife Law & Policy (1999), 291, and Christopher Joyner, "The 1991 Madrid Environmental Protection Protocol: Contributions to marine pollution law," 20:3 *Marine Policy* (1996), 183-197.

Therefore, the main objective of the Madrid Protocol is that the Parties commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems and designate Antarctica as a natural reserve, devoted to peace and science.[400] It therefore establishes a comprehensive system of environmental impact assessment.[401] The protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research, are required to be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area.[402]

Activities must be planned and conducted so as to avoid activities in the Antarctic Treaty area shall be planned and conducted so as to limit adverse impacts on the Antarctic environment and dependent and associated ecosystems,[403] and to avoid:[404]

> (i) adverse effects on climate or weather patterns;
> (ii) significant adverse effects on air or water quality;
> (iii) significant changes in the atmospheric, terrestrial (including aquatic), glacial or marine environments;
> (iv) detrimental changes in the distribution, abundance or productivity of species of populations of species of fauna and flora,
> (v) further jeopardy to endangered or threatened species or populations of such species; or
> (vi) degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance.

Judgments about environmental impacts are to take into account the scope of the activity, cumulative impacts, any detrimental effects on other activities, the capacity to monitor for adverse effects necessary modification, and capacity for prompt and effective response to accidents.[405]

Activities must take place in a manner consistent with the environmental principles of Article 3,[406] and be able to be modified, suspended or cancelled if they result in or threaten to result in impacts upon the Antarctic environment or dependent or associated ecosystems inconsistent with the principles.[407]

The Madrid Protocol is administered through the Antarctic Treaty Consultative Meetings which define the general policy for the comprehensive protection of the Antarctic environment and dependent and associated ecosystems; and which adopt measures under Article IX of the Antarctic Treaty for the implementation of the Protocol,[408] drawing on the recommendations and advice of the Committee for Environmental Protection (CEP).[409] The CEP provides advice and formulates recommendations to the Parties in connection with the implementation of the Protocol, including the operation of its Annexes,

[400] Madrid Protocol Article 2.
[401] Madrid Protocol Article 3(2), Article 8.
[402] Madrid Protocol Article 3(1).
[403] Madrid Protocol Article 3(2)(a).
[404] Madrid Protocol Article 3(2)(b).
[405] Madrid Protocol Article 2(c).
[406] Madrid Protocol Article 3(4)(a).
[407] Madrid Protocol Article 3(4)(b).
[408] Madrid Protocol Article 10(1).
[409] Madrid Protocol Article 10(2).

for consideration at Antarctic Treaty Consultative Meetings (ATCMs).[410] It meets at least once a year in conjunction with the ATCM.[411]

This then can be seen to be a specific implementation of the goals of the ecosystem approach, to be achieved through environmental impact assessments, with specified environmental goals and outcomes, regular and effective monitoring, and conduct of activities.

CCAMLR

The 1980 CCAMLR[412] applies to the Antarctic marine living resources[413] of the area south of the Antarctic Convergence. CCAMLR recognises the importance of safeguarding the environment and protecting the integrity of the ecosystem of the seas surrounding Antarctica and this recognition is reflected in its unique applicability to the Antarctic marine living resources of the area between 60 degrees south and the Antarctic Convergence which form part of the Antarctic marine ecosystem.[414]

The 1980 CCAMLR convention was one of the first international instruments to adopt an ecosystem approach and is still a leading multilateral environmental convention featuring an ecosystem approach,[415] which takes account of dependent and associated species as well as target species. Article II provides as a principle of conservation the prevention of changes or minimization of the risk of changes in the marine ecosystem which are not potentially reversible over two or three decades, taking into account the state of available knowledge of the direct and indirect impact of harvesting, the effect of the introduction of alien species, the effects of associated activities on the marine ecosystem and of the effects of environmental changes, with the aim of making possible the sustained conservation of Antarctic marine living resources. Conservation measures are to include measures concerning the effects of harvesting and associated activities on components of the marine ecosystem other than the harvested populations.[416] For instance, CCAMLR not only regulates krill harvesting but also monitors the effect which krill harvesting may exert on species that eat krill, or species that in turn rely on those species through its CCAMLR Ecosystem Monitoring Program (CEMP).[417]

The implementation of the EAF in CCAMLR as such takes a leading role in the minimisation or avoidance of manipulation or human intervention of the marine environment, and specifically aims at the promotion of ecosystem protection as well as healthy fish stocks.

