ACCESS
Arctic Climate Change
Economy and Society

Project no. 265863

ACCESS

Arctic Climate Change, Economy and Society

Instrument: Collaborative Project

Thematic Priority: Ocean.2010-1 "Quantification of climate change impacts on economic sectors in the Arctic"

D3.42 – International and national fishery management, adaptation practices and strategies to climate-related changes in fisheries

Due date of deliverable: **28/02/2015**

Actual submission date: **27/05/2015**

Start date of project: **March 1st, 2011** Duration: **48 months**

Organisation name of lead contractor for this deliverable: **UoL**

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Contents

Legal regulations and management regimes in Arctic fisheries

Anna Stammler-Gossmann, Arctic Centre, University of Lapland

Introduction

Fish move freely from the egg stage to the time when they are caught – drifting as larvae, joining the adult stock, and migrating to the feeding and mating grounds. Many species of fish migrate distances over of hundreds or even thousands of miles. In some cases the fish relocation may occur very fast and sudden. Experts' observations reveal that for example mackerel can move up to 100 miles a day during the summer feeding period in Norwegian Sea when following zooplankton (Marine Informatics database).

Fish migrate between spawning and feeding grounds in regular cycles. Their movements are influenced by different factors including ocean temperatures and the availability of food. Occurring and potential changes in fish distribution and abundance have become a common catchword, representing changing sea water physicality associated with climate change.

Fish also move not knowing any borders across national boundaries. This movement is defined in legal and scientific terms as such: migratory species move across regions; trans-boundary stocks move across national jurisdictions; and straddling stocks are those occurring both on the high seas and in national zones (UNCLOS 1982, Annex 1and article 63(2); Maguire et al 2006: 5; Stokke 2010: 209). Most of the economically important stocks move between the zones of two or more states.

Fish are not only 'natural' elements of the marine ecosystem, fish take multiple social forms: fish feed, are used in husbandry of marine species and animals, availability of fish keeps coastal economies viable, shortage of fish may directly threatens society. Fish are a powerful resource, create values, both economic and moral, have imagination powers, signify national and local identities, and might become a matter of tension. This not just a purely ecological significance of fish and their all-encompassing meaning become more imperative in the management of living marine resources.

Warmer Arctic waters facilitate already the northwards extension of fish stocks such as capelin, mackerel and cod (Sadovy de Mitcheson 2009; Hoel 2014, Marine Informatics data base). Intensified fishing activities of fleets following the fish bring new aspects on the resource governance and management agenda. It is also anticipated that some fish stocks may expand their distribution range and straddle national exclusive economic zones (EEZs) (Jeffers 2010; Molenaar 2012; Molenaar 2012; Hoel 2014; Wegge 2015). The latter has brought speculations that, should the Arctic high sea areas be ice-free for extended periods, commercial fisheries could emerge beyond the jurisdiction of the coastal states (Hoel

2014:58-59; Wegge 2015), where marine capture fisheries have not taken place yet (Molenaar 2012: 63).

An increased attention, observed since the mid-2000s, to the conflict potential of the Arctic (Østerud and Hønneland 2014) is related to its resources. Although the offshore hydrocarbons are the main point of departure in climate change-resources-accessibility debates, fish resources are also placing increased pressure on this agenda, turning the fish to a 'bio-political' fact. Geographical expansion of important commercial species has impact on many of the contemporary issues in the fisheries regulatory frameworks that include both ecological and social components. It may range from protection of biodiversity, defining sustainability indicators for marine environment and for coastal societies to reconsidering maritime boundaries. Therefore, the term management, which carries implications of domination of nature, can be updated, as pointed by Berkes, to highlight governance, social relationships, and adaptation (Berkes 2009: 57).

Studies of the last years demonstrate a growing academic interest particularly among legal and political scientists to the question how climate change will alter fisheries governance and management (see Mcllgorm et al 2010). However, this matter, particularly in the specific Northern context is a developing research field addressed by some studies, though perhaps less than one would be expected (Jeffers 2010, Molenaar 2014). There are studies on international legal and management frameworks, institutional regulatory system of the Arctic fisheries focusing on the potential future fisheries in the area beyond national jurisdiction (Hoel 2014, Molenaar 2014, Wegge 2015) and management framework (Molenaar 2014), but very few involving social components of management in a broader conceptual (Berkes 2009) or in a regional context (Hønneland 2014)

As far as many uncertainties and shortcomings are involved in fisheries management and regulations, zooming in on setting their current objectives, generated values and discourses can bring more understanding about the societal scale of impact of environmental changes and pave the way for appropriate adaptive practices.

In this paper, already on-going changes in fish distribution provide the background for the assessing sensitivities of existing management regimes and interactions between Arctic countries to ecological and socioeconomic alterations. It refers specifically to key commercial species that indicate distinct changes in their recent distribution and abundance patterns. The paper looks at specific ecological pressures in the European part of the Arctic Ocean and analyses affiliated national discourses towards the question on how to deal with

these changes. It evaluates how international and bilateral regimes respond to ongoing and potential changes in the marine environment and what kind of management mechanisms already exist or are under discussion.

This report is based on the results of anthropological fieldwork in the communities of Northern Norway, Iceland and Northwest Russia. Case studies are structured around changes in fish distribution that can be defined according to spatial scale as straddling or highly migratory species. It provides a snapshot of current social and legal concerns in fisheries related to the new range of fish distribution.

The underlying material for the analysis presented here comes from a variety of sources, ranging from participant observations, semi-structured interviews with fishers, policy makers, official representatives of the Arctic states, scientists and resource managers as well as studying the related academic literature, participation at different climate change and fisheries related conferences and meetings, systematic evaluation of media coverage to interpretation of statistical and monitoring data provided by the Marine Informatics Company in Murmansk (Russia).

1. Fish in the sea: Shifts in species distribution and abundance

1.1. Fish movement and climate change

Fish has been always moving and fluctuations in the yield are nothing new for the fishing industry. In his classic work on fish migration from 1914 Hjort, the first director of the Norwegian Institute of Marine Research and the former president of ICES (The International Council for the Exploration of the Sea), stated according to the research stand at the beginning of 20th century, that fish movements and yield fluctuations had as a rule been of some periodical character and considerable duration (Hjort 1914). Although fish movement is nothing new for the fisheries, the multiplicity of scales involved into current distribution of fish, native to Arctic ecosystem and invasive, is new and there is no historical account of experiencing it.

Two species, targeted by commercial fisheries, Atlantic cod (*Gadus morhua*) and mackerel (*Scomber scombrus*) are among the species that are associated with warming waters and have the highest relevance for scientists, government officials and coastal communities alike. Changes in their distribution and abundance are seen as one of the key footprints of climate change in Arctic marine ecosystems (McBride et. al 2014, Christiansen et. al 2014, Wegge 2015).

Recent shifts in migrating patterns of cod and mackerel brought heated political debates on the international and national level. While politics and mass media tend to make direct linkages between climate-driven changes and impact on marine ecosystem, the scientific knowledge emphasizes its limits in understanding of the complexity of changes when it comes to cause - effect relationships (Drinkwater et al 2010, Ottersen et al 2014, Wegge 2015). Arctic marine ecosystems have considerable natural variability, and their responses to climatic or climate-related changes are complex and uncertain (Hoel 2013). In this way, the scientific community has a tremendous opportunity and a tremendous responsibility to provide the scientific foundation for smart policies moving forward, as expressed by Chris Field, co-chair of the Intergovernmental Panel on Climate Change Working Group II (Field 2015)

1.2. Cod

The Barents Sea stock of Atlantic cod (*Gadus morhua*), North-East Arctic cod is currently the world's largest cod stock (Ottersen et all 2014). The reliance of northern economies on codfish cannot be overstated: it is by far the most important in economic terms in the Norwegian fisheries (FAO 2013) and is of great importance to Russia (MSC 2015). A slogan still heard across the species' range is “In Cod We Trust.” (Waldman 2014).

