

NICOLÁS J. I. RODRÍGUEZ

Bilateral Approach to Ecosystem-Based Marine Management in the Barents Sea

ABSTRACT In 2006 the Government of Norway presented a marine management plan for the Norwegian part of the Barents Sea, and a Northern strategy was introduced as a supportive regional instrument. For the first time the method of ecosystem approach is applied in a Norwegian context as a principle in the Barents Sea plan. The main elements of the plan consist of ecosystem indicators, management goals and planning maps indicating biologically vulnerable areas where petroleum activity cannot be performed. An important question is the relation between the plan and existing management regimes in laws and through bilateral cooperation in the Barents Sea, in respect of both biological resources and non-renewable resource extraction. A general, political plan such as the Barents Sea plan must have some sort of consistency among already existing legal regimes, sector management and bilateral cooperation in order to succeed. If underlying regimes are not sustainable in their practice, neither can a general plan be. The article examines the basis for an implementation of an ecosystem approach comparing the bilateral management of Norway and Russia in the Barents Sea using the question of fishery resources in the region as a case.

KEYWORDS ecosystem approach, regional marine management, Barents Sea, bilateral collaboration Norway and the Russian Federation

Introduction

Ecosystem-based management has been used for the implementation of a plan for the Norwegian part of the Barents Sea (cf. St. meld. nr. 8 [2005–2006], Ch. 9; Olsen *et al.* 2007). The main aim of the plan, imple-

mented on 30 March 2006, is to resolve possible conflicts between the users of the Barents Sea, detect ecologically vulnerable areas and clear the ground for where industrial activities can be performed in the area without harming the biological resources. In addition the plan contains ecological quality objectives that are used to monitor and assess the status of the ecosystem. Currently a management plan has been implemented only for the Norwegian part of the Barents Sea (Fig. 1), but representatives of the Norwegian Government have several times seized the opportunity to express that their vision is a common management regime for the whole Barents Sea.



Fig. 1. The polygon shows the planning area (2006) for the Norwegian Barents Sea Plan with an approximate size of 1,400,000 square kilometres. The maritime border between the Russian Federation and Norway, which runs through the eastern part of the planning area, is based on the coordinates given in Article 1 (1) of the "Treaty between the Kingdom of Norway and the Russian Federation concerning Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean" (2010). The treaty is signed and not yet ratified. Data Sources: The Directorate for Nature Management (polygon data)/ Google Earth v5.x (satellite data).

Norway and the Russian Federation have two bilateral organisations that are important for resource management and environmental issues in the Barents Sea Region:

The Joint Russian-Norwegian Commission on Co-operation in the field of Environmental Protection has put the question of a common regime on ecosystem-based management for the Barents Sea on the agenda. The commission deals with a wide range of environmental issues, but I will limit the discussion to the Norwegian-Russian working group on the marine environment that was established in 2005.

The Joint Norwegian-Russian Fishery Commission is responsible to set total allowable catch (TAC) and quota distribution for the common fishery resources in the Barents Sea Region.

Since the World Summit on Sustainable Development in Rio 1992 there has been an increasing focus on an ecosystem approach, which since then has been embraced in policies, management and international legislation. In fisheries the management principle has been included in several declarations and agreements. The Food and Agriculture Organization of the United Nations (FAO) has been working on developing guidelines that should be considered as advice to the coastal nations (Garcia *et al.* 2003). They build further on the Reykjavik declaration from 2001 and the World Summit on Sustainable Development in Johannesburg in 2002 (Bianchi 2008). It is a study of the implementation of an ecosystem approach through the bilateral cooperation between Norway and the Russian Federation in the Barents Sea Region that is at the heart of this article.

Outline of the Study

In this article I am interested in the challenges of developing a bilateral regime based on an ecosystem approach for the Barents Sea. It is especially interesting to study how two nations who share a common resource pool can resolve the implementation of an ecosystem approach.

I have organized the study around three points in order to research how well implemented the ecosystem approach is in the Barents Sea Region. These three study points have been chosen since they will give a picture of the extent to which there is compliance with the concept of an ecosystem approach to resource management, and they can also serve to illustrate potential challenges to applying an ecosystem approach in practical management:

(1) A study of international agreements that have relevance for the management of large marine ecosystems that oblige the parties to consider a management system based on an ecosystem approach. Are the Russian Federation and Norway party to such agreements that oblige them to implement a management regime based on an ecosystem approach?

(2) A study of national law. Is the concept of ecosystem approach incorporated into national fishery legislation for the parties in question, which has relevance for the management of large marine ecosystem?

(3) A study of the content of bilateral cooperation that could enhance the implementation of ecosystem approach to the management of a large marine ecosystem. To what extent is an ecosystem approach a part of the bilateral cooperation and do the parties have the intention of collecting data in order to introduce a management system based on the ecosystem approach?

Ecosystem Approach and the Human Dimension

The idea of an ecosystem approach has its origin in the biological concept of *ecosystems*. The travel from a scientific principle to environmental policy, management principle and legislation has been a long one. In 1935 Alfred G. Tansley (1871–1955) first introduced the powerful concept of *ecosystem* in biological thinking in his article on “The use and abuse of vegetational concepts and terms” (Tansley 1935: 297–303). At this time the concept of *ecosystem* explicitly emphasized the living nature as a dynamic system of processes and relationships between organic and inorganic nature. Williams (1993: 26) clearly interprets Tansley as including humans and human activity as part of the ‘ecosystem’ concept, but a dominating idea in classical ecology has been the so-called “equilibrium paradigm” (Pickett & McDonnell 1993: 312) making the ecologist not deeply involved in the human dimension:

From an operational point of view, the classical paradigm implied that ecologists, seeking to understand how ecological systems were structured and functioned, should work in areas free of human disturbance.

There is consensus in the theory of ecosystem-based management to include the human dimension as part of the ecosystem, not aligning itself as an idea of studying nature apart from human influence: the ecosystem approach calls for public participation in the planning of nature resources and it includes humans as part of the ecosystem.