Conservation of Albatross and Petrels Convention (ACAP)

The 2001 ACAP[418] implements many elements of the ecosystem approach. It recognises that albatrosses and petrels are an integral part of marine ecosystems which must be conserved for the

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[410] Madrid Protocol Article 12(1).

[411] CEP website is at http://cep.ats.aq/cep. The next meeting of the CEP will be held in conjunction with the 30th ATCM in New Delhi, India from 30 April to 4 May 2007.

[412] Convention on the Conservation of Antarctic Marine Living Resources**,** done at Canberra, 20 May 1980, entered into force 7 April 1982. Text at http://www.ccamlr.org/pu/e/pubs/bd/pt1.pdf. Its members include Argentina, Australia, Belgium, Brazil, Chile, European Community, France, Germany, India, Italy, Japan, Korea (Rep. of), New Zealand, Norway, Poland, Russia, South Africa, Spain, Sweden, Ukraine, United Kingdom, United States, and Uruguay. See map at http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/CCAMLR.pdf.

[413] Antarctic marine living resources" means the populations of fin fish, molluscs, crustaceans and all other species of living organisms, including birds, found south of the Antarctic Convergence. CCAMLR Article I(2).

[414] CCAMLR Article I(1).

[415] CCAMLR Article II(c) and IX(2)(i).

[416] CCAMLR Article IX(2)(i).

[417] See http://www.ccamlr.org/pu/E/sc/cemp/intro.htm.

[418] Agreement on the Conservation of Albatross and Petrels Agreement, concluded at Cape Town on 19 June 2001, entered into force 1 February 2004. Text at http://www.acap.aq/acap/text_of_the_agreement/agreement_on_the_conservation_of_albatross_and_petrels. Secretariat website at http://www.acap.aq.

benefit of present and future generations, and that their conservation is a matter of common concern, particularly in the Southern Hemisphere[419] and states that its Parties are aware that the conservation status of albatrosses and petrels can be adversely affected by factors such as degradation and disturbance of their habitats, pollution, reduction of food resources, use and abandonment of non-selective fishing gear, and specifically by incidental mortality as a result of commercial fishing activities.[420]

.The objective of the Agreement is to achieve and maintain a favourable conservation status for albatrosses and petrels.[421] The precautionary approach is implemented.[422] The term "Conservation status of a migratory species" is defined to mean the sum of the influences acting on the migratory species that may affect its long-term distribution and abundance.[423] In a detailed definition,[424] Conservation status will be taken as "favourable" when all of the following conditions are met:

> i. population dynamics data indicate that the migratory species is maintaining itself on a long-term basis;
> ii. the range of the migratory species is neither currently being reduced, nor is likely to be reduced, on a long-term basis;
> iii. there is, and will be in the foreseeable future, sufficient habitat to maintain the population of the migratory species on a long-term basis; and
> iv. the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management.

Conservation measures to be taken include conserving and restoring habitats[425] and addressing the adverse effects of activities that may influence the conservation status of albatrosses and petrels.[426]

INTERNATIONAL WATERCOURSE CONVENTIONS

The Convention on the Law of the Non-navigational Uses of International Watercourses[427] requires watercourse States to protect and preserve the ecosystems of international watercourses.[428] This is a specific application of the requirement that watercourse States are to use and develop international watercourses in a manner consistent with their adequate protection.[429] The ILC has described this

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[419] ACAP Agreement Preamble.
[420] Ibid.
[421] ACAP Agreement Article II.
[422] ACAP Agreement Article II.
[423] ACAP Agreement Article I.2(m).
[424] ACAP Agreement Article I.2(n).
[425] ACAP Agreement Article III.1(a).
[426] ACAP Agreement Article III.1(c).
[427] Convention on the Law of the Non-navigational Uses of International Watercourses, concluded at New York on 21 May 1997, not in force, 36 ILM (1997), 719, at http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf. Status at http://www.internationalwaterlaw.org/IntlDocs/Watercourse_status.htm.
[428] International Watercourse Convention article 20. Article 22 requires Watercourse States to take all measures necessary to prevent the introduction of species, alien or new, into an international watercourse which may have effects detrimental to the ecosystem of the watercourse resulting in significant harm to other watercourse States. See Owen McIntyre, "The emergence of an 'ecosystem approach' to the protection of international watercourses under international law," 13 *RECIEL* (2004), 1-14, at http://www.blackwell-synergy.com/doi/abs/10.1111/j.1467-9388.2004.00379.x.
[429] International Law Commission, Report of the International Law Commission of its Forty-Sixth Session, UN Doc A/49/10,118., at http://untreaty.un.org/ilc/documentation/english/A_49_10.pdf.