Observations indicate that during the 2000s, the distribution patterns of cod extended further north- and eastwards in the Barents Sea than seems to have been case previously (Drinkwater et al 2010; Chen et al 2011; Dolgov&Karsakov 2011, Drevetnyak et al 2011; ICES Report 2011, Lind and Ingvaldsen 2012, Hoel 2013, Dalpadago et al. 2014, Hollowed and Sundby 2014, Kjesbu et al., 2014). Although none of the climate data could statistically explain, as Jørgensen (Jørgensen 2015) point it out, why cod is moving north, this distinct changes in cod movement indicate good feeding and growth conditions in these regions (ICES Report 2011).

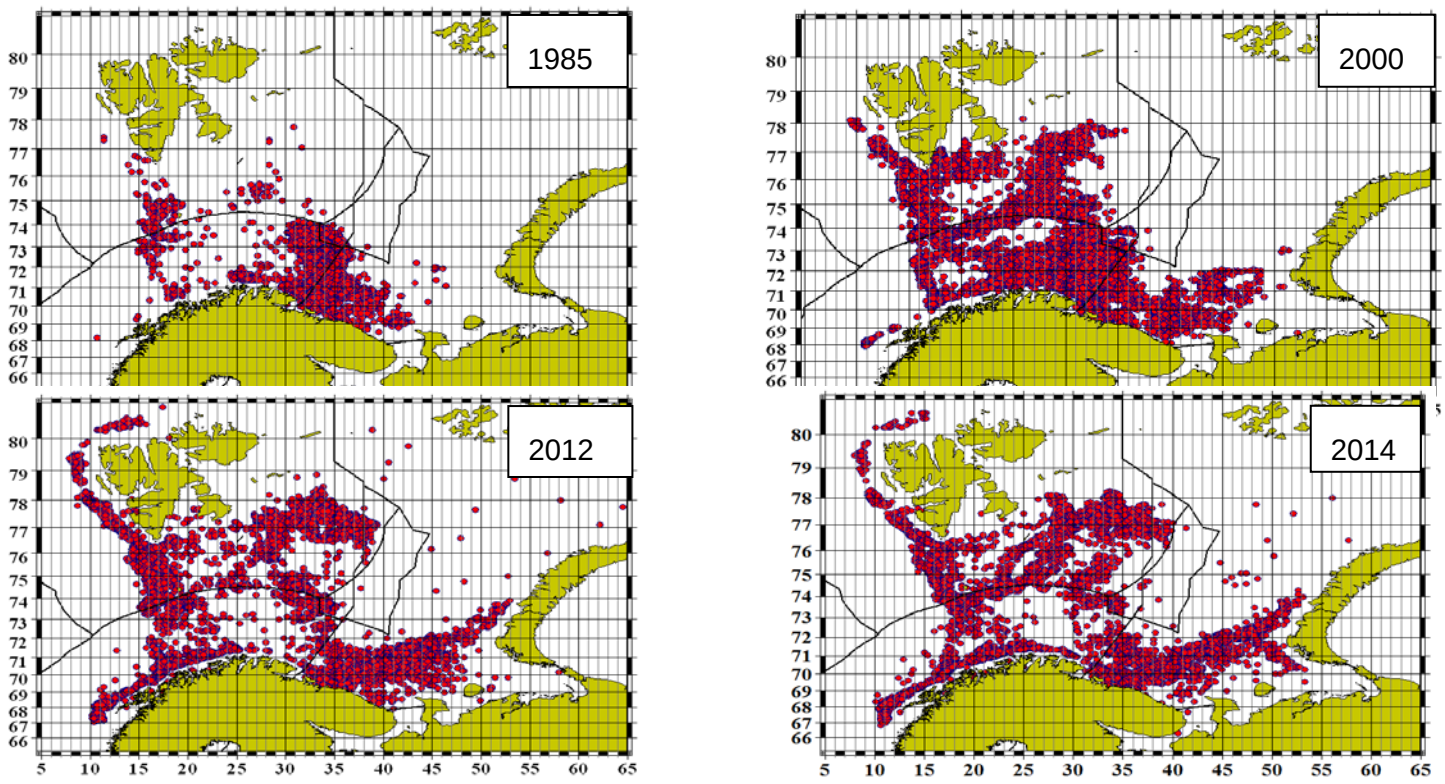
Recent research has documented that Barents cod stock now grows faster than ever (Kjesbu et al 2014, Jørgensen 2015). It has increased markedly and the spawning stock biomass is now at an unprecedented high (Kjesbu et al 2014). Greater abundance has increased total allowable catch for cod in the Barents Sea and changed fleet activities patterns.

Atlantic cod has been sighted at latitude of 82°N in the recent years and has moved fishing fleet to the new grounds, specifically, around Svalbard (see Fig.1). While the ‘offshore’

segment of Norwegian cod fisheries is much smaller compared to coastal operations, economic returns of fishing from the Svalbard waters are substantial for Russia. It is related to the fact that the Russian Exclusive Economic Zone (EEZ) is the main feeding area for juveniles and young cod, while the Norwegian EEZ includes spawning areas and the main feeding grounds for the mature and larger cod (Hjermann 2011, Marine Informatics).

The basic Russian catch comes from the outside of the national EEZ, mainly from the area along the northwestern coast of Norway and around Svalbard. According to the Russian expert, 62.3 per cent of the harvesting activities of the Northwest fleet occur in the EEZ of other countries, 24.5 percent in the Russian EEZ and 13.2 percent beyond of the EEZs (Zabolotski 2012). More than a quarter of Russia's annual catch of Northeast Atlantic cod is taken in the waters off Svalbard (Zilanov 2013:44, Åtland and Pedersen 2014: 29). During the colder periods when cod distribution takes more north-west direction these numbers for this part of the Barents Sea including Svalbard may increase up to 65 per cent as stated by the Head of Federal Fisheries Agency (Fishnews 2013).

Figure 1: Cod: Fishing grounds of the Russian fleet in 1985, 2000, 2012, 2014 (Source: Marine Informatics database, Murmansk)



1.3. Mackerel

Northeast Atlantic mackerel is the most recent newcomer to Icelandic coastal waters, which first began to make its home in Icelandic fishing grounds in the beginning of the 21st century. It migrated to Icelandic waters occasionally, but until 2006 no catches by Icelandic boats were reported (Icelandic Ministry of Fisheries and Agriculture). Since 2007 mackerel have appeared in large numbers in many areas around the country and this has led to a directed fishery since

2007. (Astthorsson et al 2012; ICES 2014, ISI 2014)

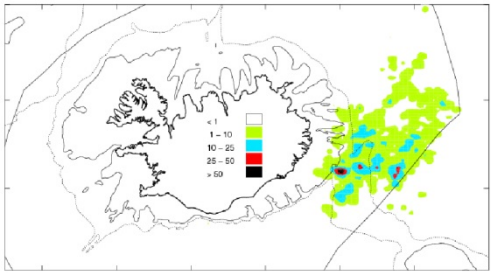
In recent years mackerel numbers have increase massively in Iceland's waters. Traditionally, the fishing areas with higher catches of mackerel have been in the

northern part of the North Sea, and off the west coast of Scotland and Ireland. This specie, which was not previously known to spawn around Iceland, is now increasingly present in Iceland's water all year around (Icelandic Ministry of Industries and Innovation).

