Arctic Review on Law and Politics, vol. 1, 2/2010 p. 186-206. ISSN 1891-6252

Integrated Oceans Management in the Arctic: Norway and Beyond

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Abstract: The introduction of ecosystem-based oceans management has become a critical issue in the Arctic. Norway has been at the forefront in introducing such comprehensive oceans management, where the assessment of the total impacts on ecosystems from various sources is a critical element, and a process for reconciling various concerns is another. An important lesson is that ecosystem-based oceans management has to build on existing structures and administrative systems and develop these. The article also addresses the recent efforts at ecosystem-based oceans management in the Arctic Council, through the Best Practices in Ecosystems Based Oceans Management Project which resulted in a set of Observed Best Practices for ecosystem-based oceans management in an Arctic context. The experiences from seven Arctic countries were the basis for the identification of these best practices.

Keywords: Integrated oceans management, Barents Sea, Arctic

1. Introduction

Global change brings a host of challenges to the governance of ecosystems at all levels from the global to the local.[1] Marine ecosystems are no exception.[2] An un-

1. Steffen, W., Jäger, J., Carson, D.J. and Bradshaw, C. (Eds.) (2002). *Challenges of a Changing Earth*, Berlin: Springer.
2. B. S Halpern, S Walbridge, K. A Selkoe, C. V Kappel, F Micheli, C D'agrosa, J. F Bruno, K. S Casey, C Ebert, H. E Fox, R Fujita, D Heinemann, H. S Lenihan, E. M. P Madin, M. T Perry, E. R Selig, M Spalding, R Steneck, R Watson (2008). A global map of impacts on marine ecosystems. *Science*, 319: 948–952.; Miles, E.L. (2010). On the Increasing Vulnerability of the World Ocean to Multiple Stresses. *Annual Review of Environment and Resources*, November 2009, 34: 17–41(doi: 10.1146/annurev.environ.33.041707.110117).

derstanding is emerging that more integrated approaches to oceans management are needed to respond effectively to these challenges.[3] While the case for integrated oceans management has been made in academic literature for more than three decades,[4] actual integration of marine policies has been slow to come about.[5] Also, while the literature is impressive,[6] much of it is theoretical. The actual impact of integrated oceans management and similar concepts can be studied by examining implementation of the concept into real marine ecosystems.

Arctic communities are dependent on the marine environment and its natural resources.[7] In many regions, fisheries and hunting of marine mammals are critical to the local economies. Commercial fisheries in the seas surrounding the Arctic are of global significance, and have been so for a long time.[8] Non-renewable resources are important in some regions of the Arctic, and petroleum-related activities are likely to grow in the future.[9] Shipping in the Arctic is likely to increase over the next decades.[10] Also tourism, particularly cruise tourism, as well as scientific activities, are growing industries in some areas. Expansion of economic activity coincides in time with the onset of the effects of climate change in the Arctic.[11] While the Arctic marine environments are generally healthy,[12] increasing levels

3. Ebbin, S.A., Hoel, A.H. and Sydnes, A.K. (Eds.) (2005). *A Sea Change. The Exclusive Economic Zone and Governance Institutions for Living Marine Resources*. Dordrecht, Springer.
4. Underdal, A. (1980). Integrated marine policy: What? Why? How? *Marine Policy* 4(3): 159–169; Reichle, D. (1975). Advances in Ecosystem Analysis, *BioScience* 25(4): 257–264.
5. Juda, L. (2003). Changing national approaches to ocean governance: the United States, Canada, and Australia. *Ocean Development and International Law* 34: 161–187; McLeod, K. and Leslie, H. (2009). Why ecosystem-based management? pp. 3–12. In: McLeod, K. and Leslie, H. 2009 (Eds.) *Ecosystem-based management for the oceans*. Island Press, Washington DC.
6. See, for example, Curtin, R. and Prellezo, R. 2010: Understanding marine ecosystem based management: A literature review. *Marine Policy* 34: 821–830 for a review.
7. Arctic Human Development Report 2004. Stefansson Arctic Institute, Akureyri
8. Hoel, A. H.; Vilhjamsson, H. Arctic Fisheries. I: Encyclopedia of the Arctic. London: Routledge 2004. s. 635–641.
9. AMAP 2007: Arctic Oil and Gas Assessment. Arctic Monitoring and Assessment Programme, Oslo. Available at: http://amap.no/.
10. AMSA 2009: Arctic Marine Shipping. Available at: http://www.pame.is/amsa.
11. ACIA 2005: The Arctic Climate Impact Assessment. Cambridge University Press, Cambridge.
12. CAFF 2001: Arctic Flora and Fauna. Status and Conservation. Available at: http://caff.arctic-portal.org/document-library/arctic-flora-a-fauna.

of pollution and contaminants,[13] as well as the impacts of climate change,[14] give cause for concern.

To address the cumulative effects of economic activities, pollution and climate change, integrated approaches to the management of the marine environment is critical.[15] The Arctic countries are now working to develop and implement ecosystem-based management of their oceans in general, including their Arctic seas.[16] Of the eight Arctic countries, six are major marine powers: Russia, USA, Canada, Denmark/Greenland, Iceland and Norway. With the exception of Iceland, they are all coastal states bordering on the Arctic Ocean. While the central Arctic Ocean has little economic activity, there are significant levels of fishing, petroleum operations and other activity in the seas surrounding the polar basin, such as the Bering Sea and the North Atlantic.