requirement as "an essential basis for sustainable development,"[430] and noted that there is ample precedent for this obligation in the practice of States and the work of international organizations,[431] citing the 1975 Statute of the Uruguay River[432] and other international watercourse agreements, and the Act of Asunción,[433] which referred to grave health problems arising from ecological relationships in the River Plate Basin, as well as a recommendation of the United Nations Water Conference in 1977[434] which stated that it is necessary to protect ecosystems. Also cited were the Stockholm Declaration, World Charter for Nature, 1985 ASEAN Agreement and numerous other international instruments.[435]
The ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes Convention[436] requires parties to "ensure that transboundary waters are used with the aim of ecologically sound and rational water management, conservation of water resources and environmental protection"[437] and to "ensure conservation, and, where necessary, restoration of ecosystems."[438] Parties are also to ensure that "sustainable water-resources management, including the application of the ecosystems approach, is promoted."[439]

THE INTERNATIONAL CONVENTION FOR THE REGULATION OF WHALING AND THE INTERNATIONAL WHALING COMMISSION

The preamble of the International Convention for the Regulation of Whaling ('ICRW')[440] sets out its objectives:[441]

- Recognizing the interest of the nations of the world in safeguarding for future generations the great natural resources represented by the whale stocks;
- Considering that the history of whaling has seen over-fishing of one area after another and of one species of whale after another to such a degree that it is essential to protect all species of whales from further over-fishing;
- Recognizing that the whale stocks are susceptible of natural increases if whaling is properly regulated, and that increases in the size of whale stocks will permit increases in the number of whales which may be captured without endangering these natural resources;

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[430] Ibid., 119, noting that the maintenance of biological diversity is a major element in achieving sustainable development. See note 329.
[431] Ibid., 119.
[432] Argentina and Uruguay agreed to co-ordinate appropriate measures to prevent the alteration of the ecological balance, and to protect and preserve the aquatic environment. Ibid., 119.
[433] Adopted by the Fourth Meeting of Foreign Ministers of the River Plate Basin States in 1971. See ILC, op. cit., 120.
[434] Recommendation 35 of the United Nations Water Conference, in *Report of the United Nations Water Conference, Mar del Plata, March 1977,* UN. Pub. Sales No. E.77.II.A.12, part one, chapter I., p. 25, cited in ILC, *opt. cit*., 120.
[435] ILC, op. cit., 120-121.
[436] Economic Commission for Europe (ECE) Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Helsinki, 17 March 1992, entered into force 6 October 1996, at 31 ILM (1992), 1312, at http://www.unece.org/env/water/pdf/watercon.pdf. Status at http://www.unece.org/env/water/status/legal.htm.
[437] Helsinki Convention, article 2(2)(b).
[438] Helsinki Convention, article 2(2)(d).
[439] Helsinki Convention, Article 3(1)(i).
[440] International Convention for the Regulation of Whaling, opened for signature at Washington, 2 December 1946, entered in force 10 November 1948, 161 UNTS 72. Amended 19 November 1956 (338 UNTS 366).
[441] This section of the paper draws on DEJ Currie, "International Governance of the Conservation and Management of Whales," June 2006.

- Recognizing that it is in the common interest to achieve the optimum level of whale stocks as rapidly as possible without causing widespread economic and nutritional distress.