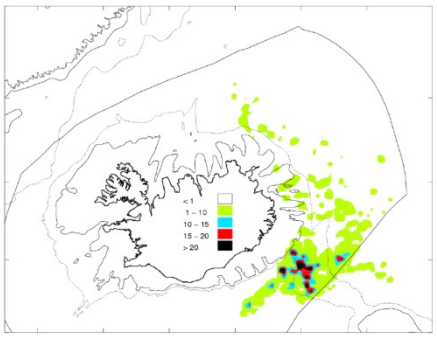
In political and public opinion the unprecedented occurrence and extended distribution of the species is clearly linked to climate change. Fisheries experts point on challenges in identifying cause of the change and emphasize that it is most likely the result of several contributing or co-occurring factors: such as a gradual increase in temperature, changes in the feeding conditions, competition with other major pelagic fish stocks in the area, and the relatively good status and age/size structure of the mackerel stock (ICES 2014a: 2). ICES states that there is no scientific basis to indicate whether this situation should be considered permanent or transient (either returning to the previous state or continuing change in the same direction) (ICES 2015: 1)

Previously, Britain and other European countries such as Norway fished for mackerel, while for Icelandic fisheries other species have been of traditional interest. Marked changes in distribution and abundance of mackerel in Icelandic waters have resulted in the development of new fisheries and fishing of mackerel has increased dramatically over the last few years.

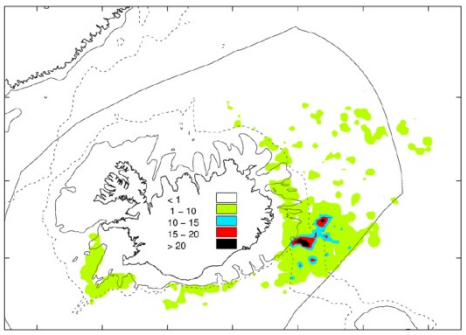
Figure 2: Atlantic Mackerel: Fishing grounds of the Icelandic fleet: 2008 - 2013. Dark areas indicate highest catch. Source: Marine Research Institute, Iceland http://www.hafro.is



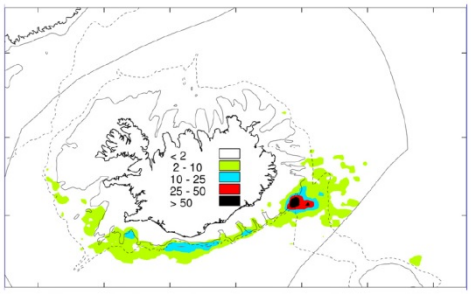
2008



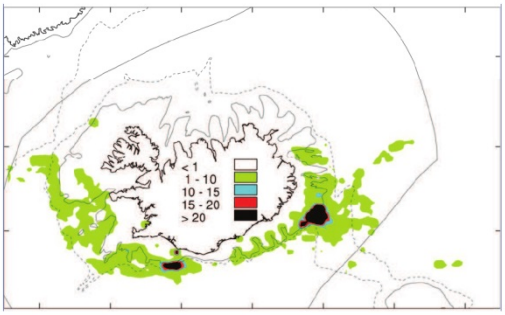
2009



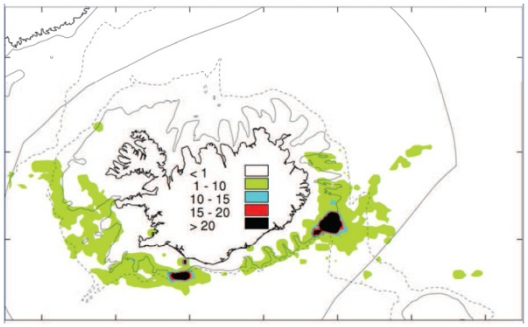
2010



2011



2012



2013

2. From biology to politics: Resource management challenges

2.1. Objectives' conflict: what are sustainable fisheries?

Changes to the fish distribution, timing of migrations, and spawning patterns have raised both scientific and biological considerations, as well as questions over the political rationale behind each resource management decision. Several factors challenge flexibility of the Arctic regulatory framework and management efforts in addressing these changes. One of them lays in general conflict between objectives in current fisheries management.

The objective of preserving marine ecosystems and maximization of biological production might be broadly in conflict with all other objectives because 'the more you protect an ecosystem the less resource is available for utilization in the form of yield, economic rents, or jobs' (Hilborn 2006). Objectives of maximizing catch and securing employment might lead to heavily exploited stocks. Profitability for national economic interests might be not compatible with preservationist values and equity objectives. Human consumptive needs for sea food are fundamentally in conflict with non-consumptive goals of maintaining ecosystems in intact at a suitably low risk to the resource (see Hilborn 2006, Cochrane and Garcia 2009).

In the history of fisheries management, objectives have changed over time, for example from the maximum sustainable yield (MSY) approach to maximum economic yield (MEY) to optimum sustainable yield (OSY) (Berkes 2009, O'Riordan T. 2014). The concept of MSY that has been widely criticized by scientists for ignoring the social aspects of fishing as well as for not being able to preserve the stocks (Berkes 2009, Flinley 2011).

However, this approach is still at the heart of modern fisheries management. As defined by the EU Commission, MSY is the optimal catch that may be taken from a fishing stock year after year without endangering its capacity to regenerate for the future (EU 2006). Almost all jurisdictions have adopted formal objectives with MSY written into UNCLOS and repeated in numerous international agreements and national legislation.(see (UNCLOS 1982, article 61).

The concept is based on a confidence that scientists can predict. Some experts reveal that, regarding several uncertainties in understanding marine processes, the weakness of MSY lies at its very inception and in this way it is considered as tool of government rather than science (Finley 2011). By 1970s, search for an alternative to MSY and MEY paradigm led to the introduction of the notion of optimum sustainable yield (OSY). The idea behind this concept is to merge deliberately biological, economic, social and political values. Critics point

out that this objective remains more than ideal, and its greatest weakness is the difficulty in making it works (O'Riordan 2000: 232)

Experts state that many high-profile disputes arise from conflicting biological, economic, social and political objectives' categories. The growth of advocates for protecting marine ecosystems in the context of climate change debate reflects a greater awareness about the historical dichotomy between human development and nature conservation, but also generates more challenges in a search for balance in management and governance regimes (Hilborn 2006, Garcia et al 2013, O'Riordan 2000).

Resource management is considered as part of the governance regime and could be 'fully effective if it is implemented within the wider environment of good governance' (Cochrane and Garcia 2009: 6). Following the assumption that management is about action and governance is about politics (Berkes 2009: 68) a particular attention in resource management should be given concerning aspects of sharing responsibility and power in the Arctic.

2.2. Complexity

Fishery management is more than stock assessment. The set of existing regimes on fisheries is extremely complex (Rudolff 2010). They are established at all regulatory levels and include global, multinational, regional, bilateral and national scales. They may have partly overlapping goals around the concept of sustainable resource use, but their strategies and stakeholders may differ. Some authors point on jurisdictional and functional overlaps in agencies, laws and regulations (Ekstrom et al 2010, Molenaar et al 2014).

The management of fishing resource is also scientifically, socio-economically, and politically complex. Hoel identifies it as three, interrelated functions in the traditional fisheries setting (Hoel 1998):

1. Knowledge based: providing information on abundance, recruitment, etc. of fish stocks

2. Regulatory, distinctly political: when, where, how and how much to fish.

3. Enforcement of regulations: this implies controlling harvesting operations directly at sea as well as landings of catches, by self-reporting by fishermen and external controls

Scientists identify different factors that may humper successful performance of these generally defined tasks. Practices vary to a large extend among countries. Additionally, some regimes are only spatially defined, while others are on specific species. Resource management that uses linear thinking performs poorly in a world characterized by non-linear natural processes and phase shifts. To the challenges belongs also an inherent conflict between short-term social and

economic needs and the longer-term need for sustainability (Hoel 1998, Berkes 2009, Rudolff 2010, Garcia et al. 2014).