The purpose of this article is to examine how integrated oceans management is implemented in one Arctic country, Norway, and to review the status of ecosystem-based oceans management in the Arctic as addressed in the Arctic Council, the eight state high level forum for environmental protection and sustainable development.[17] In doing so, we draw on the findings of the Best Practices in Ecosystems Based Oceans Management Project, which was conducted under the purview of the Arctic Council 2007-2009.[18]

Following a brief overview of the international institutional framework for oceans management and its status in relation to the Arctic marine environment, the implementation of integrated oceans management in Norway is discussed. About to adopt a second generation integrated management plan for its northern waters, Norway is among the countries with the most advanced programs in this regard,[19] and therefore of particular interest. We then turn to the question of integrated oceans management in the Arctic more generally, before conclud-

13. AMAP, 2009. Arctic Pollution 2009. Arctic Monitoring and Assessment Programme, Oslo. Available at: http://amap.no/.
14. Koc, N., Njaastad, B., Armstrong, R., Corell, R.W., Jensen, D.D., Leslie, K.R., Rivera, A., Tandong, Y., Winther, J.G. (Eds.) (2009). Melting Snow and Ice: A Call for Action. Centre for Climate, Ice and Ecosystems, Norwegian Polar Institute.
15. Kroepelien, K. (2007). The Norwegian Barents Sea Management Plan and the EC Marine Strategy Directive. *RECIEL* 16/1, pp 24–35.
16. Hoel, A.H. (Ed.) (2009). Best practices in ecosystem-based oceans management in the Arctic. No 129 Norwegian Polar Institute Report Series, Norwegian Polar Institute, Tromsø.
17. See the Arctic Council homepage at: http://www.arctic-council.org/.
18. Hoel, A.H. 2009 (ed.).
19. Kroepelien, 2007; Olsen, E., Gjøsæther, H., Røttingen, I., Domasnes, A., Fossum, P. and Sandberg, P. (2007). The Norwegian ecosystem-based management plan for the Barents Sea. *ICES Journal of Marine Science* 64: 599–602.

ing with some observations on the challenges of implementing integrated oceans management in practice.

2. The international framework for ecosystem-based oceans management

The international oceans regime that has been developed over the last century consists of a comprehensive set of measures to regulate interactions among countries in oceans affairs.[20] Preceded by two conferences under UN auspices, the third United Nations Conference on the Law of the Sea (UNCLOS III, 1973–1982) brought a substantial, international framework for the management of the oceans and related activities. Notably, it introduced the Exclusive Economic Zones (EEZs) which brought a major reconfiguration of rights to natural resources in the oceans, as well as further development of a coastal state based system of resource management regimes. Along with a subsequent, substantial body of law, the 1982 Law of the Sea Convention provides a global framework for regulating the use and protection of the oceans.[21] The Convention entered into force in 1994, and has since been elaborated upon and made more specific in relation to fisheries[22] and deep seabed minerals.[23] As regards integrated oceans management, the Convention explicitly states that "... ocean spaces are closely interrelated and need to be considered as a whole" (Preamble).

By 2010, 160 countries have acceded to the Convention. To follow up on its implementation and address emerging oceans issues, the United Nations General Assembly has instituted an annual meeting, the United Nations Informal Consultation Process on Oceans and the law of the Sea (UNICPOLOS). Specifically, in relation to ecosystem-based management, in 2006, the informal consultations produced a set of "Agreed Consensual Elements" on ecosystem approaches and the

20. Ebbin, S.A., Hoel, A.H. and Sydnes, A.K. (Eds.) (2005).
21. The United Nations Law of the Sea Convention, at: http://www.un.org/Depts/los/convention_agreements/convention_overview_convention.htm.
22. The 1995 UN Fish Stocks Agreement: http://www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm.
23. Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982. http://www.un.org/Depts/los/convention_agreements/convention_overview_part_xi.htm.

oceans.[24] Also, the UN General Assembly has repeatedly noted ecosystems-based oceans management in its annual resolutions on oceans and the Law of the Sea.[25]

Other relevant global agreements in relation to integrated oceans management include the 1992 Biodiversity Convention. This convention is general in its approach, provides few specific obligations and relies on countries to develop plans for its implementation.[26] Protected areas are a key measure. Other global, marine treaties regulate shipping-related activities and pollution, and therefore address aspects of integrated oceans management. The International Maritime Organization (IMO) has adopted a number of global agreements to protect the marine environment from negative impacts of marine transport, dealing with certifications as well as oil pollution damage, anti-fouling systems, ships ballast water and sediment, carriage of hazardous and noxious substances, etc.[27] There are global regimes for climate gases[28] and ozone[29] that apply in the Arctic, although not all Arctic countries are party to these. There are also global regimes for persistent organic pollutants[30] and dumping of waste at sea,[31] among others, which are elements of the global framework for integrated oceans management.

Based on the framework and principles provided by these global instruments, international co-operation on the protection of the ocean environment is furthered in regional institutions. In the Northeast Atlantic, regional co-operation to protect the marine environment is based on the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).[32] The convention has five annexes on land-based pollution, dumping, ocean-based pollution, environmental assessments, and conservation of ecosystems and biodiversity. The annexes and measures adopted by OSPAR are the basis for domestic implementation in the member countries. Regional co-operation on the management

24. 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. At: http://daccessdds.un.org/doc/UNDOC/GEN/N06/432/90/PDF/N0643290.pdf?OpenElement.
25. See, for example, Resolution 64/71 from 2009 on Oceans and the Law of the Sea, para. 134. http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N09/466/09/PDF/N0946609.pdf?OpenElement.
26. Hoel, A.H. (2003). Marine biodiversity and institutional interplay. *Coastal Management* 30: 25–36.
27. http://www.imo.org/home.asp?topic_id=1488.
28. http://unfccc.int/2860.php.
29. http://ozone.unep.org/.
30. http://chm.pops.int/Convention/tabid/54/language/en-US/.
31. http://www.imo.org/Conventions/contents.asp?topic_id=258&doc_id=681.
32. Convention for the Protection of the Marine Environment of the North-East Atlantic, signed in Paris, 22 September 1992, entered into force 25 March 1998, 32 ILM 1069. See http://www.ospar.org.

of transboundary fisheries in the Northeast Atlantic occurs through a number of coastal state arrangements for the areas under national jurisdiction, and through the North-East Atlantic Fisheries Commission (NEAFC) for the fisheries on the high seas.[33] OSPAR and NEAFC have formalized their co-operation in a 2008 Memorandum of Understanding.[34]

A number of "soft law" arrangements that supplement legally binding agreements that apply to the marine environment have gained in importance over the years. These include Agenda 21 and its chapter 17 on oceans,[35] and the WSSD 2002 Johannesburg Plan of Implementation[36] that provides guidance to governments in developing their ocean policy. The latter specifically "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".[37]

Soft law arrangements also exist at the regional level. In the Arctic, the Arctic Council, the high-level forum for co-operation among the eight Arctic countries, has emphasized the importance of the ecosystems-based approach to oceans management in several statements and declarations. In 2004 the Arctic Council adopted an Arctic Marine Strategic Plan,[38] calling for ecosystem-based oceans management in the Arctic, defined as an activity that is "… coordinated in a way that minimizes their impact on the environment and integrates thinking across environmental, socio-economic, political and sectoral realms".[39] Several of its working groups conduct assessments of the status in specific issue areas and perform other activities relevant to integrated oceans management in the Arctic.