D. Scott Slocombe (1998) emphasizes that the ecosystem approach developed within different disciplines all the way back to the 1960s and “even earlier,” and it builds on but also constitutes an important supplement to ecology. R. Edward Grumbine (1994) traces the roots and origin of ecosystem management further back to the 1930s and 1940s, but it was not before the 1970s that it found widespread acceptance in resource planning. There

exists an important distinction between ecosystem approach and ecosystem-based management as concepts, which is acknowledged by authors that have written on the concept of ecosystem-based management (Grumbine 1994; Slocombe 1998; Hoel 2005: 43). While the ecosystem approach is a description of the entities in the ecosystem and the way they interact with each other and with the environment, the management regime is thus based on an understanding of these interactions in order to harvest in a sustainable manner, set goals, correct a disturbance or protect elements of the ecosystem (Slocombe 1998). It is possible to distinguish between the ecosystem approach applied as holistic management (horizontal dimension) and as sector management (vertical dimension) for example applied to fisheries (Hoel 2005: 43). In the research literature on ecosystem-based management the distinction is not sharp and often the concepts of ecosystem approach, integrated ocean management and ecosystem management are used in the sense of ecosystem-based management alone (Slocombe 1993). Anyhow, the development of a plan such as the Barents Sea Plan depends on successful strategies for an ecosystem approach to biological resources utilized by humans or which could be affected by human activity.

The Barents Sea Plan contains a broad assessment covering several sectors of human activity that affect the area in addition to assessments of the status of the ecosystem and identification of knowledge gaps regarding the ecosystem and possible consequences of human activity (Table 1). An adaptation of the ecosystem approach to management of large marine ecosystems can be viewed as paradigm changing the present state of the system from sector-by-sector management to an integrated sectoral approach to management (Sherman & Duda 1999). It is a strategy for integrated management that coordinates the effort across sectors (Bugge 2009: 38). This is partially true when it comes to the theory of ecosystem approach and its application, but we should not forget that institutions are not ecosystems but humans interacting through their actions with the ecosystem. A management regime that is not ecosystem-based has been described by Sherman & Duda (1999) as consisting of a focus on “single species, small spatial scale, short-term perspective, humans independent of ecosystems, management divorced from research and managing commodities,” but we will see in the next section that the shift of focus away from single species models is contested.

Ecosystem Approach to Fisheries

The ecosystem approach to fisheries can be viewed as a sector principle for how to manage the specific actions of fisheries and effects on the ecosystem.

Assessments	Year
Environmental description of the Barents Sea (5)	2002–2005
Transport at sea (4)	2003–2005
Fishery activity and aquaculture (3)	2002–2004
Petroleum activity (3)	2002–2005
Identification of vulnerable areas (3)	2003–2005
Pressures and impacts on the Barents Sea (2)	2004–2005
Identification of knowledge needs (1)	2005
Society and the Barents Sea (1)	2003

Table 1. An overview of the main fields where assessments have been performed in preparation of the Barents Sea Plan (2006). The numbers in brackets indicates the number of reports within each field. Data source: St. meld. nr. 8 (2005–2006), Appendix II.

Viewed as such, the ecosystem approach to fisheries can consist both of normative principles and of course also of didactic principles in the sense of conducting case studies of best practices (Bianchi *et al.* 2008: 5). It can be the foundation on developing both regimes in a political sense and as normative legislative regimes, but it is also an approach originating in ecology as a scientific viewpoint of researching, describing and searching for understanding relations between species, organisation of food webs, nutrient cycles, environmental change (acidification of the oceans [Monaco Declaration 2008; Orr *et al.* 2005]), climate change (Brierly & Kingsford 2009; IPCC 2007; Thackeray *et al.* 2010) and physical influences.

So how does an ecosystem approach to fisheries differ from today's way of managing fisheries? Some authors emphasize that this is not a new approach to research, but a new approach to management (Bianchi *et al.* 2008: 19). But without doubt it shifts the focus for fisheries ecology to being focused on the ecosystem context. This does not mean that single species studies in ecology or models based on single species are useless for management (Mace 2004; Sígurjónsson 2008)—it is the integration of these studies in an ecosystem context that matters and is meant by an ecosystem approach.

FAO defines the ecosystem approach as:

An ecosystem approach to fisheries strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries (Garcia *et al.* 2003: 6).

When approaching the concept of ecosystem approach to fisheries, several authors in the field wish to do away with misunderstandings about the con-

cept, and to make clear that there is no need for management to have a detailed and complete overview of every component of an ecosystem (Lotze 2004). In order to cope with the uncertainty, the precautionary approach becomes quite important in relation to the concept of ecosystem approach. I will deal with the connection between these two concepts later in this article.

The ecosystem approach to fisheries is about managing human actions and not about managing ecosystems as entities by themselves (Garcia *et al.* 2003: 6). But on the other hand, ecosystem research and understanding are a challenge to ecology and to increasing the knowledge of details in order to supply management with more knowledge. Traditionally fishery management has had a focus on the stock and how to predict the maximum sustainable yield from a population without creating havoc when harvesting from the fish stock—a shift towards an ecosystem perspective would mean considering the elements in relation to each other; Lotze (2004) expresses it like this:

(1) all the parts (species, habitats) are kept, (2) all parts are kept in a state (of abundance, diversity, complexity) that allows long-term persistence and resilience of populations, communities and ecosystems, and (3) high environmental quality is provided to ensure health and survival.

Several methods have been suggested in order to implement an ecosystem approach to fisheries; some of them are:

The use of biological indicators. Key elements in the food web are identified and time series are collected of the key elements. It has been suggested to create trophodynamic indicators (for example predation) that can measure the interaction between different levels of the food webs, and by this be able to say something about effects of fishing in the marine ecosystem (Cury *et al.* 2005). Other regimes of biological indicators collect several data on both the physical environment (pollution, nutrients etc.) and the biological environment. The indicators are used to assess and monitor the health and status of the ecosystem (Wisnes & Skjoldal 2008). The use of biological indicators is also typical of the assessment and monitoring methods implemented in the EU Water Framework Directive [2000/60/EC] and the EU Marine Strategy Framework Directive [2008/56/EC] (Skjoldal & Misund 2008).

The use of multi-species models (Andersen & Ursin 1977). These models are presented as an alternative to the traditional single-species models, but in order to study other aspects of the ecosystem than what is possible with a single-species model. They model dynamically the interaction between

several species in an ecosystem and try to predict the effects that they enact upon each other over time and changing conditions (Lindstrøm *et al.* 2009). The models are fitted to historical data and in addition they can be used to explore uncertainties and to run different scenarios (for example changing stock levels, different harvesting regimes and environmental change).