The information needed for science-based decision-making about these complex systems is always incomplete and uncertain (Garcia et al. 2014). Uncertainties in available knowledge make achieving of specific goals more controversial and elusive. Hilborn underlines that scientists may often urge much more cautious management in the aftermath of the collapse (Hilborn 2006).

The decision making level for the regulatory function depends upon the migratory range of fish stock (Hoel 1998: 241). A costal state has the power to decide on all aspects of management in its own waters. As far as fish may cross national boundaries, there is a need for joint management with another state. There are also numerous stocks that are exploited both within coastal states' 200 exclusive economic zones and beyond, on the high seas. In this case management of highly migratory might pose even more difficulties than cooperative management of 'shared' fish stock.

All mentioned challenges do not always mean an actual clash between scientific, regulatory and enforcing functions performed by different actors involved and on the institutional level. The fisheries management in the North Atlantic region is evaluated as a field where actual incompatibility and conflict has been often avoided (Molenaar et al. 2014). Among the regulatory hierarchy particularly three institutional bodies are central for managing trans-boundary and straddling fish stocks.

The 'scientific machinery' of production advice how much fish could be taken from the sea is represented by Intergovernmental Council for the Exploration of the Sea (ICESb). The North East Atlantic Fisheries Commission (NEAFC) is entitled to make recommendations on the establishment of total allowable catches (TEC) and their allocation to Contracting Parties, the regulation of the amount of fishing effort and its allocation to Contracting Parties (OECD 12:2). Currently the Commission consists of its five members Denmark (in respect of the Faroe Island and Greenland), the European Union, Iceland, Norway and Russian Federation. NEAFC's recommendations can apply to all or part of the 'Convention Area' (within and beyond national jurisdiction) or all or part of 'Regulatory Area' (beyond the waters under the fisheries jurisdiction of Contracting Parties') (see Molenaar 2014). NEAFC is often evaluated as a very successful regional fisheries management organization (RFMO) (Rudolff 2010, Hønneland 2012, Hammer and Hoel 2012, Waldman 2014).

Joint Norwegian-Russian Fisheries Commission (Joint Commission) rules the shared fish stocks management in the Barents Sea like the Northeast Arctic cod, defining fishing quota, sharing data as well as jointly deciding on recovery plans. In spite of existing differences in discourses the work of the Joint Commission is evaluated as collaborative from using 'bargaining' mechanisms (Hønneland 2014) to moving to a more joint-benefit discourse (Korpoo et al 2015). Dramatic decline of illegal, unreported, and unregulated (IUU) fishing of the Northeast Arctic Cod is celebrated as one of the great outcomes of this Norwegian-Russian joint effort (Stokke 2010, Gullestad et al 2013).

However, if the prevailing view of continuing Arctic warming and further massive shifts in fish distribution poleward hold true, it may result in new or revived questions about shortcomings in already highly politicized management regime for the Arctic fisheries. One consequence of climate change debates is the emergence of clarifying definition 'what the Arctic is' within social and political studies. Also the more precise characterization of the Arctic Ocean and borders of marine waters gain an increased attention in the fisheries studies. Following chapters reflect what kinds of questions arise on the regulatory and management agenda due to present and predicted changes in fish movement.

3. Moving behind the cod: Strange case of Svalbard

3.1. Fishing in Svalbard's waters

The Atlantic cod, a species that many North Americans would recognize as an emblem of overfishing and regulatory failure (Waldman 2014), is now in a great abundance in waters around Svalbard. In 2013 the International Council for Exploration of the Sea (ICES) stated that the key specie of the Arctic fisheries, the Barents Sea cod stock's spawning-stock biomass is "now the highest observed" and fishing mortality is "close to its lowest value in the time-series [since 1946]" (ICES 2013). Stock status for cod from 2014 assessment indicates that the stock is well above the MSY reference point, and is very likely to remain at this level for the next few years (MSC FCI 2014).

Could the northwards shift of spawning sites be related to climate? Or it is because of the fact that cod has a reputation of being one of the best managed fish resources worldwide (Jøorgensen 2015) Some authors put emphasis on climate variation (CAFF 2013), others identify the crucial social and environmental factors that made this unique growth possible (Kjesbu et al. 2014). While scientists are puzzling about the present northward fish movement, the highly lucrative cod fishing following the current trend occurs already more intensively in the Svalbard Fisheries Protection Zone (FPZ).

As far as cod fishing takes place mainly within Norwegian (80%) and Russian waters (Southall 2010:8), the TAC and allocation are determined by the Joint Norwegian-Russian Commission based on advice from ICES. According to Regulations under the Act (1976) on the EEZ of Norway, FPZ (1978) and management of wild living marine resources (2008) there is a general prohibition to fish for cod in the FPZ around Svalbard unless specifically provided otherwise (Regulations 2014, section 2). Notwithstanding the prohibition, Norwegian and Russian vessels may fish North-East Arctic cod in the Fisheries Protection Zone around Svalbard within the quotas allocated to vessels from these countries. Among the different nationalities engaged here, Russian vessels are by far the most numerous.

Also vessels from EU member States and the Faroe Islands have a (limited) right to fish in FPZ. Negotiated bilaterally quotas for third parties are shared traditionally by granting part of Russian quotas to the Faroe Islands and Norwegian quotas to the EU (Henriksen et al. 2005, Tamnes and Holsmark 2014, Regulations 2014). Despite disagreements about the status of FPZ (Molenaar 2012, Åtland and Pedersen 2014) both countries do not want the current management regime to collapse, since this may lead to a radical increase in the number of third-country fishing vessels.

3.2. Sensitivities.

Although the maintaining the management regime and political stability in the region is of mutual interest, the intensified fishing activities have pointed on some shortcomings in seemingly balanced fisheries cooperation. The political and public interest in recent years to Svalbard fisheries has been attracted by several detentions especially of Russian vessels in FPZ.

The most spectacular episode occurred near Svalbard in 2005 when Russian trawler 'Electron' detained by Norwegian authorities in the Barents Sea for illegal fishing, abruptly broke away homewards with two Norwegian inspectors on board, as reported by New York Times (Numberg 2005). After the incident in 2012 with another trawler 'Melkart II', accused for illegal dumping of fish, the Russian Foreign Ministry as in some previous cases defined the arrest

unacceptable and gave Norway an official complaint. According to the Barents Observer quotation "the Norwegian side was strongly informed about the unalterable Russian position on the non-recognition of the so-called 'fisheries protection zone' around Svalbard and the unacceptable practice of detaining Russian fishing vessels in the area" (Pettersen 2012).

In one of the last episodes reported in January 2014 by RIA news agency the fishing vessel 'Novoasovsk' from Murmansk was detained because of the fish discard. This incident was interpreted by Russian Federal Fisheries Agency as a routine practice by Norwegian authorities according to their understanding of discard. Russian representative stressed that 60 per cent of complains are later recognized as not violating the rules (Lyskin 2014).

Norway has a ban on discards as this is both a waste of resources and because discarded fish are not registered in the statistics, making it more difficult for researchers to calculate the size of stocks. Rules require all incidental catches of non-target species, or bycatch, to be used as food and to be considered in the ecosystem analysis. If the vessel gets too much by-catch in one haul, it must move to another fishing ground.

According to ICES discarding issue has in the last years again arisen in the Norwegian management and media debate. The combination of great amounts and fishable concentrations of cod in the Norwegian Economic zone and in the Svalbard area, may due to large amounts of large and better paid fish and a reduced possibility for the enforcement agencies to close small-fish areas (due to more liberal legal catch sizes), lead to a greater risk for discarding (ICES 2014a:10).