3. Integrated oceans management in perspective

It is evident, then, that many international agreements apply to the marine environment in the Arctic. Variations of the theme "ecosystem approach" have been developed and incorporated into a number of these international agreements,

33. Kvalvik, I. (2010). The Northeast Atlantic Fisheries Commission and Implementation of Sustainability Principles: Lessons To Be Learned? In: Russel, D. and VanderZwaag, D. (Eds.) 2010: *Strengthening Transboundary Fisheries Management Arrangements in Light of Sustainability Principles: Canadian and International Perspectives*. Brill, Dordrecht.
34. http://www.neafc.org/system/files/%252Fhome/neafc/drupal2_files/opsar_mou.pdf.
35. http://www.un.org/esa/dsd/agenda21/.
36. http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIToc.htm. See para 30 (d).
37. Johannesburg Plan of Implementation, para 29 (d).
38. Available at: http://www.pame.is/arctic-marine-strategic-plan.
39. 2004 Arctic Marine Strategic Plan, p 8.

non-legally binding instruments in particular. It is not, however, always clear what this means in practice.

A useful starting point is a theoretical definition: A management framework for integrated oceans management can be defined as "… a mechanism for a strategic and integrated plan-based approach for marine management that makes it possible to look at the 'bigger picture' and to manage current and potential conflicting uses, the cumulative effects of human activities, and marine protection".[40]

Attempts to develop and implement integrated oceans management go under many denominations: "marine spatial planning",[41] "ocean zoning",[42] and "ecosystem-based oceans management",[43] just to mention some. The core ideas of these concepts and the literature they are spawning are similar. However; the cumulative impacts of various uses of and pressures on the marine environment necessitate integrated approaches to its management.

This perspective raises at least two major issues: the need to develop methodologies and approaches to assessing total impacts on ecosystems, and the need to develop institutional mechanisms to reconcile incompatible uses where the total impacts exceed the carrying capacity of ecosystems. Achieving the first requires at least two preconditions to be at least partially met: the ecosystem must somehow be defined and its boundaries drawn, and an understanding of its carrying capacity has to be developed. These are very demanding tasks in terms of the scientific effort required, and raise a host of issues relating to performance assessments[44] and the relationship between science and policy.[45]

The real meaning and significance of concepts such as integrated oceans management and ecosystem-based oceans management in practice, can only be assessed by examining *implementation* of the concept in real marine ecosystems. Actual implementation will have to address the two issues of total impacts and the balancing of different concerns. The way these issues are handled in practical terms is critical to the actual performance of integrated oceans management.

40. Douvere, F. (2008: 766). The importance of marine spatial planning in advancing ecosystem-based sea use management. *Marine Policy* 32: 762–771.
41. Ehler, C. (2008). Conclusions: Benefits, lessons learned, and future challenges of marine spatial planning. *Marine Policy* 32: 840–843.
42. Crowder, L.B. G Osherenko, OR Young, S Airamé, EA Norse, N Baron, JC Day, F Douvere, CN Ehler, BS Halpern (2006). Resolving mismatches in US ocean governance. *Science*, 313: 617–618.
43. McLeod and Leslie, 2009.
44. Mitchell, R., Clark, W., Cash, D., and Dickson, N. (Eds.) (2006*): Global Environmental Assessments: Information and Influence*. MIT Press, Cambridge.
45. Knol, M. (2010). Scientific advice in integrated ocean management: The process towards the Barents Sea plan. *Marine Policy* 34: 252–260.

The regulatory measures in ecosystem-based oceans management is likely to require substantial scientific activity and regulatory adjustment. This gives governments the central role in ecosystem-based oceans management. Only governments have the means to fund scientific inquiry on this scale, and the authority to devise and enforce regulation of human activity, thereby reconciling incompatible uses.

Institutional frameworks for decision-making on management of marine ecosystems at the domestic level vary from country to country, as do the translation of ecosystem-based oceans management principles found in the literature into actual management frameworks.[46] It is therefore not always possible to apply experience and lessons learned in one country to another. Also, implementation is a complex phenomenon.[47] and difficult to generalize on the basis of any single case study.

4. The Norwegian case

Norway's oceans span more than 3000 kilometers from north to south. Its marine environment includes the temperate waters in the North Sea as well as the polar waters to the North of the Svalbard archipelago. The North Atlantic Current brings warm waters from the southwestern Atlantic, warming coastal Norway to 5–8°C more than other areas at the same latitude. The marine environment is generally healthy with the major fisheries at sustainable levels, but is exposed to climate variability as well as long-range pollution.[48] The major sources of marine pollution are to the south of Norway, and are brought north with ocean currents. Shipment of petroleum from north-west Russia through the Barents Sea and along the north Norwegian coast[49] has led to the establishment of designated shipping lanes in the North, 30 nautical miles from the coast. The system was approved by the International Maritime Organization in 2006 and went into effect in 2007.[50]

The offshore petroleum industry accounts for about one quarter of the country's gross domestic product, and one third of the income of the state.[51] The total

46. Arkema, K.K., Abramson, S. and Dewsbury, B. (2006). Marine ecosystem-based management: from characterization to implementation. *Front Ecol Environ* 4: 525–532.
47. Hill, M. and Hupe, P. (2009). *Implementing Public Policy*. Sage, Los Angeles.
48. IMR 2010: Havforskningsrapporten 2010. Fisken og havet, særnr 1–2010. Institute of Marine Research, Bergen.
49. Bambulyak, A. and Frantzen, B. (2009). Oil Transport from the Russian part of the Barents Region. The Norwegian Barents Secretariat and Akvaplan-niva, Norway. At: http://www.akvaplan.niva.no/download/reports/oil_transport_2009.pdf.
50. These apply to vessels above 5000 GRT. See: http://www.kystverket.no/?did=9460680.
51. Ministry of Petroleum and Energy (Olje og energidepartementet) 2009: Fakta – norsk petroleumsverksemd. Olje og energidepartementet, Oslo pp:14. At: http://www.npd.no/no/Publikasjoner/Faktahefter/Fakta-2009/.

landings from marine fisheries were 2.5 million tons in 2009. Herring, cod, haddock, saithe, capelin, mackerel and blue whiting are the most important species. The aquaculture industry produced some 850,000 tons of salmon the same year.[52] Norway is a globally significant exporter of both petroleum and fish. With a small domestic market (population less than 5 million), Norway exports most of the production of marine natural resources.