The use of single-species models in an ecosystem context. Some authors argue that single-species models should not be abandoned and that they function as a supplement to multi-species models (Lindstrøm *et al.* 2009). Single-species models should still be used since they are in “in the spirit of such an approach” (Mace 2004; Sigurjónsson 2008)—they only need to be developed with more discipline and under a more cautious fishing regime.

The Regional Context

The implementation of a management regime based on an ecosystem approach requires a geographical area and of course organisational bodies/states that have jurisdiction over the area. How do we define this geographical area? One proposal is the large marine ecosystem (LME) classification that divides the oceans of the earth into divisions of 64 ecosystems (Sherman & Hempel (eds.) 2009). The large marine ecosystem division is a network of ecoregions (Fig. 2). An ecoregion can generally be defined as a “major ecosystem, resulting from large-scale predictable patterns of solar radiation and moisture, which in turn affect the kinds of local ecosystems and animals and plants found there” (Bailey 1998).

The criteria for speaking about large marine ecosystems (LME) is that they are ocean regions of 200,000 square kilometres or larger. In addition no administrative or national boundaries have been used in identifying the LMEs, and here ecological and oceanographical parameters are used to construct and decide the size and extent of the ecoregion. ICES also gives advice based on ecoregions as an acknowledgment of an ecosystem approach (ICES 2010: 2).

The early stages of ocean law territorialisation ensured coastal nations jurisdiction in their adjacent waters. Newer trends in international legislation propagate a regional territorialisation that does not follow administrative jurisdictional boundaries, but where classification of ecosystems is the basis of creating ecoregions. The division between administrative jurisdictional boundaries and ecoregions is a challenge to modern marine management, when the right to exercise power cannot necessarily ensure holistic ecological considerations in an ecoregion. The Barents Sea is the largest of the Arctic Shelf seas and is defined as a large marine ecosystem, but only half of this LME is covered by a comprehensive management plan.

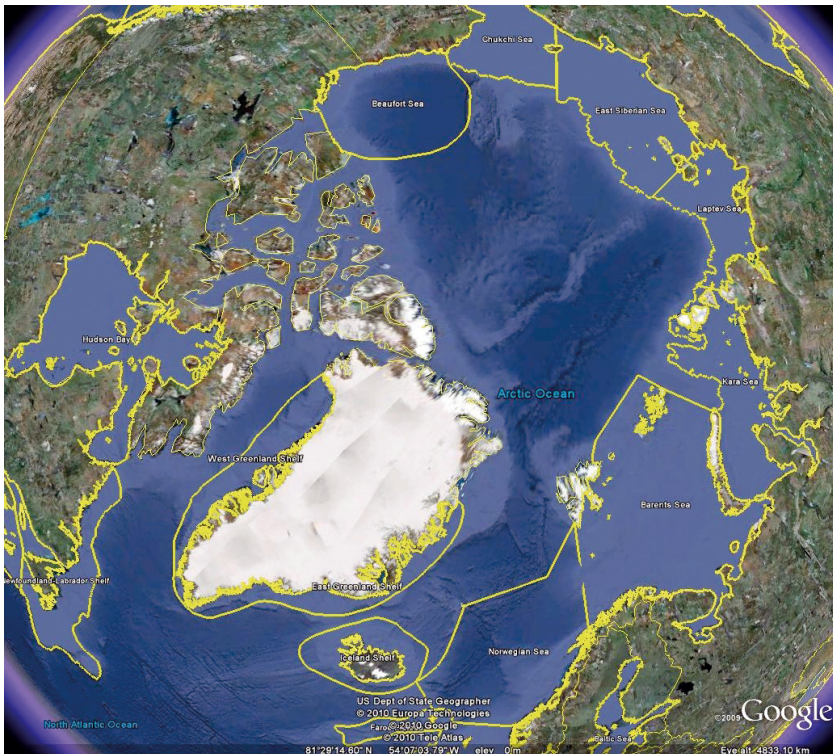


Fig. 2. Certain areas of the world's oceans have been divided into 64 large marine ecosystems (LME) (Sherman & Hempel 2009). The Barents Sea is one of the LMEs according to this division. Data Source: National Oceanic and Atmospheric Administration (LME data)/Google Earth 5.x (satellite data).

International Agreements. The Convention on Biological Diversity and the Ecosystem Approach

Norway and the Russian Federation are both parties to several international agreements that have a focus on both conservation of marine resources and encouraging the implementation of the ecosystem approach in biodiversity conservation. Of special interest in this case is the Convention on Biological Diversity, which asks the parties of the convention to apply the ecosystem approach. There are other international treaties that both Norway and Russia have joined that have a focus on conservation, for example the United Nations Convention on the Law of the Sea (UNCLOS), and implementation of the precautionary approach (UN Fish Stock Agreement under UNCLOS, FAO Code of Conduct and CBD) when managing resources (cf. Table 2).

Treaties/ Agreements/ Declarations	Norway	The Russian Federation
International Council for the Exploration of the Sea Convention 1964	Ratified 26.05.1965	Ratified USSR 28.10.1965/ The Russian Federation 15.01.1992
United Nations Convention on the Law of the Sea (UNCLOS) 1982	Ratified 24.06.1996	Ratified 12.03.1997
North East Atlantic Fisheries Commission (NEAFC) Convention 1982 with amendments in 2004 and 2006	Ratified 03.07.1981	Ratified USSR 23.04.1982/ The Russian Federation 15.01.1992
United Nations Biodiversity Convention (CBD) 1992	Ratified 09.07.1993	Ratified 05.04.1995
The Convention for the Protection of the marine Environment of the North-East Atlantic (OSPAR) 1992	Ratified 08.09.1995	Not a contracting party. Invited as observers.
The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas 1993 (FAO Conference Resolution 15/93)	Ratified 28.12.1994	Not a contracting party
United Nations Agreement on Straddling and Highly Migratory Fish Stocks 1995	Ratified 30.12.1996	Ratified 04.08.1997
Food and Agriculture Organization of the United Nations Code of Conduct for Responsible Fisheries 1995	Recommendation. Voluntarily to follow up the normative principles in national legislation or policies.	Recommendation. Voluntarily to follow up the normative principles in national legislation or policies.
Protocol between Norway and Iceland under the Agreement between Norway, Iceland and Russian concerning certain aspects of cooperation in the area of fisheries (loophole agreement) 1999	Agreement in force 15.07.1999	Agreement in force 15.07.1999
Reykjavik Declaration on Responsible Fisheries in the marine ecosystem 2001	Declared 18.10.2001	Declared 18.10.2001
Nort East Atlantic Fisheries Commission Agreement on Port State Control 2007	Agreement in force 01.05.2007	Agreement in force 01.05.2007
Cooperation through International Maritime Organization (IMO) on the ship transport route Vardø - Røst	Traffic Separation Scheme decided by IMO, in force 01.07.2007	Supportive of sea route
The Ilulissat Declaration 2008	Declared 28.05.2008	Declared 28.05.2008
Treaty on maritime delimitation and cooperation in the Barents Sea and the Arctic Ocean 2010	Signed 15.09.2010 (not yet ratified by the Norwegian Storting)	Signed 15.09.2010 (not yet ratified by the Duma of the Russian Federation)