Northern Seafood Council reported a high incidence of discards from EU countries as well (NSF 2012:10). The case of a German flagged vessel that was accused for violating by-catch regulation within FPZ raised anew the discussion about non-discriminatory principles of the Svalbard Treaty. In 2014 the Supreme Court of Norway heard a case that as it was expected may have consequences for the management of the natural resources of the Norwegian High North (Henriksen 2014). The defendants sought an acquittal on the basis that the regulation violates the Svalbard treaty. At the end, the Court dismissed the appeals of the accused on the grounds that the regulation concerned does not violate the provisions on equal treatment of the Svalbard Treaty (Dahl 2014).

The latest accounts on detention cases reflect more awareness about the discard problematic on the Russian site and developing mutual mechanisms to solve the problem without escalation: video recording of catch activities, caution procedures for arrested vessels and their release until the case will be clarified, more distinct scheme of fines (Lyskin 2014), a pilot project testing methods to estimate discard (Nedreaas 2014), mutual agreement in continuation of preparation of Instruction document about the control procedure of fishing vessels in the Barents and Norwegian Seas (Fishnews 2014).

However, the violation statistics are recorded on the both sides and interpreted accordingly to the national view on the peculiar status of archipelago and their surrounded waters.

3.3. Russian position

In cases, where fishers feel to be accused unfairly, they often refer to a technical matter that might cause discard during for example getting up the howl to the trawler (personal conversation). It could be perceived by them sometimes as exaggerated from the Norwegian part 'because the Norwegian catch in FPZ is not as important as for Russian fisheries sector'. Russian fishers, who stay on board for several months far away from their home, point that they have to put more effort for their fishing strategy planning than Norwegian fishermen, who get their fish anyway (personal conversation).

But the main reason behind these incidents is seen, as some Russian fisheries experts and authorities explain, not clear definition 'what actually discard is' or its absence in regulations (personal conversation).

Detention cases became a driving factor for Russian representatives to force this issue for discussion during the yearly Joint Commission's sessions. Russia demands to address separately the fisheries matter in FPZ on the sessions' agenda, what Norwegian colleagues, according to the Russian sources, try to avoid (Fishnews 2014).

This issue of Russian fishing vessels detained in FPZ was again addressed by the current Head of Federal Fisheries Agency during the recent meeting with Norwegian ambassador on Arctic ecosystem conservation declaration and preventing unregulated fishing in the Central Arctic Ocean (Sputniknews 2015). Need for the 'harmonization of the rules', as expressed in personal conversations and mentioned in official sources (Fishnews 2014) , is seen by Russian experts as an urgent task in the current management practices.

Empirical accounts indicate that fishers also strongly oppose to the fact that inspection in FPZ is carried out only by the Norwegian coastal guard and not by joint effort with Russian inspectors. Practices of closing areas to protect spawn and small fish due to declared fish discard by Norwegian inspectors require fishing vessels to move to another fishing area are. In practice, changing the location and searching for the new fishing grounds can be costly for the big trawlers with the operational costs up to 100 000 eu a day (personal conversation). During the annual session of the Joint Commission in 2014 Russia specifically addressed the question of Real-Time-Closures regime and required developing of practical guidelines to avoid unreasonable closing practices in Svalbard area which may cause serious losses for fishing companies (Fishnews 2014)

Arrests of Russian vessels and perceived pressure on fishers from Norwegian inspection may contribute to sharpening of 'chronically latent' disagreement around precautionary principle in fisheries. Russian experts formally accept it and agree that it works well to keep sustainability of resources when they are in a critical situation. At the same time they point that it hinders to increase the catch when the stock abundance is in a good conditions (Glubokovski et al 2013:19). Russian view refers to the interdependency of marine life and predatory nature of cod, which can have impact on other species and cannibalism in case of great abundance.

3.4. Sustainability in Russian

The precautionary principle based on the sustainability concept as reflected in international fisheries agreements and codes of conduct is not explicitly laid down in Russian fisheries law. In spite of a wide acceptance of the concept of sustainable development and its increased role for national politics, uncertainties in the theoretical background make the balance between national strategy and cooperation with the global community not easy.

The Russian position towards the requirements of the precautionary approach traces its patterns back to the Soviet dominant principle in the fisheries - 'rational use of resources'. It could be interpreted as most equivalent to the 'sustainable resource use' concept and it was a main slogan in the Soviet fisheries sector (Spridonov and Nikolaeva 2005: 30). The meaning of this definition could be understood as 'non-exhaustive' use of living marine resources, where ecological aspects in spite of any rhetorical acceptance fall behind economic and social categories.

Another internationally most agreed aspect of sustainability concept is downplayed in the Russian rational 'use of resources': the idea of development without compromising the quality of life of future generations. The difficulty to design a Russian sustainable future in its western understanding lies in relatively recent appearance of the idea on the national agenda and in the same problem of certain 'elusivity' that the concept in general has. It is challenging to turn theoretical constructions into an operational paradigm and to transfer vague statements into practical guidelines, not only in Russian context. Not all experts agree that this idea is fruitful for Russia and for the fisheries sector specifically.

Russian Federation has ratified international agreements, which adopt precautionary approach. However, the principles applied in the Federal Fisheries Act and other legislative texts at lower level refer to principles of protection and rational use. Food Certification International in its 1st Surveillance audit of Russian Barents and Norwegian Seas cod and haddock fisheries concludes that it is still unclear to what extend these principles include a presumption toward more precautionary decision making and how their practical application

will be especially in the event of scientific uncertainty (MSC FCI 2014:27). The report encourages Russian fisheries authorities to explicitly adopt the precautionary principle as such in Russian legislation. In the meantime, the Russian Fisheries Association of the Northern basin demands an increase of TEC of North East Arctic cod in the Barents Sea based in relation to increased abundance of fish, a fact confirmed by science (Fishnews 2015).

3.5. 'Destined to cooperate'

'We are destined to cooperate', is a phrase used by Russian scientist and participant of Joint Commission sessions to characterize bilateral management activities between Russia and Norway (personal conversation). Current marked presence of cod and vessels in Svalbard waters has raffled from time to time the long-standing history of fisheries cooperation between two nations. At the same time, despite these tensions, the recent understanding is that these issues concern the fisheries agencies, and not necessitate higher political intervention (Johnson 2008; Åtland and Pedersen 2014)

Åtland and Pedersen point out that the general Russian perception relates these conflicts first of all to attempt to undermine Russia's economic interest in the Svalbard region (Åtland and Pedersen 2014: 31). Russian comments on conflicts in FPZ express the suspicion to Norwegian actions as a strategy to 'undermine the competitor with "clean methods" that create bad image of Russian fishers on the European markets (Zilanov 2013: 62).

Nevertheless, the aspect that the main effort of Russian large-scale fisheries takes place mainly outside of the national waters makes the situation politically sensitive. According to the prominent fisheries authority Zilanov, the control and arrests of Russian vessels significantly increased after the Norwegian-Russian delimitation agreement of 2010 (Zilanov 2013: 111). 'Economic' card is commonly supported by mantralike reminder that Russia does not recognize the FPZ around Svalbard introduced by Norway in 1977. Several jurisdictional problems remain unresolved and are largely discussed in the literature (see Molenaar 2012). The peculiarity of Svalbard FPZ is related to Norway's sovereignty and rights of Spitsbergen Treaty parties (1920) and right to claim or enforce a 200 nautical miles zone determined in the UNCLOS (1982) on the basis of jurisdiction of coastal states.

Russia's Foreign Ministry spokesman underscored in October 2014 the need to force a common understanding of the legal framework for regulating economic activity off the archipelago by the states that signed the 1920 Treaty on the Status of Spitsbergen

(MFA 2014). Adopted in 2014 by Russian government concept 'Strategy of Russian presence on the Archipelago of Spitsbergen until 2020' declares the securing of Russian position on Svalbard as one of the national priority of the Arctic state policy (Strategy 2014).