The preamble states that the reason for Parties agreeing the Convention was "to conclude a convention to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry." The conservation of whale stocks is thus a goal, but it is stated as means to the orderly development of the whaling industry.
These aims are to be achieved through the Schedule, which forms an integral part of the Convention.[442] Amendments to the Schedule can be made to carry out the objectives and purposes of the Convention and to provide for the conservation, development, and optimum utilization of the whale resources. Amendments shall be based on scientific findings, shall not involve restrictions on the number or nationality of factory ships or land stations, nor allocate specific quotas to any factory or ship or land station or to any group of factory ships or land stations, and shall take into consideration the interests of the consumers of whale products and the whaling industry.[443]

The ICRW in itself does not incorporate the ecosystem approach, which was developed decades after the conclusion of the Convention. The Convention is oriented towards safeguarding whale stocks for later exploitation, with a strong focus on the whaling industry. The goal is to achieve the optimum level of whale stocks as rapidly as possible, without causing widespread economic and nutritional distress. Thus consideration for matters such as whale habitat, entanglement and bycatch, climate change, ship strikes, pollution, feeding ground degradation, prey depletion, marine ecosystem integrity, health or functioning, and marine noise is not specifically incorporated.

A rudimentary form of sustainability is included in that whaling operations should be confined to those species best able to sustain exploitation in order to give an interval for recovery to certain species of whales depleted in numbers. However the stated goal is the 'optimal level' of whale stocks, which is not further described. Amendments to the Schedule are to be made with respect to the conservation and utilization of whale resources,[444] and must provide for the conservation, development, and optimum utilization of the whale resources.[445]

In 2001 the International Whaling Commission (IWC) acknowledged that better understanding of marine ecosystems, including interactions between whales and fish stocks, would contribute to the conservation and management of living marine resources, and gave notice that, as the competent international organization for the conservation and management of whale stocks, it has decided to make the study of interactions between whale and fish stocks a matter of priority.[446] It was agreed that any studies conducted by the FAO on ecosystem-based fisheries management be holistic and balanced in approach.[447] This does recognise that single-species management, such as management of whales alone, at least since the Reykjavik Declaration, the CBD's Decision V/6 and the JPOI, has been recognized to be inappropriate and that an ecosystem approach to management should be adopted.

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[442] ICRW article I(1). Schedule is at http://www.iwcoffice.org/commission/schedule.htm and http://www.iwcoffice.org/_documents/commission/schedule.pdf.
[443] ICRW article V(1).
[444] ICRW article V(1).
[445] ICRW article V(2).
[446] Resolution 2001-9, Resolution on interactions between whales and fish stocks (2001), at http://www.iwcoffice.org/meetings/resolutions/resolution2001.htm.
[447] Ibid.

The Conservation Committee, which first met in 2004,[448] was established to address issues other than from the perspective of whaling. Those opposing the Committee considered that it took the objective of the 'conservation of whale stocks' out of the context of the objective of making possible 'the orderly development of the whaling industry'.[449] At the 2005 meeting the split was clear, with the Committee unable to agree its terms of reference.[450] This impasse continued in St Kitts in 2006,[451] although the Committee endorsed recommendations on ship strikes and agreed to forward a Working Group report to the CMS and IMO.[452] The Committee also reviewed proposals for whale sanctuaries in the South Atlantic and South Pacific and some national reports on cetacean conservation activities.

The ecosystem approach was accepted as the international standard at the 2006 meeting in the St Kitts and Nevis Declaration,[453] where the Commission stated that Commissioners were

> ACCEPTING that scientific research has shown that whales consume huge quantities of fish making the issue a matter of food security for coastal nations and requiring that the issue of management of whale stocks must be considered in a broader context of ecosystem management since eco-system management has now become an international standard.

The first part of the recital appears more politically than scientifically motivated, since 'huge quantities of fish' was not quantified, although the link to food security for coastal nations indicated an intention to draw a link to depletion of fish stocks by whales. The statement in itself is so general as to be virtually meaningless, especially when the Scientific Committee agreed in 2004 that "[t]here is currently no system for which we have suitable data or modelling approaches to be able to provide reliable quantitative management advice on the impact of cetaceans on fisheries or fisheries on cetaceans."[454]

The recital neither states which whales eat fish nor how many fish are eaten. It has been estimated that over 60% of food caught by marine mammals consists of deep sea squids and very small deep sea fishes not harvestable by humans,[455] while baleen whales in the Southern Hemisphere primarily consume large zooplankton, being small crustaceans, primarily krill.[456]

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[448] See Report of the Conservation Committee, July 2004, at http://www.iwcoffice.co.uk/_documents/meetings/reports/AnnexH.pdf. See Resolution 2003-1 establishing the Committee.