Table 2. Treaties, agreements and declarations that are interesting in relation to the implementation of management regimes based on the ecosystem approach and the precautionary approach in the Barents Sea.

To decide when signed international treaties create legally binding obligations for the national state, one must go to national law. In Russian law Article 15 (4) of the Russian Constitution states:

Universally acknowledged principles and standards of international law and international treaties of the Russian Federation shall be part of its legal system. Should an international treaty of the Russian Federation establish rules other than those established by law, the rules of the international treaty shall be applied (Belyakov & Raymond 1993).

The Russian system is treated as an example of monism, which means a di-

rect incorporation of international law with the same status as national law when ratified. Legal scholars in Russia argue that treaties cannot be in contradiction to the constitution, and thus the formulation in Article 15 (1) and Article 125 (6) gives the constitution of the Russian federation precedence over international law in questions of conflict (Burnham *et al.* 2004: 26). In Norwegian law there is a requirement that treaties that Norway is party to and has ratified has to be incorporated into national law and undergo treatment in the National Assembly as Norwegian law—such a procedure without direct implementation of international law as national law is defined as dualism.

The ecosystem approach has existed and been developed in different fields within resource management, but first occurred in a legal context with the introduction of the Convention on Biological Diversity (CBD), which entered into force in 1993 for the parties who signed the convention on the Earth Summit in Rio 1992 (UNEP 2004). Both Norway and the Russian Federation are parties to the Convention on Biological Diversity (Table 2). An important principle for implementation of the goals of the Convention on Biological Diversity is the ecosystem approach. The concept is not mentioned in the convention itself, but belongs to the so-called *Malawi-principles* that were introduced as a strategy for implementation of the three main objectives of the convention (cf. Art. 1). The Malawi-principles were introduced at the fifth meeting of parties (COP5) in 2000 and the definition of Ecosystem Approach states:

[It] is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems (COP5 2000).

A study performed by Jørgensen and Hønneland (2006) of four environmental agreements suggests a weak follow-up of the Convention on Biological Diversity in the Russian Federation. They describe that the environmental Non-Governmental Organisations (NGOs) and the Government had a good relation in the early 1990s, but that the dissolution of the State Committee for Environmental Protection in 2000 was a major blow to the work on environmental legislation and policy in the Russian Federation. On the other hand the Russian Federation is accredited for having large protection reserves and also a Red List of threatened species in existence independent of the CBD.

According to Article 5 of the Convention on Biological Diversity the parties are encouraged to cooperate in the circumstances of shared resources and the question of biological diversity. The convention can also be applied to the marine area (cf. Article 4). This could be viewed as a supportive means and incentive for both Norway and the Russian Federation to implement the ecosystem approach to their shared resources in cooperation in order to reach the objectives of the convention.

The Connection Between the Ecosystem Approach and the Precautionary Approach

The Convention on Biological Diversity also incorporates the precautionary approach (cf. the Preamble). I wish in this section to discuss the connection between the strategy for the ecosystem approach and the precautionary approach. The connection is important because we are faced with uncertainty when we want to make management decisions regarding marine ecosystems, and thus we need a mechanism to handle uncertainty. In international agreements the precautionary principle serves as a mechanism to handle uncertainty and avoid potential harmful actions. In the Rio Declaration (1992: Art. 15) a general precautionary principle was formulated:

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

There is a distinction between the concept of precautionary principle formulated in the Rio Declaration above and the concept of *precautionary approach*. The first concept was seen as signifying the nature of pollution substances during the FAO conference leading toward the FAO Code of Conduct for Responsible Fisheries (1995), where Norway and the Russian Federation were among the nations who were critical towards implementing a precautionary principle to fisheries management (Hønneland 2004: 11). Nevertheless a more modified concept of *precautionary approach* was applied to the FAO Code of Conduct for Responsible Fisheries and the UN Fish Stock Agreement. Later the FAO Code of Conduct for Responsible Fisheries was also supplied with normative principles for implementing an ecosystem approach and a FAO Compliance Agreement. The FAO Code of Conduct is a voluntary agreement, while the FAO Compliance Agree-

ment is legally binding and a part of the FAO Code of Conduct (Henriksen *et al.* 2006: 6).

In addition to the Convention on Biological Diversity, the precautionary approach is also a part of the FAO Code of Conduct (a voluntary party document) and the UN Fish Stock Agreement (a legally binding document for fish stocks of the high seas and in the coastal state jurisdiction).

The origin of the concept of *precautionary approach* can be traced to the *Vorsorgeprinzip* (German *Vorsorge*, 'precaution, foresight') (Bugge 1999: 77; Hønneland 2004: 8), which was developed during the 1970s in German environmental law, and later was first transferred and applied to international law for prevention of ocean pollution. Later the principle has found its way into the national legislation of different countries and as an important principle implemented in international law.