Concept is concerned with comprehensive work to fortify, modernize and diversify the Russian presence on Spitsbergen. It proposes a development of larger scientific activities and establishing Science Centre in Russian settlement of Barentsburg on Svalbard. Among different announced priorities are also assessment and estimation of biological resources of western part of Arctic as a base for the economically efficient fishing efforts. The almost 'chronical' up and down curves between calming down and tension periods are getting more dense with increased prominence of the Arctic region and appearance of new non-Arctic players.

Viewing the Norwegian-Russian fisheries out of national interests' context brings more balancing component to the drawing of this density curve. Movement of living organisms across the EEZs of different states, as well as from the EEZs to the high seas and back, is the normal state of affairs. In this way, Norway and Russia are 'destined to cooperate' in an increasingly competitive security environment in the Arctic. Both parties have overlapping interests, where 'we simply must cooperate closely' (personal conversation).

Migratory range of important commercial fish stocks that do not recognise maritime boundaries is one of most essential reasons to keep 'destined' ties. Norwegian and Russian fishers share different species, which may spawn depends on fish species in Norwegian or Russian EEZs, the larvae may drift to the Russian EEZ and stay there for some years and go back again to the Norwegian side. Both countries share the space: Russian vessels fish in Norwegian waters, some attractive for Norwegian fishers species may be fished in the Russian zone. Both parties are interested to keep the stock healthy and protect from overfishing by third countries.

Although observational methods for fish assessments and scientific finding on the both sides might differ, fishers on the ground are very aware about influences of climatic variations on fish migrations and abundance. Some interviewed Russian experts are sceptical about the western climate change related models and point on current ice increase in some parts of the Arctic waters that might indicate a start of new period of cooling. However, the fish movement will be influenced 'whether the Arctic ice is melting or growing' (personal conversation).

In this way, Russia and Norway fisheries sectors are 'destined to cooperate' in increasingly changing natural and political environment. However, the long-term cooperation continues to coexist with long-term disputes about the 'troubled' waters of Svalbard. While understanding of the 'destined' character of bilateral management cooperation is there, intractable disputes over territory will last, leaving a room for both cooperation and conflict in the Arctic.

4. Mackerel fisheries: whose fish?

4.1. Mackerel war

The quantity of mackerel being taken in Icelandic waters is a recent issue and there is still little knowledge and several uncertainties about the reasons of stock growth as well as about its migratory route (Piling et al 2009, ICES 2014a). The current situation has become baffling as far as dynamic migration patterns of mackerel include the exclusive economic zones of the EU, Iceland, Norway, the Faroe Islands and in the recent days increasingly Greenland. Heated debate on whose regulation matter the mackerel fisheries are, bring some authors to the question 'are they stocks or merely politically convenient components?' (Piling et al 2009).

So-called 'Mackerel War', titled in association with 'Cod Wars' between Iceland and Britain in 1950s-1970s, is about the size of catches and quotas that countries are allowed to take from the sea within their own territory. The situation, caused by the fish movement, brought a new problem: how to integrate new coastal states whose EEZ is invaded by mackerel into decision-making processes? Existing international regulations (UNCLOS 1982, Straddling Fish Stocks Agreement 1995, North East Atlantic Fisheries Convention 1980) and bilateral-trilateral agreements between "relevant Coastal States" fail to provide rules for present decision-makers to incorporate newcomers (see Ørebech 2013).

The three 'relevant Coastal States' for mackerel have been the EU, Norway and the Faeroe Islands and they have been the signatories to the mackerel Coastal States agreement (in place for over 20 years) all under the NEAFC framework. Coastal States have both the right to harvest the fish stock and the responsibility to co-operate with other Coastal States in order to ensure their sustainable exploitation (UNCLOS 1982, Art.58, 61). Regulations include allocation of quota shares on the base of a historical track record and in accordance with the latest scientific advice for the stock.

In 2010, Iceland was finally accepted as a Coastal State for mackerel. Referring to international law, Icelandic government highlights that as a Coastal State the country has the incontestable right to fish mackerel within its EEZ (MII website). At this point it became the joint responsibility to reach an agreement on the comprehensive management of the mackerel fisheries. However, the Coastal States have not succeeded to reach agreement on quotas shares. The EU and Norway felt that Iceland, which did not fish mackerel until recent years, should not have a greater quota because of its history of non-participation in this fishery. Iceland and Faroes Island have refused to accept a lower quota and set unilaterally their own autonomous quota. Since 2009 there has been no international agreement on TAC (ICES 2014a).

Case with the mackerel has marked an increasing tendency in regulating regimes to enforce certain management targets combining catches and trade as a 'punishment' instrument. The EU has used this trade sanctions tool to 'discourage massive fishing of mackerel by Iceland and the Faroe Islands' (Seafish 2013). New rules ratified by the EU Parliament and Council in 2012 have provide the legal foundation to ban EU imports of fish from stocks which are being unsustainably fished (Weissenberger 2013).

Marine Stewardship Council (MSC), the Europa's largest eco-label certifier for a sustainable fishing, suspended accreditation for all North East Atlantic mackerel fisheries by 2012. The MSC's decision was taken due to the inability of Coastal States to agree on quota allocation within TAC and large increase in catch by Iceland and Faroe Islands against scientific advice (MSC 2014). Taking the fish off its 'fish to eat' list is a measure that affects fresh, smoked, tinned and frozen mackerel products sold across Europe.

In March 2014 the European Union has reached a deal on mackerel fishing rights in the northeast Atlantic with the Faroe Islands and Norway and signed an agreement which Iceland is not a party to. Under the new mackerel pact, about 49% of the entire catch quota was allocated to the EU, Norway got 22,5% and the Faroe Islands got 12,6% (Seafish 2014). Remaining around 16% is reserved for Iceland and Russia should they join during the five years that the agreement is valid.

The level of autonomous quotas set by both Iceland and the Faeroe Islands since has been strongly challenged by both the EU and Norway concerning about the overfishing and long-term sustainability of valuable stock. Iceland justifies the issuing unilateral quotas, using the same sustainability vocabulary, with the aim to protect the stock and ensure sustainability for benefit of all Coastal States, as the recent 'Iceland's Commitment to Sustainable Mackerel Fishing' states.

Shift in mackerel migration and failure to reach a satisfactory agreement within available regulatory framework gave thoughts to some authors to comment the situation as bearing resemblance to a 'tragedy of commons' (Dahl 2011).

4.2. Sustainability in Icelandic

The understanding of sustainability could be seen as an underlying point of the conflict, which hampers an achievement of an agreement acceptable to all. The effort to bring in accordance three pillars of sustainability concept seems to face considerable challenges also in the 'mackerel case'. Main discussions are running under the sustainability framework umbrella. They have been concentrated around perception of the mackerel stock, Icelandic 'historic rights' to a share of the mackerel catch and of the MSY reference points.

In the view of the European Parliament Commission, the fisheries problem was diagnosed as overfishing, with much reliance on the slogan "too many fishermen chasing too few fish" (European Parliament 2013). The Scottish Fishermen Association defined unilateral increase of mackerel quota by Iceland as 'totally unsustainable' (SPFA). It pointed out that Iceland and Faroe Islands have set quotas outwith any international agreement despite having little tracks record in catching the fish prior to 2008 (SPFA). The Association referred also to the fact that EU and Norwegian catches are all sold for the human consumption market, while Icelandic and Faroese catches are processed for fishmeal and oil products.

Icelandic fisheries organizations in opposite bring forward the argument that mackerel is entirely processed for human consumption (Iceland Pelagic 2013). To the EU claim that Iceland is overfishing, Iceland has made a clear point that as a fishing nation it knows better how many mackerels should be sustainably taken from its water. 'Iceland's Commitment to sustainable mackerel fishing' emphasizes that national fisheries policy is recognized internationally for maintaining biodiversity and sustainability (MII a). Iceland claims to have a far better record of sustainable fishing than many other countries and all and catches have been within scientifically recommended levels (MII b).