[449] 2004 Report, ibid.

[450] See 2005 report of the Conservation Committee at http://www.iwcoffice.org/_documents/meetings/ulsan/AnnexH.pdf. The IWC was able to carry forward recommendations about so-called 'stinky' grey whales, contaminated whales in the arctic which have a strong chemical smell, and ship strikes. See Chairman's report at http://www.iwcoffice.org/_documents/meetings/ulsan/CRREP57.pdf.

[451] Chair Summary Report or the 58th Annual Meeting, St Kitts and Nevis, June 2006, page 7, at http://www.iwcoffice.org/_documents/meetings/ChairSummaryReportIWC58.pdf.

[452] Ibid.

[453] Resolution 2006-1, St. Kitts and Nevis Declaration, at http://Www.Iwcoffice.Org/Meetings/Resolutions/Resolution2006.Htm#1.

[454] IWC, Report of the Scientific Committee 2004, 39, in J*ournal of Cetacean Research and Management* (2004), Supplement, 30, and at http://www.internationalwildlifelaw.org/rsc55.pdf.

[455] A.W. Trites, V. Christensen, and D. Pauly, "Competition between fisheries and marine mammals for prey and primary production in the Pacific Ocean." 331 *Journal of Northwest Atlantic Fisheries Science* (1997) 173-87, at http://www.marinemammal.org/pdfs/Trites_etal1997-competition.pdf, page 173.

[456] D. Pauly et al., "Composition and trophic levels of marine mammals," 55 *ICES Journal of Marine Science* (1998), 467-481, Table 2, at http://www.cephbase.dal.ca/refdb/pdf/7676.pdf, Blue whale, fin whale, sei whale, minke whale and humpback whale feeding in the Antarctic feed mainly on krill.

Similarly, it has also been observed that the primary predators of fish are not whales, but other fish.[457] However, as catches increase, the possibility has been raised that the primary production available to marine mammals may decrease.[458] This raises the possibility of indirect competition for primary production, and in turn may raise the possibility that RFMOs may need to take into account the indirect effect of fish catches on other species such as marine mammals when setting TACs.

Observers have noted that fishing has caused of the decline of commercial fish stocks worldwide as well as habitat degradation,[459] that the removal of top predators by humans tends to undermine ecosystem resilience,[460] and that many whale populations are currently at a small fraction of their initial levels before whaling,[461] when commercial fish populations were considerably larger than current populations.[462] Overwhelmingly, it is fishing that has altered fish stocks and marine ecosystems worldwide, not whales.[463]

To the extent that the recital implies that whales should be culled[464] to preserve fish for human consumption, the proposal would conflict with the ecosystem approach,[465] as well as the purposes of the ICRW to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry.[466]

However, despite the recital, the second part of the recital did reflect the ecosystem approach and therefore indicate an intention to implement that approach, as well as recognise that the management of whale stocks must be considered in a broader context of ecosystem management. However, use of the

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[457] Trites, *op. cit.,* page 173, 181.

[458] Trites, *op. cit.,* page 182.

[459] D. Pauly et al., "The future for fisheries," 302 *Science* (2003) 1359-61, at http://www.sciencemag.org/cgi/content/abstract/302/5649/1359 and http://www.fisheries.ubc.ca/members/dpauly/journalArticles/TheFutureOfFisheries.pdf. Pauly et al estimated that global fisheries landings were declining by about 500,000 metric tonnes per year. Page 1359.

[460] See Carl Folke et al., "Regime Shifts, Resilience, and Biodiversity in Ecosystem Management.", 35 *Annual Review of Ecology, Evolution, and Systematics*, (2004),:557-581, at http://arjournals.annualreviews.org/doi/abs/10.1146/annurev.ecolsys.35.021103.105711?journalCode=ecolsys.

[461] With the exception of minke whales and probably orca and southern bottlenose whales. See Karl-Hermann Kock. 2000. Understanding CCAMLR's approach to management., page 4, at http://www.ccamlr.org/pu/E/e_pubs/am/text.pdf.