In addition both the concept of *precautionary approach* and that of *ecosystem approach* can be said to qualify as soft law (Kroepelien 2007), but the concept and principle of *ecosystem approach* and *precautionary approach* can both be said to be in the process of being incorporated as more than 'soft law' concepts in Norwegian management legislation. In the Norwegian Marine Resources Act (MRA 2009: §7) the concepts are brought together as a guiding principle for the management regime of ocean resources (in effect 1 January 2009, see MRA 2009: § 7). The same is the case with the Norwegian Nature Diversity Act (NDA), which also covers territorial waters (12 nautical miles) of the ocean area (in effect 1 July 2009, see NDA 2009: § 9). The concept of *ecosystem approach* functions as a guideline for management decisions in natural resource management.

ICES has recognized the concept of *ecosystem approach* (ICES 2002; ICES 2004), and that it can be developed to be part of their advice regarding fishery management and as a basis for the science of marine spatial planning. Unlike the precautionary approach, which is included in their model predictions as a factor, the role of the ecosystem approach has been formulated as something that the organization will introduce stepwise and defined as:

A holistic management of human activities based on knowledge about the ecosystem functions in order to achieve a sustainable use of goods and services from the system, and maintain their functions.

According to the 1995 FAO Code of Conduct for Responsible Fisheries, the precautionary approach should be applied in situations where

the absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target spe-

cies, associated or dependent species and non-target species and their environment (cf. Section 6.5 in the FAO Code of Conduct for Responsible Fisheries 1995).

Viewed in this manner the precautionary approach becomes an important part of an ecosystem approach ensuring a mechanism for handling uncertainty. Currently ICES is working on developing a framework for Maximum Sustainable Yield (MSY) to be implemented in quota advice, which will replace the precautionary approach by 2015. It is argued that MSY is consistent with a precautionary approach, but that MSY will lead to better results in stock management than the latter alone (ICES 2010: 8).

The Ocean Resource and Environmental Cooperation

In the dawn before the establishment of exclusive economic zones or economic zones (1976–1977), quota allocations and fishery protection zones (1958–1978), the basis of a marine scientific cooperation between Norway and the Union of Soviet Socialist Republics (USSR) arose during the 1950s. The cooperation was introduced in the aftermath of a controversy regarding the reason for the fluctuating fish stocks of the Barents Sea, and especially the fluctuating stocks of North-East Arctic cod (*Gadhus morhua*) (see Fig. 3) and Norwegian spring spawning herring (*Clupea harengus*) (Røttingen *et al.* 2007). In 1957 official cooperation on marine scientific exploration of the sea was introduced in spite of both nations already being members of the International Council for the Exploration of the Sea (ICES), but the organization was not at that time involved in direct management issues and therefore there was a need for closer cooperation. In 1960 treaties between Norway and the USSR were signed on fishery zones along the two nations' coasts that neither of the parties was allowed to enter, but later a new treaty was negotiated and signed on 15 March 1962 concerning the right for USSR vessels to fish in the six to twelve mile limit off the Norwegian coast in exchange for Norwegian vessels to fish in the territory of the USSR (Moon 1964). The will to create treaties and negotiations on the issue of fishery illustrates the importance of the biological resources of the Barents Sea.

Further in 1974 Norway and the USSR agreed on establishing a Joint Norwegian-Russian Fishery Commission. The formal cooperation was established as a supplement to the international management efforts taking place at that time within the North East Atlantic Fisheries Commission (NEAFC) (Hønneland 2007a: 8) and the commission has held yearly meet-

ings since 1976. North-East Arctic cod, haddock (*Melanogrammus aeglefinus*), capelin (*Mallotus villosus*) and red king crab (*Paralithodes camtschaticus*) (until the year 2008) stock of the Barents Sea have been managed in cooperation (Fig. 4). The parties have agreed on a division rule 50:50 for cod and haddock, the capelin divided according to a rule of 60:40 in favour of Norway (Hønneland 1998) and 50:50 for the red king crab in the years 1994–2001 (limited research harvest). In the 29th session the parties agreed on commercial harvesting of the red king crab from the autumn of 2002 (St. meld. nr. 40 2006–2007: 15).

The total allowable catch (TAC) has since 1959 been set by ICES for the Northern Waters (Eikeland & Riabova 2002). Norway and the Russian Federation are not bound to follow the advice and they can decide otherwise in their negotiations. ICES introduced the precautionary approach in their advice from 1999, and this also represented a regime change for the Joint Norwegian-Russian Fishery Commission (Protocol of the 27th session 1998: section 5.1).

I will discuss two examples of the specific co-management of species in the Joint Norwegian-Russian Fishery Commission with importance for an ecosystem approach and the use of the precautionary approach.

1. The case of the cod fisheries

Disagreement has especially centred on the most important commercial fish stock of the Barents Sea: North-East Arctic cod (Hønneland 2007b). In general the cooperation between the Russian Federation and Norway has been a success story (see Fig. 3), but during the 1990s there was disagreement about discrepancies between scientific recommendations and established quotas (Hønneland 2007b). A relatively stable level has existed for the TAC for the North-East Arctic cod seen as an average, but there have been variations in the TAC from 160,000 tons in 1990 to 850,000 tons in 1997 (Eikeland & Riabova 2002) for North-East Arctic cod, and since the 1960s Norway has also claimed that the Russians have been overfishing in the Barents Sea (see Table 3). These claims have been documented through a series of reports (Fig. 3 and Table 3) from the Norwegian Directorate of Fisheries (Status reports for 2002–2008).

Table 3 gives an overview of the estimates covering the years 2002 to 2008 on the estimated rate of overfishing according to the agreed quotas between Norway and Russia. For the year 2004 the Directorate of Fisheries calculated overfishing of cod to be in the range 80,000 tons to 107,000 tons (Status report for 2004: 10). This trend showed a small decrease from the estimated overfishing in 2003. Further in 2005 the estimations showed a new breach of agreed quota for cod in the order of 101,300 tons (Status

Year	Agreed TAC	Russian Quota	Norwegian Quota	Approximation	Overfishing – NOR	Overfishing – RUS	"Overbooking"
2002	395000	183550	155550	70000 - 100000 (68%)	90000	21716	
2003	395000	183550	155550	60000 - 115000 (51%)	115000	27748	
2004	486000	212600	204600	80000 - 107000 (46%)	117000	30000	
2005	485000	213700	204700	101000 (69%)	166000	41000	
2006	471000	207700	198700	117000 (62%)	127000	28000	
2007	367000	187500	179500	40000 (75%)	41087	8757	13000
2008	408000	179650	170650	15000 (84%)	15000	0	7000
2009	507000	222100	213100	0	0	0	0