Mackerel is seen in Iceland as an aggressive predator feeding on variety of fish, including commercially important fish such as capelin (Einarsson 2011, personal conversations). This is reflected in the governmental statement pointing that exponentially multiplied mackerel numbers obviously have a major impact on the ecosystem (MII a). It is stated that mackerel also compete with certain bird species that rely on ocean feeding, such as the puffin stock, which has drastically decreased in Icelandic waters in the last few years (MII b). An Icelandic parliamentarian, as quoted by Einarsson, called mackerel as 'sea rats' with reference to their predatory nature and potential harmful impact on the regional marine ecosystem (Einarsson 2011).

At the same time the arrival of mackerel was also 'welcomed', as Einarsson mentions, as 'Icelandic citizens' (Einarsson 2011) particularly due to the financial collapse of 2008. In this critical for the country situation fisheries have become a sector that greatly supported the national economy. Many people in urban areas of the country with a population just over 300 000 still have strong links to fisheries through their rural origin or relatives. The 'rescuing' role of fisheries during the crisis that hit people also emotionally is often perceived as a key component in country's return to growth: 'We survive here in Reykjavik only thanks our fishers' (personal conversation).

Importance of the sector for the Icelandic national economic welfare is a trump reference in the resource allocation dispute. To the argument by EU that Iceland doesn't have a great track record and to the question why Iceland has to have a higher quota, the Icelandic government refers to the fact that country's economy is heavily dependent on fisheries. This *ceteris paribus* attitude seeing the equal importance of this factor indicates much closer country's relation to fishery than in other Coastal States.

Even official political texts and talks become emotionally sensitive when it comes to mackerel. Ministry of Industries and Innovation puts it in this way:
'It can be said that Icelanders live from fish. Fishing is the backbone of the economy, with more than 40 percent of foreign currency earned from exported goods coming from the export of fish products. The sustainable use of marine resources is therefore not an option for Iceland - it is essential to protect our future. For comparison, fisheries are to Iceland what petroleum is to Norway, wine to France, motor vehicles to Germany and the City to the UK' (MII b).

The statement from Icelandic Minister of Industries and Innovation regarding the mackerel movement said that 'the key to solving the mackerel dispute is to take into account these changed circumstances and respect the legitimate interests of all Coastal states' (MIIe).Fish allocations, therefore, have not always to do with good fisheries management. Sustainability concept as it appears in the Icelandic interpretation is strongly related not only to sustainable yield, biological and economic concern, but is seen in a larger scale through a cultural lens. From this point of view the sustainability in Icelandic seems to be less referring to the targets as defined by assessment models, like of maximum sustainable yield framework. In this way, it echoes with Russian approach of 'rational resource use'.

4.3. The way ahead in the cooperation: uni- or multilateral?

Iceland expressed its disappointment at the signed in March 2014 five-year agreement between EU, Norway and Faroe Islands on mackerel fisheries saying that 'it is not a full Coastal State agreement' (MII c, RÚV 2014). In the following month Iceland announced to set its mackerel quota unilaterally. Annual consultation between the Coastal States with participation of Russia and Greenland as observers on the management of the mackerel stock in London in October 2014 also did not succeed to reach an agreement 'as one coastal state was not in position to agree on a share for Iceland' (MII d 2014).

The EU approach to solving complex stock management problems has been considered inappropriate and not flexible especially on the earlier stage of negotiation. According to Iceland government the EU claim a 90 per cent on quota share, leaving only 10 percent for the other Coastal States, Iceland and the Faroe Islands, as well as Russia. This ignores the changed migration pattern of the mackerel stock (MII e). It has been interpreted in 'Icelandic Commitment' as unreasonable unilateral approach that blocks efforts to secure the long-term health of the mackerel stock (MII b). Bailes and Thorhallson reveal that to Icelandic eyes, the EU's style of negotiating in specific disputes can appear both rigid and doctrinaire, to a degree that merely inflames the concern about a small interlocutor being bullied and pushed aside. Such perceptions are shared among many Icelanders. The popular fear about Europe is that 'the EU (or large members like Britain and Spain) will take our fish' (Bailes and Thorhallson 2013).

In Iceland's view Iceland is a Coastal State and has the incontestable right to fish mackerel within its exclusive economic zone according to international law (MII a). Unilaterally set management measures are considered as responsible. According to the Commitment statement Iceland has introduced quotas on mackerel within the Icelandic EEZ, bringing mackerel firmly under its fisheries management system (strict surveillance). Further, Iceland has strengthened scientific research on the mackerel stock (MII b)

'Mackerel war' has highlighted the crucial role of science for the decisions, which policy might deploy in the context of large uncertainties on the nature of changes in fish migration. In their advice for 2015 ICES pointed out that in all years since 2008, a lack of agreement on the Management Plan has led unilateral quotas being set which together are higher than the TAC indicated by the Management Plan (ICES 2014:5). However, as Seafish briefing note put it, ICES was unable to deliver their advice on the basis of which the Parties could have developed a revised management plan as foreseen in the five-year arrangement (Sefish 2015). The stock assessment for Northeast Atlantic mackerel was benchmarked in 2014. This led to a revised perception of the stock compared to the last assessment of the stock (ICES 2014: 5)

ICES evaluation has justified Iceland's main point of argument of having a higher quota, as more mackerel in healthy state are now found in the county's waters. Iceland's chief negotiator for mackerel catch quotas commenting the new advice specified the strong believe that fish catch 'must be grounded in scientific data and an agreement on how to share the stock must reflect these realities' (Worldfish 2013)

The scientific advice from ICES on total allowable catch for 2015 was presented during the meeting in London and again reflected a strong status of the stock (ICES 2014, MII d 2014). With ICES last advices confirming healthy qualities of fish concerns about situation with

mackerel have got a new component that might indicate some slow changes in the long-running debates. This situation is definitely in favor of Icelandic sustainability concept and lessens overfishing claims of other Coastal states. For the EU, as Weissenberger notes the increase of mackerel stock could be seen as an opportunity to try to find a compromise on a new share of the stock, without absolute losses of quotas by the EU (Weissenberger 2013).

According to the Seafood Business news, the new chair of Fisheries Iceland stated that a focus on sustainability and environmental issues would be important for some kind of revitalization (Undercurrent news 2015). I*celand's announcement of its unilateral mackerel quota has been positively perceived by EU because it is closer to the share figure it had previously claimed in the Coastal State mackerel negotiations. Also the EU and Norway brought down the total catch share toward the level advised by ICES. The EU has said from the outset that the door is open for Iceland to join the arrangement (*European Commission 2014)

However, the popular opposition to EU in Iceland is tightly linked to the fisheries sector. Fisheries in general are strongly opposed to joining EU and have a powerful political lobby (Einarsson 2011, Bailes and Thorhallsson 2013). This still might bear a deal-breaking potential. In March 2015 government of Iceland announced withdrawal of its proposal to join the EU. Media comments suggest mackerel talks are at heart of this decision despite the fact that the 'elites' might be still seeking EU membership (North 2015).

The question on how the situation around mackerel will develop if its migration patterns will change again in unexpected fashion remains open. What could be observed now is a growing presence of mackerel in Greenlandic waters (ICES 2014). These changes have the potential as in case of the 'Mackerel war' alter the power of new actors in mackerel fisheries and increase a competition among them for attention to their understanding of problem sets and their concepts. Anyway, Greenland's future requests for a Coastal State status are already expected.