Norway has jurisdiction over oceans of more than two million square kilometers. Due to its long coastline, vast oceans and small population, different uses of the oceans have coexisted with relatively low levels of conflict. Generally, oceans management is built on sector-based legislation and institutions.[53]

This system has been reinforced with new legislation, as well as the introduction of management plans for the oceans, and the establishment of an inter-ministerial committee for oversight and interagency coordination. The drive towards greater coordination between policy sectors stems from practical experience with the management of oceans issues, developments in scientific knowledge, new and evolving standards to be met in international agreements, and increasing levels of conflict between different uses of the oceans. The prospects of growing petroleum-related activities were particularly important in this regard. These developments generate a need for a more comprehensive approach to oceans management.

A first step in the direction of more coordinated management of the oceans was taken in 2002, with a government white paper outlining a more integrated and ecosystem oriented marine policy: "Protecting the Riches of the Seas" by the Storting (the Parliament) (Report No. 12 to the Storting).[54] Following this, the development of an integrated management plan for the Norwegian part of the Barents Sea and the offshore waters south to the Lofoten Islands was initiated. Also, in 2003, a year afterwards, work to develop a more modern legislative framework for the oceans and the marine environment was begun.

4.1 The Barents Sea management plan

The work on the plan took place under the oversight of an inter-ministerial Steering Committee led by the Ministry of the Environment, and with representatives from

52. Statistics from the homepage of the Fisheries Directorate: http://www.fiskeridir.no/statistikk/.
53. Hoel, A.H. (2005). The Performance of Exclusive Economic Zones: The Case of Norway, pp. 33–48. In: Syma A. Ebbin, Alf Hakon Hoel, and Are K. Sydnes (Eds.) 2005.
54. Ministry of the Environment 2002: St.meld.nr. 8 (2005–2006) Helhetlig forvaltning av det marine miljø i Barentshavet og havområdene utenfor Lofoten (forvaltningsplan). 2006. Oslo, Ministry of Environment. http://www.regjeringen.no/nb/dep/md/dok/regpubl/stmeld/20012002/Report-No-12-2001-2002-to-the-Storting.html?id=452041.

other relevant ministries overseeing the work.[55] An important aspect of the plan process was the need to work across institutional barriers at both ministry and agency levels.

The actual work on the plan was carried out by a number of government agencies and research institutions. An initial scoping phase produced a number of status reports for the economic sectors in the region, the socio-economic aspects, and the marine environment and natural resources.[56] A second phase of the development of the plan was assessments of potential impacts of economic activities (petroleum-related, shipping, and fisheries) and the impact of external forces such as climate change on the marine environment. Phase 3 consisted of aggregating activities; assessing the cumulative impact, identifying valuable and vulnerable areas, defining gaps in knowledge, and the setting of management objectives for the marine environment.[57]

In phases 2 and 3 of the plan work (as well as in the subsequent implementation of the plan), the decision-making process was opened up to consultation with stakeholders in the form of stakeholder meetings, and opportunities for submission of written comments to the plan documents.

The geographical area covered by the plan includes several interacting ecosystems: the Barents Sea itself, the area southwest of the Barents Sea (Tromsøflaket), the area around Svalbard, and parts of the deep-sea areas of the Norwegian Sea.[58] This is a vast area, some 1.4 million km^2.[59] There are large natural fluctuations in environmental conditions throughout this area. An important driver of the ecosystem is the inflow of warm Atlantic water from the southwest, which supports high biological productivity and keeps most of the area ice-free year-round. About 3000 marine species have been recorded in the region.[60] While the plan area covers the Norwegian ocean in the north, the eastern Barents Sea is under Russian jurisdiction and therefore not part of the plan.

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55. Knol, 2010.
56. These reports (in Norwegian) are available at the website of the Ministry of Environment: http://www.regjeringen.no/nb/dep/md/tema/hav--og-vannforvaltning/forvaltningsplan-barentshavet.html?id=87148.
57. Olsen, E., Gjøsæther, H., Røttingen, I., Domasnes, A., Fossum, P. and Sandberg, P. (2007). The Norwegian ecosystem-based management plan for the Barents Sea. *ICES Journal of Marine Science* 64: 599–602.
58. With the adoption of the Management Plan for the Norwegian Sea in 2009, the latter was transferred from the Barents Sea to the Norwegian Sea plan.
59. Following the development of a management plan for the Norwegian Sea, the plan area for the Barents Sea has been reduced to 1.2 million km^2.
60. Sakshaug, E., Johnsen, G. and Kovacs K. (Eds.) (2009). *Ecosystem Barents Sea*. Tapir Academic Press, Trondheim.

The most important economic activity in the plan area is fisheries. The major fisheries include cod, haddock, capelin and king crab. Northeast Arctic cod (TAC 607,000 tons in 2010[61]) is the most important fishery. This is managed by a joint Norway-Russia Fisheries Commission, which also covers haddock, capelin and Greenland halibut. Petroleum-related activities in the plan area were initiated in 1980. By 2010, some 80 exploration wells have been drilled. Discoveries thus far are limited and mainly gas. The first gas and condensate field "Snøhvit" came on-stream in 2007, producing liquefied natural gas in Hammerfest.