Table 3. Estimates on overfishing 2002–2009 of North-East Arctic cod in the Barents Sea. The column "Approximation" gives the yearly estimates presented by the Norwegian Directorate of Fisheries on Russian overfishing. The Russian Federation and Norway have presented different estimates for ICES on Russian overfishing in the Barents Sea. Overfishing has been a high priority issue in the Joint Norwegian–Russian Fishery Commission in the last few years. Both parties agree that bilateral cooperation and the NEAFC agreement on port state control 2007 have been successful in reducing the problem of overfishing in the Barents Sea (estimates by Norway and the Russian Federation given as "Overfishing–NOR" and "Overfishing–RUS"). The column "Overbooking" represents Norwegian overfishing of cod in the Barents Sea for the years 2007 and 2008. The "overbooking" situation was due to how quota allocation was practised, and the incident of 2007 and 2008 was openly communicated to the Joint Norwegian–Russian Fishery Commission. In 2009 no overfishing was detected. Data sources: Reports from the Norwegian Directorate of Fisheries 2002–2008 (Status for 2002 [2003]–2008 [2009]; Protocol of the 37th session (2008); Protocol of the 38th session (2009) of the Joint Russian–Norwegian Fisheries Commission; ICES (2008).

report for 2005: 13), and the year 2006 an overfished weight of 77,300 tons of cod (Status report for 2006: 8). The numbers show a further decrease towards 2008, which has been attributed to the success of the port control and cooperation between authorities in the Russian Federation and Norway.

The cod quota is shared 50:50 between the Russian Federation and Norway after about 15 per cent is given away to third countries. The third countries are EU countries, Iceland and the Faroese Islands (Hoel 2005: 38).

A new management rule for the North-East Arctic cod was applied at the 32nd and 33rd meetings of the Joint Norwegian–Russian Fishery Commission. This new harvesting rule is based on the precautionary approach with a forecast for three years for the cod stock and the variation should not be more than ± 10 per cent from year to year (Protocol of the 32nd session 2003; Protocol of the 33rd session 2004). This rule is also known as the management plan for North-East Arctic cod. A similar harvesting regime based on the precautionary approach was also applied to the other stocks under the commission. However, at the 37th session in 2008 the commission did not apply the precautionary harvest rule because the North-East Arctic cod stock was estimated to be in quite a good shape, but it was underlined that the precautionary harvest rule would be considered when setting TACs in the future (Protocol of the 37th Session 2008: 3). The TAC was set at a total of 525,000 tons for North-East Arctic cod in 2009.

NORTHEAST ARCTIC COD

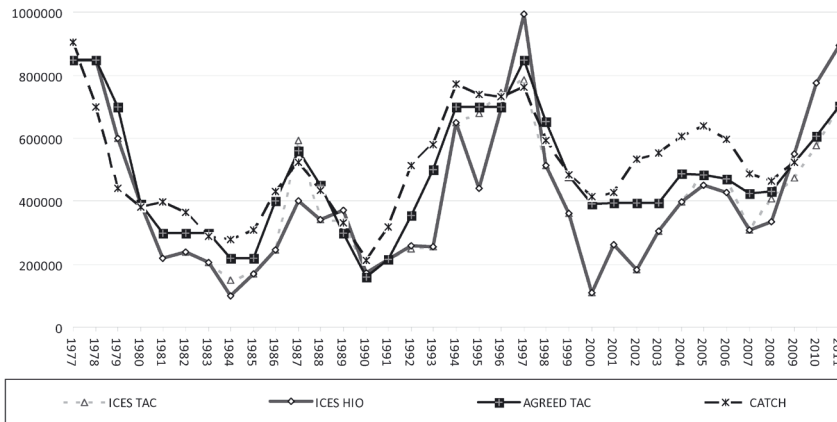


Fig. 3. Statistics for the catch of North-East Arctic cod in the Barents Sea 1977–2011 (Y-axis: tonnes; X-axis: years). The International Council for the Exploration of the Sea (ICES) was established in Copenhagen in 1902 and is an international organisation for scientific investigations of the marine ecosystem. The first meetings that led to the formation of ICES was held in Stockholm (1899) and Christiania (1901) respectively. The figure includes both recommendations (ICES TAC), highest catch option that gives an increase in spawning stock biomass (ICES HIO), agreed quotas between Norway and the Russian Federation in the Joint Norwegian–Russian Fisheries Commission (AGREED TAC) and actual catch in total (CATCH). The ICES TAC is a primary recommendation given as best scientific advice to the Joint Norwegian–Russian Fishery Commission. The advice is not legally binding. Data sources: Hønneland 2007a and reports from ICES regarding stock advice for the North-East Arctic cod (ICES 1976–2010).

2. The case of red king crab

The Barents Sea has been exposed to two invasive crab species; the best known of them is the Kamchatka king crab also known as red king crab (*Paralithodes camtschaticus*), that was intentionally introduced to the ecosystem by Russian scientists between 1961 and 1969 (Orlov & Ivanov 1978). The other species is the snowcrab (*Chionoecetes opilio*), which is assumed to have been introduced by release of ballast water from a ship/ships, but other explanations are possible. In research performed by PINRO the species' core area has been located to the Goose Bank, and in a conference paper for ICES S. A. Kuzmin (2000: 6) stated that the species is able to form a significant commercial stock and that it does not represent a threat with regard to competition for resources with the red king crab.

Norway and Russia have since 1994 managed the king crab population together through the Joint Fisheries Commission. At the meeting of the Joint Norwegian–Russian Fisheries Commission in 2007 the parties agreed not to manage the stock of red king crab (*Paralithodes camtschaticus*) in co-operation (see Fig. 4), but instead have separate management regimes for the species (Protocol of the 36th session 2007, Section 9: 6–7).