[462] For an assessment of the impact of over-fishing on marine mammals in the future, see D. P. DeMaster et al., "Predation and Competition: The Impact of Fisheries on Marine-Mammal Populations Over The Next One Hundred Years," 82 *Journal of Mammalogy* (2001), 641-651, at http://www.bioone.org/perlserv/?request=get-abstract&doi=10.1644%2F1545-1542(2001)082%3C0641%3APACTIO%3E2.0.CO%3B2.

[463] The FAO reported in 2004 that "[i]t is estimated that in 2003 about one-quarter of the stocks monitored were underexploited or moderately exploited (3 percent and 21 percent respectively) and could perhaps produce more. About half of the stocks (52 percent) were fully exploited and therefore producing catches that were close to their maximum sustainable limits, while approximately one-quarter were overexploited, depleted or recovering from depletion (16 percent, 7 percent and 1 percent respectively) and needed rebuilding. From 1974 to 2003 there was a consistent downward trend in the proportions of stocks offering potential for expansion. At the same time there was an increasing trend in the proportion of overexploited and depleted stocks, from about 10 percent in the mid-1970s to close to 25 percent in the early 2000s." FAO, 2004., "The State of the World Fisheries and Aquaculture 2004: Part I: World Review of Fisheries and Aquaculture", page 32, at http://www.fao.org/docrep/007/y5600e/y5600e00.htm.

[464] See Peter Yodzis, "Must top predators be culled for the sake of fisheries," 16 *Ecology & Evolution* (2001), at http://cat.inist.fr/?aModele=afficheN&cpsidt=985741.

[465] See discussion of culling in the context of the FAO Guidelines on page 22.

[466] Culling also appears to contravene the Revised Management Procedure (RMP), at Annex H, *Rep. Int. Whal. Commn*. 44: 145-52, at http://luna.pos.to/whale/gen_rmp.html, as amended. See Resolution 1994-5 at http://www.iwcoffice.org/meetings/resolutions/IWCRES46_1994.pdf. See a description at http://www.iwcoffice.org/conservation/rmp.htm, noting the management objectives underpinning the RMP, particularly that catches should not be allowed on stocks below 54% of the estimated carrying capacity.

term ecosystem approach instead of ecosystem management would have been more appropriate and consistent with international practice.

The operative part of the Declaration read that:

> COMMISSIONERS express their concern that the IWC has failed to meet its obligations under the terms of the ICRW and,
>
> DECLARE our commitment to normalising the functions of the IWC based on the terms of the ICRW and other relevant international law, respect for cultural diversity and traditions of coastal peoples and the fundamental principles of sustainable use of resources, and the need for science-based policy and rulemaking that are accepted as the world standard for the management of marine resources.

The reference to 'relevant international law', sustainable use of resources and science-based policy and rulemaking can all be seen as pointing towards acceptance of the ecosystem approach, consistent with the second part of the recital. While the precautionary approach was not expressly mentioned in the Declaration, the references to international standard, international law and ecosystem management are broad enough to incorporate the precautionary approach where it is mandated by those standards, laws and management principles discussed elsewhere in this paper. That approach would require the implementation of the ecosystem approach in its entirety, including the importance of predator diversity, predator-prey relationships, the abundance of predators and species competing for the same trophic resources, allocation of some of the potential yield of a prey species to the predator rather than all being allocated to the fishery targeting the prey species, the ecosystem effects of the loss of predators at high trophic levels, the role of habitat, and other impacts on whales, including climate change, entanglement, and pollution, as well as other aspects of ecosystem-based management.

The Chair's Summary[467] records that plans were put into place with respect to a joint workshop with CCAMLR in 2008 to review information required for ecosystem models being developed to provide management advice on krill predators in the Antarctic marine ecosystem, as well as participation in an FAO Expert Consultation on modelling ecosystem interactions for informing an ecosystem approach to fisheries, in 2007.

SPREP

The Pacific Regional Environmental Programme is carried on by SPREP[468] under the SPREP[469] Convention. The Convention recognises the special ecological characteristics of the South Pacific region, as well as the threat to the marine and coastal environment, its ecological equilibrium, resources and legitimate uses posed by pollution and by the insufficient integration of an environmental dimension into the development process. The Convention envisages that the Parties will conclude

[467] St Kitts Chair's Summary Report, note 451, page 6.