The management plan was adopted by the Storting in March 2006,[62] in the form of a white paper: "Integrated Management of the Marine Environment of the Barents Sea and the Sea Areas off the Lofoten Islands".[63] The plan is essentially a plan for area-based management, which emphasizes the assessment of cumulative impacts of various pressures on the marine environment. There are always risks related to economic activities in marine ecosystems. Therefore, risk assessment is an important dimension in the assessment of total load on the environment.[64] In the Barents Sea and along the Norwegian coast, maritime transport causes by far the most risk of pollution, more so even than the petroleum-related activities.

On-going monitoring of the ecosystem and its components is central to the management plan. A number of indicators have been selected for the physical environment, as well as for various species of plankton, fish, marine mammals, seabirds, etc. The set of indicators are monitored over time to assess the extent to which the objectives of the plan are achieved.[65] Every year a number of monitoring programs are executed to check on the status of the indicators.

The concept of "valuable and vulnerable areas" is introduced in the plan to denote areas with biological processes of particular importance to the functioning of the ecosystems, as for example, spawning grounds for major fish stocks. Based on an assessment of the risk of various economic activities, it was decided where and in which periods petroleum activities could take place in the plan period through 2010.

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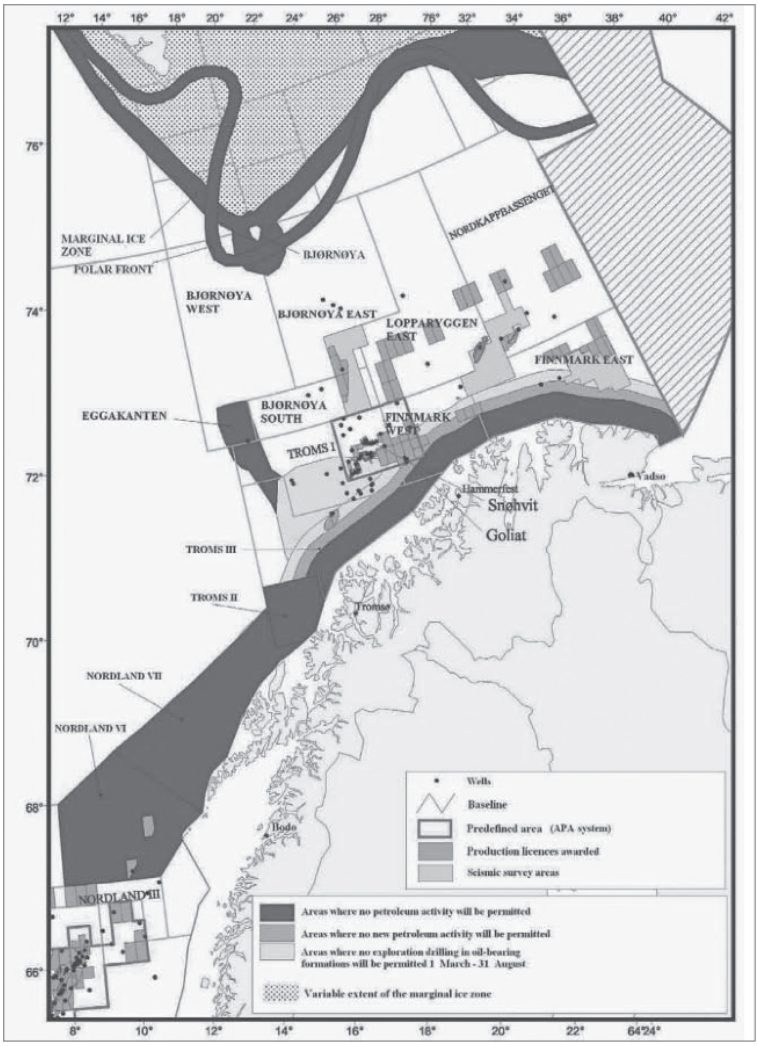
61. http://www.regjeringen.no/nb/dep/fkd/pressesenter/pressemeldinger/2009/enighet-om-norsk-russisk-fiskeriavtale-f.html?id=579383.
62. Kroepelien, 2007.
63. Ministry of the Environment 2006: Integrated Management of the Marine Environment of the Barents Sea and the Sea Areas off the Lofoten Islands. Report to the Storting No 8 (2005–2006), Ministry of Environment, Oslo.
64. Hoel, A.H., Von Quillfeldt, C.H. and Olsen, E. (2009). Norway and Integrated Oceans Management – the Case of the Barents Sea, pp 43–52. In: A.H. Hoel (Ed.) (2009).
65. Von Quillfeldt, C. (Ed.) (2010). Det faglige grunnlaget for oppdateringen av forvaltningsplanen for Barentshavet og havområdene utenfor Lofoten. Fisken og Havet, særnr 1a 2010 pp 155. Institute of Marine Research, Bergen.

Another example of area-based management is the a mandatory routing and traffic separation scheme for shipping, moving traffic out to 30 nautical miles from the coast, to reduce the risk of acute oil pollution from ships. Fishing is also regulated by area-based measures, although this is not specifically related to the management plan. Temporary closures of areas are frequently used in fisheries manage-



The areas where ocean zoning is established by the 2006 Management Plan.
Source: Report No 8 to the Storting, p. 128. Ministry of Environment website at:
http://www.regjeringen.no/upload/MD/Vedlegg/STM200520060008EN_PDF.pdf

ment in Norway, as are measures restricting the use of certain fishing gears in vulnerable areas.[66]

The traditional approach to resource management and conservation is to manage species. A number of obligations flow from international agreements. One example is the numerous fisheries agreements Norway is party to, where annual limitations are established on how much can be taken of any given resource.[67] Another is the obligation to protect polar bears, laid down in the 1972 polar bear agreement.[68] The management plan, therefore, does not replace species-based management, but rather supplements it.

Alongside the plan, the conventional sector-based regulations continue to apply to fisheries, petroleum activities, shipping, and other areas. This is an important aspect of ecosystem-based oceans management in Norway: The thinking is that without effective management of the economic activities - which is difficult to achieve in the absence of sector-based regulations - the overall ambition of ecosystem-based oceans management will be challenging. For example, for petroleum, the sector legislation and control procedures are intended to reduce the impact of petroleum activities on the environment and inconveniences to other industries operating in the same areas. A specific requirement for petroleum activity in the management plan area is that drilling operations shall have zero discharges.