RED KING CRAB QUOTA ALLOCATION

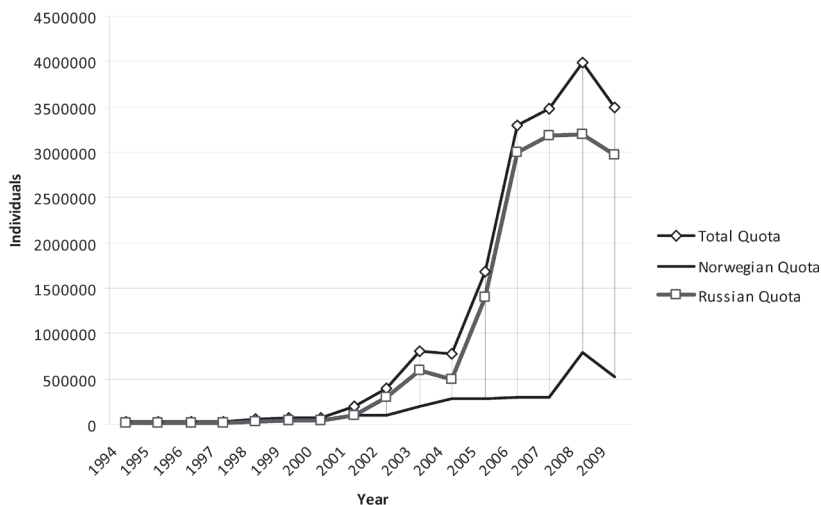


Fig. 4. Statistics for the total amount of allowable catch for the red king crab stock in the Barents Sea 1994–2009. Data Source: Ministry of Fisheries and Coastal Affairs and Protocols from the Joint Norwegian-Russian Fisheries Commission 1994–2009.

A hypothesis that has also been introduced about the possible harm that the species could cause to the endemic species, is that it could possibly be linked to the transfer of *Trypanosoma murmanensis*, which is a protozoan that act as a blood parasite in fish (Hemmingsen *et al.* 2005). The parasite *T. murmanensis* is transferred to marine fish by the leech *Johanssonia arctica*. A favourite substrate where the leech puts its eggs is the carapace of the king crab. Measurements of the Varangerfjord-area by Hemmingsen *et al.* (2005) suggest a link between high rates of *T. murmanensis* in the blood of marine fish and the presence of king crab. Another fear is how the crab might possibly affect the ecosystem in other manners, such as predation and competition with endemic species (Oug *et al.* 2010).

The red king crab is a challenge to a management regime based on the ecosystem approach. What policies to implement against invasive species? Here the contradictory response has been to manage the red king crab as a commercial stock instead of as an invasive species through the Joint Norwegian-Russian Fishery Commission. In the Norwegian management regime the red king crab is treated as an invasive species west of 26° E (free catch area) and as a commercial species east of 26° E (quota regulated). In February 2009 the Norwegian Ministry of Fisheries and Coastal Affairs (MFCA 2009a) reported that it feared a negative influence of the free catch area on the quota regulated area, and decided to reduce the TAC by 200,000

individuals. In contrast, in October 2009 the ministry (MFCA 2009b) gave 5 million NOK to rent vessels in order to conduct increased fishing for red king crab west of 26° E and deplete the presence further here as part of the five-year management plan for red king crab (St. meld. nr. 40 2006–2007).

The Specific Fishery Management Regimes of Norway and the Russian Federation

I will here focus on the current status of the Norwegian and Russian fishery regime established for the Barents Sea at the national level pertaining to the fishery legislation. Understanding of the current established regimes is important in order to assess the possibility of cooperative management of the Barents Sea implementing the principle of ecosystem-based management. The Russian part of the Barents Sea is a part of the Northern Fishery Basin, which constitutes the second most important fishery region in Russia (Hønneland 2004: 4). The fishery regions in Russia are connected to certain administrative regions and not to specific sea areas, for example the Northern Fishery Basin consists of the federal subjects of Murmansk, Arkhangelsk Oblasts, the Republic of Karelia and the Nenets autonomous okrug (Hønneland 2004: 4). Characteristic of the development in the post-Soviet area are rapid changes in the structure of the fisheries management and the power struggle for control between the regional and federal level.

An observation of the Russian legal system is that many of the resolutions, decisions and decrees issued are not enforced at all. This makes Hønneland (2005a) conclude and characterize the legislative work done as “inertia at the higher levels of the governing hierarchy and a flood of legal documents at its lower levels.”

Today the fisheries are under control of the State Committee for Fisheries, despite the power conflict between the regional and federal level for control of the fisheries industry (Hønneland 2005b: 60). The State Committee for Fisheries also has the administrative responsibility for research and regulation. The Federal Border Service, which is now a unit of the Federal Security Bureau, is responsible for border control and enforcement.

The preparatory work on the Russian fisheries law was started early in the 1990s by the Federal Parliament and after several rejections the State Duma approved the law on 19 July 2000 (Hønneland 2005a). After this there followed several rejections in the further document treatment of the law; it was first rejected by the Federal Council because of a dispute among regional leaders, and later on it was rejected by the President of the Russian Federation, and finally there was a new rejection by the State Duma of the revised draft in 2001 (Hønneland 2005a). The main disagreement con-

cerned the distribution of power between the regional and federal level in the management of biological resources, and another characteristic is continuous reorganizations of the bureaucracy regarding fisheries management (Hønneland & Jørgensen 2006: 96). Finally a law on fisheries and conservation of aquatic biological resources was adopted on 20 December 2004 (cf. Federal Law No. 166-FZ). In the above-mentioned Fishery Act from 2004 there are no remnants of concepts like *precautionary approach* or *ecosystem approach*, but instead one finds wordings in article 1 (7) such as preservation of biological resources:

meaning maintenance of aquatic biological resources or restoration thereof to a level that ensures the maximum sustainable procurement (catch) of aquatic biological resources as well as the biological diversity thereof by means of using scientific data to implement measures for study, preservation, reproduction, rational use of aquatic biological resources and preservation of the habitat thereof (Korolev & Sigurdarson 2005: 17).

The wording can be interpreted as being in consistency with an ecosystem-based management.

In the research literature Geir Hønneland (2004: 5) has investigated the following question regarding the Russian fisheries: "To what extent Russian fisheries management practice since the early 1990s qualifies as precautionary." He concludes that there are few traces of the precautionary approach in Russian national legislation and that the concept is absent from Russian legislation at the federal and regional level, but that Russia has agreed to the concept by being part of international agreements and international cooperation forums that emphasize this approach (Hønneland 2004: 167–168).