[468] Website at http://www.sprep.org.

[469] Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, signed at Noumea, 24 November 1986, entered into force 22 August 1990, at http://www.sprep.org/legal/documents/AgreementEstablishingSPREP.PDF.

bilateral or multilateral agreements[470] such as the Apia Agreement,[471] Dumping Protocol,[472] Pollution Protocol[473] and the Waigani Convention.[474]

SPREP's Islands Ecosystems programme[475] addresses the issues of ecosystem conservation, the sustainable management of natural resources and the protection of priority threatened species from threats posed by human-induced impacts, invasive species and living modified organisms. SPREP's Pacific Futures programme[476] aims at securing a healthy Pacific islands environment for future generations, and addresses multilateral environmental agreements, regional co-ordination, environmental monitoring and reporting and broader issues such as climate change, waste management and pollution control.

Parties are to prevent, reduce and control pollution of the Convention Area and to ensure sound environmental management and development of natural resources.[477] Parties are to co-operate with other organisations to promote sustained resource management and to ensure the sound development of natural resources,[478] as well as to prevent, reduce and control pollution.

The Parties are to take measures to protect and preserve rare or fragile ecosystems and depleted, threatened or endangered flora and fauna as well as their habitat in the Convention Area,[479] through protected areas. In doing so they are to prohibit or regulate any activity likely to have adverse effects on the species, ecosystems or biological processes, and prohibit or regulate any activity likely to have adverse effects on the species, ecosystems or biological processes that such areas are designed to protect.

Environmental impact assessments are to be made of major projects which might affect the marine environment, in order to prevent any substantial pollution of, or significant and harmful changes within, the Convention Area.[480]

Measures are to be taken to prevent, reduce and control pollution from land-based sources[481] and seabed activities,[482] airborne pollution[483] and from dumping at sea,[484] from the storage of toxic and hazardous wastes,[485] and nuclear testing,[486] to address environmental damage caused by coastal engineering, mining and similar activities.[487]

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[470] SPREP Convention Article 4.

[471] Convention on Conservation of Nature in the South Pacific, 1976, entered into force 1990, http://www.spc.org.nc/coastfish/Asides/conventions/apia.htm, and 2000 amendment, not in force, at http://www.sprep.org/legal/documents/Apia_amendmentsitalics.doc.

[472] Protocol for the Prevention of Pollution of the South Pacific Region by Dumping, Noumea, 25 November 1986, at http://www.sprep.org/legal/documents/SOUTHPACIFICDUMPING_text.doc.

[473] Protocol Concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region, Noumea, 25 November 1986, at http://www.sprep.org/legal/documents/PollutionEmergencies_text.doc.

[474] Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region, 16 September 1995, at http://www.forumsec.org.fj/docs/Gen_Docs/wc.htm.

[475] Website at http://www.sprep.org/programme/island_eco.htm.

[476] Website at http://www.sprep.org/programme/pacific_futu.htm.

[477] SPREP Convention Article 5.

[478] SPREP Convention Article 5(4).

[479] SPREP Convention Article 14.

[480] SPREP Convention Article 16(2).

[481] SPREP Convention Article 7.

[482] SPREP Convention Article 8.

[483] SPREP Convention Article 9.

[484] SPREP Convention Article 10.

[485] SPREP Convention Article 11.

The Pacific Cetaceans Memorandum of Understanding

There was a Memorandum of Understanding (MOU)[488] signed by 9 States[489] under the joint auspices of CMS and SPREP in September 2006. The MOU recognises that cetaceans, as an integral part of the marine environment that connect ecosystems and cultures, should be conserved for the benefit of present and future generations,[490] and emphasises that knowledge of the biology, ecology, migrations, population abundance, and conservation status of many cetaceans is deficient and that international co-operation will facilitate research and monitoring of these species in order to develop and implement conservation measures.