The key issue in the management plan is the weighting of petroleum versus fisheries interests. The 2006 white paper concluded that given the strict standards that apply to petroleum activities in the area, discharges into the sea and mechanical disturbances of the seabed were not expected to have significant environmental impacts. To the fisheries' interests, the increase in petroleum-related activities in the north has raised concerns that seismic surveys, drilling operations as well as accidents can have negative effects on the marine ecosystem and fisheries. The key feature of the management plan, therefore, is that petroleum-related activities are subject to restrictions in time and space.

4.2 Implementation of the plan

The implementation and further development of the plan after its adoption in 2006 has been based on activities in three permanent working groups: an advisory

66. The regulation stipulating how fisheries can be conducted in waters under Norwegian jurisdiction contains a number of provisions limiting where fishing can take place. The regulation "Forskrift om utøvelse av fiske i sjøen" is available at the Web site of the Fisheries Directorate: http://www.fiskeridir.no/fiske-og-fangst/j-meldinger/gjeldende-j-meldinger/j-148-2010.

67. St m 18 (2009–2010) Fiskeriavtalene Noreg har inngått med andre land for 2010 og fisket etter avtalane i 2008 og 2009.

68. Agreement on the Conservation of Polar Bears, I.L.M. 13:13–18, January 1974.

group on monitoring, a forum on environmental risk management, and a forum for the coordination of the scientific aspects of ecosystem-based management. The three groups have representatives from relevant agencies and research institutions. A coordinating steering committee, led by the Ministry of Environment, also includes the ministries of Energy and Petroleum, Fisheries and Coastal Affairs, and Foreign Affairs. To allow for stakeholder input, a reference group has been established, meeting once a year.

The plan is now under revision. In March 2010 a new scientific report[69] underpinning the plan work was released, and the government will adopt a revised version of the plan in 2011. The report also emphasized potential effects of climate change on the ecosystems in the plan area, and identified species dependent on sea ice as a possible first species in the plan area vulnerable to climate change. The report also pointed to the need for indicators of ecological effects of climate change.

In conjunction with the revision, a number of reports addressing different aspects of the economic activities, the environment and their management have been released, and are subject to a public hearing process. Notably, the oil spill in the Gulf of Mexico in the spring 2010 brought increased concerns for similar incidents in Norway. The Ministry of the Environment has therefore commissioned another report, addressing the lessons to be learned from the Gulf of Mexico incident.

A management plan for the Norwegian Sea was adopted in 2009,[70] and the North Sea will see its plan in 2013. Eventually, the entire ocean areas under Norwegian jurisdiction will be subject to management plans.

A related, important development is that Norway in 2008 adopted a new Oceans Resources Act, consolidating relevant provisions for the management of living marine resources into a single act and bringing modern principles for environmental stewardship to bear on oceans management.[71] The act provides for the application of ecosystem-based oceans management to the maritime areas under Norway´s jurisdiction, and shall ensure economically sound management of wild marine resources by sustainable use and long-term conservation. Also, a Nature

69. Von Quillfeldt, 2010.

70. Ministry of Environment 2009: Integrated Management of the Marine Environment of the Norwegian Sea. Report No 37 to the Storting. Oslo. http://www.regjeringen.no/nb/dep/md/dok/regpubl/stmeld/2008-2009/report-no-37-2008-2009-to-the-storting.html?id=577875.

71. Lov om forvaltning av viltlevande marine ressursar (havressurslova). at: http://www.lovdata.no/all/hl-20080606-037.html. Legislation pertaining to the right to participate in fisheries is contained in a separate act (Act No. 15 of 1999 on the right to participate in fishing and hunting of marine animals, 26 March 1999).

Diversity Act was adopted in 2009.[72] Still another recent development of interest in this context is the planned establishment of a network of marine protected areas. This will include protected areas also in the southern part of the management area.

5. Prospects for integrated oceans management in the Arctic

What, then, is the situation for the Arctic as a whole concerning ecosystem-based oceans management? This question is not critical yet for the central Arctic Ocean, which is still ice-covered large periods of the year. While summer spats of open water occur, open water over the entire Central Arctic Ocean is likely a few decades from now.[73] In the surrounding seas, like the Canadian northern archipelagic waters, the Bering Sea, the waters around Iceland, and the Barents Sea, where economic activities do regularly take place and which is ice-free large parts of the year or year-round, this is an important question for actual oceans management.

The Arctic Council 2004 Arctic Marine Strategic Plan[74] advocates an ecosystem approach to oceans management. Furthermore, based on its initial experiences with the Barents Sea plan, Norway initiated a project during its chairmanship of the Arctic Council in 2007-2009 to address the question of how integrated oceans management is actually done in the Arctic.[75] Following some discussion on its direction and format, the project focused on ecosystem-based oceans management and what could be regarded as *best practices* in that regard.

The Best Practices in Ecosystems Based Oceans Management Project (BePOMAr) was developed as a series of case studies from seven of the eight member countries of the Arctic Council.[76] The case studies were incongruent in a number of respects, and comparison across cases was therefore not always possible. It was clear from the outset that the countries were very diverse in a number of respects. First of all, the marine environment of the Arctic ranges from polar to boreal conditions, and the properties of ecosystems are therefore very different. Second, regions of the Arctic vary with regard to types and levels of economic

72. Lov om forvaltning av naturens mangfold (naturmangfoldloven). At: http://www.lovdata.no/cgi-wift/wiftldles?doc=/app/gratis/www/docroot/all/nl-20090619-100.html&emne=naturmangfold*&&.
73. ACIA 2005; Wang, M. and Overland, J. (2009). A sea ice free summer Arctic within 30 years? *Geophysical Research Letters* 36.
74. http://www.pame.is/arctic-marine-strategic-plan.
75. Norwegian Chairmanship program 2007–2007, at: http://arctic-council.org/filearchive/AC_Programme_2006-2008.pdf.
76. Sweden did not participate.

activity. While the economic activities in some regions of the Arctic are mostly of a subsistence nature, in others they are commercial and large-scale. And third, the governance systems of the various countries are not the same, providing for different ways of approaching oceans management in general, and the challenge of ecosystem-based oceans management in particular.