Discussion

What needs to be done in order to implement an ecosystem approach in the Barents Sea? I set out to discuss the possibility to implement the ecosystem approach as a regime of management for the fisheries in the Barents Sea on the basis of bilateral cooperation.

Even if Article 15 (4) in the constitution of the Russian Federation opens up for a direct incorporation of the foundations of the Convention on Biological Diversity in Russian law, the treaty's goals are not currently prioritized by the Government of the Russian Federation (Jørgensen & Hønneland 2006). On the other hand, the Russians actively discuss the policies on both the ecosystem approach and the precautionary approach through the meetings in the Joint Norwegian-Russian Fishery Commission

and the Joint Russian-Norwegian Commission on Co-operation in the Field of Environmental Protection.

Even if the precautionary approach and the ecosystem approach are not actively used explicitly in the Federal law on fishing and preservation of aquatic biological resources, the law explicitly mentions that it is going to base the management regime on scientific advice (cf. Article 2). In Article 4 of the Federal law on fishing and preservation of aquatic biological resources there is also an opening for international law to prevail above the federal law:

If international treaties of the Russian Federation on fishing and preservation of aquatic biological resources have established rules that differ from the ones available in the legislation on aquatic biological resources the rules of these international treaties shall prevail.

The wording of the new law from 2004 is open and for the regime based on bilateral cooperation in the Barents Sea this indirectly opens for a regime that can develop on the basis of a precautionary approach and ecosystem approach, but it is a basis that is possible to change as long as the principle is not directly codified in law.

The example of cod being harvested several hundred tons over the TAC in the period 2002–2006 undermines the use of all biological predictive models and efforts by the authorities to create a sustainable harvest regime. Important in this context is the NEAFC agreement of 1 May 2007 on harbour control of fish landings. This regime is expected to keep a better control of fish landings and control the levels of fish being harvested. Statistics presented at the 37th session of the Joint Norwegian-Russian Fishery Commission indicated a further reduction in illegal overfishing in 2007 (Protocol of the 37th session 2008: see section 5.1). The two last years have also shown a further reduction in overfishing (Table 3). According to a report from V. K. Zilanov (2005), a long time member of the Joint Norwegian-Russian Fishery Commission, the solution should be to:

1. establish a joint Russian-Norwegian fisheries monitoring and control centre for the whole Barents Sea and give this centre necessary authorities to carry out joint Russian-Norwegian control over fishing activities at sea and in ports as well as the rights to close and open areas and stop fishing when the TAC level is reached; 2. harmonise legislation of both countries in the field of fisheries management, control and enforcement in the Barents Sea.

Even if the Norwegian government has put emphasis on the Barents Sea, the Russian Federation has management responsibility for several great sea areas. According to an interview (Seljeseth 2008) with Minister of Fisheries Andrey Krainiy, a prioritized area for the Russian Federation is the Far East Fisheries and the Caspian Sea:

Det ville jo være trist hvis vi skal bli husket som den generasjonen som utryddet støren. I Iran har de dødsstraff ved henging for ulovlig størfiske. Jeg sier ikke at vi skal innføre det samme her, men jeg ser at det virker.

[‘It will be sad if we are remembered as the generation that eradicated the sturgeon [Huso huso]. In Iran they have the death penalty by hanging for illegal sturgeon fishing. I don’t say that we will introduce such measures, but I see that this actually works.’]

It is the unregulated fisheries in the Far East Fisheries and the Caspian Sea that will be prioritized. In the same interview, published in *Nordlys* on 25 January 2008, Krainiy states that the major dispute in the Barents Sea is the fisheries protection zone around Svalbard: “Det at Norge valgte å utvide sonen rundt Svalbard fra 3 til 200 nautiske mil er noe vi aldri har godtatt og ikke vil godta” [‘We have never accepted and will never accept that Norway chose to extend the zone around Svalbard from 3 to 200 nautical miles’] (Seljeseth 2008). During the spring of 2008 it was expected that the Russian Federation would issue 27 new regulations in the field pertaining to fisheries in a major clean-up of the Russian fisheries. Among regulations that have been introduced is that all fish caught in the Russian economic zone should be delivered to Russian ports (cf. Federal Law No. 333-FZ). An important step forward is the agreement on a borderline between the Russian Federation and Norway in the Barents Sea and in the Polar Sea announced on 27 April 2010. The agreement was signed in Murmansk on 15 September 2010, but is still awaiting a formal ratification by the Russian Duma and the Norwegian Storting before it can be concluded that 40 years of negotiations have ended. Article 4 (3) in the new treaty states that Norway and the Russian Federation shall to a wide extent apply the precautionary approach in questions of common fishery resources (TNR 2010). In article 4 (2) close cooperation in issues of shared fishery resources is emphasised.

The Norwegian Government states in its strategy document for the northern area: “The Government emphasizes that Norwegian policy towards Russia should be pragmatic, based on interests and a focus on cooperation” (Regjeringens nordområdestrategi 2006: 9). The strongest link at the moment to a possible ecosystem approach to the Barents Sea fisheries is

present in the scientific cooperation and the bilateral cooperation between Norway and the Russian Federation. Since 2005 a more formal focus has been emphasised on the ocean environment through the ocean environment group as a subgroup under the commission. As noted by researchers at the Fridtjof Nansen Institute, this has given the commission a more specific and detailed working area than the more widespread agenda that existed previously (Rowe *et al.* 2007: 14). At the Joint Russian-Norwegian Commission on Co-operation in the field of Environmental Protection meeting in Molde, 20 November 2007, the parties agreed on making a joint report on the environmental status and biological resources of the Barents Sea (Protocol from the 13th meeting 2007, HAV-1: 1). The two bilateral commissions have been in support of making a joint ecosystem assessment for the whole Barents Sea (Quillfeldt (ed.) 2008: 91). The proposed data collection will be one step further in support of introducing an ecosystem approach to the whole Barents Sea region. In 2009 a historical joint Norwegian Russian report (Stiansen *et al.* (eds.) 2009) was published on the state of the Barents Sea ecosystem. In the press release from the Norwegian Ministry of Environment it was claimed that this was viewed by Russian authorities to be a first step towards a management plan for the Russian part of the Barents Sea.

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