The MOU also notes that signatories are concerned that the conservation status of cetacean populations that frequent the waters of the Pacific Islands Region, particularly those that have been severely depleted, can be affected by factors such as directed take and by-catch, degradation and disturbance of their habitats, chemical and noise pollution, decline in food availability, use and abandonment of fishing gear, ship-strikes, climate change, and ozone depletion.[491]

In the operative part of the MOU, the signatories agree to (among other things)

- take steps to conserve all cetaceans and fully protect species listed in CMS Appendix I that occur in the Pacific Islands Region;[492]
- consider ratifying or acceding to those biodiversity-related international instruments including CMS;[493]
- Review, enact or update legislation to conserve cetaceans;[494]
- Implement, an Action Plan that would address matters such as threat reduction, habitat protection, including migratory corridors, research and monitoring and education;[495] and
- Facilitate the exchange of scientific, technical and legal information.[496]

The Action Plan lists three key current issues for whale and dolphin interactions with fisheries operations:[497]

> 1) An argument is used by some whaling interests that large whales eat commercially important fish and that there is a conflict between whales and commercial fisheries that can be resolved by culling populations of large whales.
> 2) Depredation of commercially caught fish on longlines by some toothed whales takes place in the region.
> 3) By-catch and entanglement of whales in commercial longlines.

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[486] SPREP Convention Article 12.
[487] SPREP Convention Article 13.
[488] Memorandum of Understanding for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region, opened for signature at Noumea on 15 September 0206, UNCP/CMS/PIC-1/Inf/3, at http://www.cms.int/bodies/meetings/regional/pacific_cet/pdf/Inf_03_PacificCetaceans_MoU&AP.pdf. In force.
[489] Australia, Cook Islands, Federated States of Micronesia, Fiji, France, New Zealand, Niue, Samoa, Vanuatu. See Status of Signatures UNEP/CMS/PIC-1/Inf.1, at http://www.cms.int/bodies/meetings/regional/pacific_cet/pdf/Inf_01_Status_of_Signatures_PIC.pdf.
[490] Pacific Cetacean MOU, preamble.
[491] Ibid.
[492] Pacific Cetacean MOU, para. 1.
[493] Pacific Cetacean MOU, para. 2.
[494] Pacific Cetacean MOU, para. 3.
[495] Pacific Cetacean MOU, para. 4.
[496] Pacific Cetacean MOU, para. 5.
[497] See Pacific Cetacean MOU, Annex 2: Whale and Dolphin Acti nPlan 2003-2007.

The Action Plan notes that there is no scientific basis for the 'whales eat fish' argument in the SPREP region, as large toothed whales usually eat non-commercial prey such as deep-sea squid, which is of no commercial value, and baleen whales have not been shown to eat fish in the South Pacific part of the MOU region: studies from Japanese 'scientific whaling' in the Solomon Islands in the 1970s have shown that 97% of their diet is plankton. Baleen whales have no teeth, and are not fast enough to chase and catch large fish such as tuna. The small toothed whales that are probably involved in depredation of hooked fish on commercial longlines are killer whales, false killer whales and pilot whales. Some dolphin species take bait from hooks. The Action Plan notes that this is a significant problem in the region, particularly in Samoa, Fiji, Tonga and PNG. The Action Plan also notes that SPREP held a workshop on the issue in November 2002, which produced an Action Plan, which includes recommendations for studies on depredations. However it should also be noted that the IWC does not regulate these small cetaceans and so they are not covered by the current whaling moratorium.

With respect to scientific whaling, the Action Plan notes that over 6,000 Antarctic minke whales have been taken in the JARPA programme between 1986 and 2003, and some of these would have spent some of their lives in the waters of the Pacific Island Nations. The impact of the removal of 240 Bryde's whales between 1977 and 1979 in the vicinity of the Solomon Islands is unknown. The Action Plan notes also that scientific data shows that there are links between Tonga and other island groups in Polynesia and possibly Melanesia, and that takes from the Tongan humpback population (if carried out) may thus significantly impact other humpback populations in the region. It is noted that the Tongan population clearly has not recovered to pre-exploitation levels of abundance, so any renewed hunting pressure would be detrimental to the future of the Tongan whale stock.

There is to be meeting of the signatories in early March,[498] including a workshop on March 7 on cetaceans and fishery interactions.[499]

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[498] http://www.cms.int/species/pacific_cet/1st_pacific_cet_signatories_meeting.htm

[499] See Agenda, UNEP/CMS/PIC-1/Inf/8, at http://www.cms.int/bodies/meetings/regional/pacific_cet/pdf/Inf_08_Agenda_Workshop_CFI.pdf. o