What the BePOMAr project could address, however, was the elements of governance that seemed to be important for ecosystem-based oceans management in practice in more than one country. The objective of the project, therefore, was to present the concepts and practices the Arctic countries have developed for the application of an ecosystem-based approach to oceans management.[77] By reviewing how the Arctic countries put the concept into practice, lessons could be drawn as to how ecosystems-based oceans management can be done.

In addition to the seven case studies, the project report also contained a chapter on indigenous issues.[78] The seven cases – Canada,[79] Denmark/Greenland,[80] Finland,[81] Iceland,[82] Norway,[83] Russia[84] and USA[85] – show that the Arctic countries all have ecosystem-based oceans management on their domestic policy agenda. It is an established goal in marine management in the countries to do ecosystem-based oceans management. Also, all countries appear to have the institutional systems to put ecosystem-based oceans management into practice.

The countries vary, however, in the extent to which and how they are actually *implementing* ecosystems approaches to oceans management, in the sense of having mechanisms for assessing total impacts on ecosystems, and reconciling conflicting uses. There are differences between the countries in a number of respects, including the scale of ecosystem-based oceans management, decision-making structures, and level of ambition.

This conclusion is, however, a question of semantics, as the same concepts are given different connotations by different actors. It is a matter of substance, insofar as the marine environments in question differ in nature and the management challenges are very different across regions. The areas where ecosystem-based

77. Not only for their Arctic regions, but for the country as a whole.
78. Huntington, H. and Pungowiyi, C. (2009). Indigenous Perspectives. In: A.H. Hoel (Ed.) (2009).
79. Siron, R., VanderZwaaag, D. and Fast, H. (2009). Ecosystem-based oceans management in the Canadian Arctic, pp. 81–100. In: Hoel (Ed.) 2009.
80. Greenland 2009: Greenland, pp. 61–79. In: A.H. Hoel (Ed.) 2009.
81. Kartakallio, H. (2009). Finland, pp 37–42. In: A.H. Hoel (Ed.) (2009).
82. Iceland 2009: Iceland, pp 53–60. In: A.H. Hoel (Ed.) (2009).
83. Hoel, Von Quillfeldt, and Olsen 2009.
84. Denisov, V.V. and Mikhaylichenko, Y.G. 2009: Management of the Russian Arctic Seas, pp. 19–35. In: A.H. Hoel (Ed.) 2009.
85. USA 2009: USA, pp. 101–108. In: A.H. Hoel (Ed.) (2009).

oceans management appear to be most advanced, is also where economic activity is greatest (Northeast Atlantic) and ecosystem-based oceans management therefore most necessary.

While the case studies were written by authors from their respective countries, the final chapter was negotiated among the Arctic Council countries to arrive at the "Observed Best Practices for Ecosystems Based Oceans Management in the Arctic".[86] These were endorsed by the Arctic Council at the ministerial meeting in Tromsø in April 2009.[87]

The Observed Best Practices[88] consist of "Core Elements" and "Conclusions" that were drawn from case studies. Although definitions may differ, some core elements are essential to ecosystem based oceans management everywhere:

- The geographical scope of ecosystems must be defined by ecological criteria.
- The development of scientific understanding of systems and of the relationship between human actions and changes in other system componentsiscritical.
- The application of the best available scientific and other knowledge is essential to understand ecosystem interactions and manage human activities accordingly.
- An integrated and multidisciplinary approach to management that takes into account the entire ecosystem, including humans, is needed.
- Area-based management and use of scientific and other information on ecosystem changes to continually adapt management of human activities is important.
- The assessment of cumulative impacts of different sectors on the eco-system, instead of single species, sectoral approaches, is critical.
- A comprehensive regulatory framework with explicit conservation standards, targets, and indicators, in order to facilitate responses to changes in the ecosystem, has to be developed and implemented.
- Transboundary arrangements for resolution and handling of transboundary ecosystems and issues is needed.

As to the "Conclusions," the project reviewed the practices countries had developed for ecosystem-based oceans management. A number of practices were found useful

86. Available at the Web site of the Sustainable Development Working Group: http://portal.sdwg.org/content.php?doc=75.

87. Tromsø Ministerial Declaration page 5, accessible at: http://arctic-council.org/filearchive/Tromsoe%20Declaration-1..pdf.

88. The wording of the Core Elements and the "Conclusions" is slightly modified from the original here, mainly for purposes of language.

by one or more countries, and the conclusions were offered along with observations relating to their effective implementation.

The "Conclusions" elaborate on issues such as the need for flexible application of effective ecosystem-based oceans management, stemming from the differences in circumstances and contexts that have to be taken into consideration, as ecosystem-based oceans management is context-sensitive. It is also noted that there is not only one single method for ecosystem-based management. A number of different practices and understandings of the concept appear to work. Furthermore, ecosystem-based management is a work in progress, and should be considered a process rather than an end state.

The "Conclusions" also address the need for integrated and science-based decision-making, the need for national commitment to effective oceans management, and the importance of adaptive management, area based approaches, and transboundary perspectives. Also participation in decision-making by Arctic residents is addressed.

6. Conclusions – challenges of implementation

Numerous international agreements commit states to the introduction of ecosystem-based oceans management. For example, the 2001 World Summit on Sustainable Development in its Johannesburg Joint Plan of Action specified 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 ... (and) ... Encourage the application by 2010 of the ecosystem approach..." (para 30, JPOI). Similar sentiments can be found in many international bodies, including the UN General Assembly in its annual oceans resolutions.[89]

This has been followed up upon by many countries, through developing and implementing plans for integrated oceans management, including ecosystem-based management. All Arctic countries either are or have undertaken work in this regard, and several have implemented or are in the process of implementing ecosystems-based oceans management in one form or another. The "Core elements" and "Conclusions" identified in the Best Practices in Ecosystems Based Oceans Management Project broadly reflect what is agreed in the literature on integrated oceans management and marine spatial planning. They resonate with the principles found in the agreed consensual elements from the 2006 UNICPOLOS

89. See for example, para 134 of the 2009 resolution A/RES/64/71. Available at: http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N09/466/09/PDF/N0946609.pdf?OpenElement.

referred to above,[90] as well as the 2005 scientific consensus on marine ecosystem-based management.[91]

In assessing the case of Norway with regard to these conclusions, a significant element is that the eastern half of the Barents Sea is under Russian jurisdiction, and therefore not part of the plan area. However, this situation is being addressed in scientific and technical co-operation, in the form of joint reports describing the status of the entire Barents Sea ecosystem.[92] As to the need to build management on scientific understandings, this is a critical aspect of the plan work. The plan area has been subject to extensive research surveys for many decades, and the scientific understanding of the region is well developed in an international perspective.[93]

The plan introduces integrated, area-based oceans management in Norway. Sector-based area management has long traditions, in particular in fisheries. The core of the plan is the assessment of cumulative impacts of various economic and natural pressures on the marine environment, thereby arriving at a "total load" or impact. This total load plus the identification of vulnerable areas, form the basis for arriving at marine spatial planning, in the sense of excluding certain activities in given areas for specific periods. Monitoring of selected indicators is also important. In this way the first of the two critical issues in ecosystem-based oceans management identified at the outset here, assessment of total load on the environment, is addressed. As to the second critical issue, that of establishing mechanisms for reconciling diverse interests, this is addressed both at the inter-ministerial level by the Steering Committee, as well as at the political level in the government. And the result of the government's decisions on trade-offs between concerns for the environment, fisheries, and petroleum development is approved by the Storting.

On this basis, three potential lessons for implementation can be noted:

First, an important aspect of the Norwegian experience is that conventional sector-based management is retained. While the management plan provides the framework for overall assessments and reconciliation of various concerns, the sector measures regulate activities within the sectors. The implementation of the

90. 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. At: http://daccessdds.un.org/doc/UNDOC/GEN/N06/432/90/PDF/N0643290.pdf?OpenElement.

91. McLeod, K.L., Lubchenco, J., Palumbi, S.R., Rosenberg, A.A. (2005): Scientific Consensus Statement on Marine Ecosystem-based Management. Available at: http://www.compassonline.org/pdf_files/EBM_Consensus_Statement_v12.pdf.

92. Arneberg, P., Korneev, O., Titov, O., Stiansen, J.E. (Eds.). Filin, A., Hansen, J.R., Høines, Å., Marasaev, S. (Co-eds.) (2009). Joint Norwegian-Russian environmental status, 2008 Report on the Barents Sea Ecosystem. Part I – Short version. IMR/PINRO Joint Report Series, 2009(2): 22. Institute of Marine Research, Bergen.

93. Sakshaug et al., 2009.

management plan is not only based on existing measures, but also critically dependent upon them. The system that has been developed is therefore perhaps most appropriately described as *pragmatic sector-based coordination*, rather than fully integrated management. Integrated management depends upon effective management of the activities within the economic sectors. Coordination and integration occurs at a level above the sectors, where the key aspect is that the total load upon ecosystems is considered, and the concerns of different sectors and needs are reconciled. The latter is essentially a political task, entailing the allocation of benefits and costs among sectors, and also between different constituencies and stakeholders.

Second, the actual measures in ecosystem-based oceans management require substantial scientific activity and regulatory development and reform. The costs of monitoring programs and assessment activities are substantial. This gives governments the central role in ecosystem-based oceans management. Only governments have the means to fund the substantial scientific programs required and the authority to devise and enforce regulation of human activity. This raises important questions about the organization of science relative to policy-making, and the need to ensure that the science is not influenced by non-scientific concerns.

Third, Norway is a small country with a compact, centralized decision-making system in oceans affairs. Arriving at decisions is therefore less complex than in larger countries with more distributed decision-making systems, as is the case for example with federal structures. The management plan has passed through the three phases of planning, implementation, and review. While political attention on the plan during the initial planning phase was modest, later developments have placed the issue firmly on the national political agenda. The political context of the work with the plan has changed from being relatively technical to highly political. Nevertheless, the scientific and technical work has been largely shielded from political pressures. The adoption of the plan in the form of a report to the Storting ensures that the plan has broad political legitimacy.

What then, about the prospects for integrated oceans management in the larger Arctic context? The Arctic oceans are generally clean and productive. Other oceans, like for example the North Sea or the Mediterranean, are much worse off in terms of environmental status and need for ecosystem-based oceans management. In terms of science, ecosystem-based oceans management is very demanding, and in remote and ice-covered areas this becomes extremely costly. A second limiting factor is that in countries with federal decision-making systems, authority to develop and implement plans is fragmented. This limits the capacity to actually implement ecosystem-based oceans management. Still another limiting factor, of a more psychological nature, is the idea that ecosystem-based oceans manage-

ment entails doing away with current regulatory arrangements and measures, and installing a completely new system. While intellectually appealing, this makes it difficult to gradually improve upon existing systems.

The literature on ecosystem-based oceans management and related concepts is impressive,[94] although much of it is rather theoretical and only superficially informed by practice. The real meaning and significance of concepts such as integrated oceans management and ecosystem-based oceans management, can only be assessed by examining implementation of the concept in practice in real marine ecosystems. More case studies are needed to properly understand the challenges involved in ecosystem-based oceans management and how they can be resolved.

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Альф Хокон Хёль / Alf Håkon Hoel

Одной из насущных тем в Арктике является введение принципов экосистемного менеджмента морских ресурсов. Норвегия является лидером в представлении подобного всеобъемлющего подхода к менеджменту морских ресурсов. Экосистемный подход строится на такой важной составляющей, как определение суммарного влияния различных источников на экосистемы, и существенное внимание уделяется процессу урегулирования разносторонних проблем. Экосистемный менеджмент морских ресурсов должен базироваться на существующих структурах и административных системах, и развивать их. В статье также анализируется деятельность Арктического совета, направленная на реализацию экосистемного подхода через проект «Лучшие практики экосистемного менеджмента морских ресурсов», в результате которого появился выпуск «Лучшие Выявленные Практики для экосистемного менеджмента морских ресурсов в контексте Арктики». В основу определения этих практик был положен опыт семи Арктических стран.

94. McLeod and Leslie, 2009; Curtin, R. and Prellezo, R. 2010; Halpern, B., Lester, S.E. and McLeod, K.L. (2010). Placing marine protected areas onto the ecosystem-based management seascape. PNAS. Vol 107, No. 43, pp. 18312-18317.