Conclusion

Two case studies analyzed here exemplify the effect of already ongoing changes in the marine environment that are commonly associated with the climate change. They provide empirical accounts on how Arctic fisheries are dealing presently with the recent new patterns in fish migration and the situation of 'plenty of fish'. Scaling down the popular focuses on the melting of sea ice and warming Arctic waters to a regional fisheries context illustrates the multiple scales of consequences.

The analysis identified differences in national understandings of sustainability concept that has become a powerful framework in shaping international objectives in fisheries. Nevertheless, the concept may face considerable challenges in putting together pieces of the sustainability puzzle. Analysis of Russian and Icelandic views indicates that there are still several uncertainties over its underlying meaning as well as effectiveness in addressing emerging social and environmental problems.

While EU and Norway emphasise sustainable resource use, underpinned by the precautionary principle. Iceland tends to refer rather to the Russian view on 'rational resource use' in securing the sustainable utilization of the fish stock. Gaps in common foundation for defining 'sustainability' are reflected for example in complications in reaching an agreement over fish quotas: what are 'sustainable quotas' in a shared fisheries and biological limits of sustainability, how best to share the stock, and how to reach a multilateral agreement declaring the quotas unilaterally.

Change in migration patterns of species of big commercial interest have brought under scrutiny regulatory aspects dealing with the new situation. In Russian view, management of common resources requires a favorable rules' environment in participatory management in the Fisheries Protection Zone around Svalbard. Fisheries activities in Svalbard waters seem to be able to avoid the 'tragedy of the commons' with the practical system of resource use which is largely based on the 'destined cooperation' approach. At the same time intensified fishing activities in the area have made the long running dispute about the status of Svalbard more sensitive to the political development and question of national security may be addressed more intensively.

Northward expansion of economic activities has spurred the growth of a debate on its governance. The case of the mackerel conflict raises the question on why existing international regulatory regimes do not produce powerfully enough incentives to facilitate a satisfactory cooperative management. The international legal regime currently in place provides an extensive framework for fishery management. Nonetheless, national state remains very powerful actors in case if states are unable to find agreements. 'Mackerel war' points to how far involved parties would come to combat over the issue of catch quota and how far fisheries may influence political decision as recent Icelandic withdrawal of the EU membership reveals.

Where there are migratory and straddling stocks that do not recognize man-made political boundaries, these would always require management on a trans-national basis. The analyzed cases provide an example of pathways that such development might follow. From this Arctic experience we can see that fisheries management needs to be able to function effectively even with uncertainties and create incentives encouraging balanced solutions.

In both cases we could see how biological or economic rationality may constantly interfere with politics and social values. Dealing with the consequences of environmental changes has increased attention to own national priorities, sensitivities to related definitions, borders and eligible actors. International legal regulations related to fisheries recognize the need to determine target yield considering economic, environmental, and social implications. However, the balancing of these objectives and making a qualitative decision based on quantitative sources demand broadening of management objectives, institutions that can flexibly respond to and learn from changes and developing instruments that provide appropriated social and economic incentives.

References

Astthorsson, O. S. et al. (2012). Climate-related variations in the occurrence and distribution of mackerel (*Scomber scombrus*) in Icelandic waters. *ICES Journal of Marine Science, 69*(7), 1289-1297.

Åtland, K., & Pedersen, T. (2014). Cold War legacies in Russia's Svalbard policy. Hoogensen, G. et al. (Eds.) *Environmental and Human Security in the Arctic.* Abington: Routledge: 17-36.

Bailes, A., Thorhallsson, 2013. Iceland and Europe. Drifting further apart? *FIIA Briefing Paper* 139

Berkes, F. (2009). Social Aspects of Fisheries Management. Cochrane, K. L. , Garcia, S. M. (Eds.). *A fishery manager's guidebook.* Rome: FAO and Wiley-Blackwell: 52-74

Bjørndal, T. (2009). *Overview, Roles, and Performance of the North East Atlantic Fisheries Commission (NEAFC),* Retrieved from http://eprints.port.ac.uk/1882/1/NEAFC_Overview_Article_-_EDITED_FOR_MARINE_POLICY.pdf

CAFF Conversation of Arctic Fauna and Flora (2013). *Arctic Biodiversity Assessment. Status and trends in Arctic biodiversity*. Akureyri: CAFF.

Christiansen, J. S., Mecklenburg, C. W., & Karamushko, A. V. (2014). Arctic Marine Fishes and their fisheries in light of global change. *Global Change Biology 20:* 352-359

Cochrane, K. L., & Garcia, S. M. (Eds.) (2009). *A fishery manager's guidebook (2nd edition).* Rome: FAO and Wiley-Blackwell.

Dahl H. B. (2011). *The Problem of Sharing a Common Stock: An Analysis of the Mackerel Conflict in the North*. Tromso:UiT

Dahl, I. (2014). Norwegian by-catch regulations are not discriminatory, *JCLOS*. Retrieved from http://site.uit.no/jclos/2014/06/02/norwegian-by-catch-regulations-are-not-disciminatory/

Dalpadago, P. et al (2014). Productivity in the Barents Sea – response to recent climate variability. *PLoS ONE, 9*(5)

Drinkwater, K. F., Schrum, C., & Brander, K. M. (Eds.). (2010). Cod and future climate change. *ICES Research report, 305*. Copenhagen: ICES.

Einarsson, N. 2011. *Culture, Conflict & Crises in the Icelandic Fisheries: An Anthropological Study of People, Policy & Marine Resources in the North Atlantic Arctic*. Uppsala: Uppsala University Press.

Ekstrom, J. A. et al (2009). A tool to navigate overlaps in fragmented ocean governance. *Marine Policy*, *33*, 532–535.

EU (2006). *Implementing sustainability in EU fisheries through maximum sustainable yield.* Brussels: EU,.

European Parliament (2013). *Plenty more fish in the sea? MEPs to decide on best way to tackle overfishing*. February 4. Retrieved from http://www.europarl.europa.eu/news/en/news-room/content/20130201STO05560/html/Plenty-more-fish-in-the-sea-MEPs-to-decide-on-best-way-to-tackle-overfishing

FAO (2013). *Fishery and Aquaculture Country Profiles: The Kingdom of Norway*. Retrieved from http://www.fao.org/fishery/facp/NOR/en

Field, C. (2015). *Mapping the problem space and the opportunity space.* Retrieved from http://www.ices.dk/news-and-events/news-archive/news/Pages/Mapping-the-problem-space-and-the-opportunity-space.aspx

Finley, C. (2011). All the fish in the sea. Maximum sustainable yield and the failure of fisheries Management. Chicago (Illinois): University of Chicago Press.

Fishnews. (2014). Est shans na uvelichenie ODU treski I moivy. October 2014, Nr. 1198282 Retrieved from http://fishnews.ru/news/24678

Fishnews (2015). Norway. Russia. Fish January 26, Nr.1283301 Retrieved from http://polpred.com/?ns=1&ns_id=1283301

Garcia, S. M., Rice, J., & Charles, A. (Eds.). (2014). Governance for fisheries and marine conservation: Interaction and co-evolution. Chichester: , Wiley-Blackwell

Glubokovski et al (Eds.) 2013. International fisheries – Interests of Russia. Moscow: VNIRO (In Russ.)

Gullestad, P. et al. (2013). Changing attitudes 1970–2012: Evolution of the Norwegian management framework to prevent overfishing and to secure long-term sustainability. *ICES Journal of Marine Science, 71*(2), 173-182.

Hammer, M., Hoel, A. H. (2012). The development of scientific cooperation under the Norway–Russia fisheries regime in the Barents Sea. *Arctic Review on Law and Politics, 3:* 244-274.

Hastrup, K. (2013). Water and the configuration of social worlds: An anthropological perspective. *Journal of water resource and protection, 5:* 59-66.

Henriksen, T. (2014). *Norwegian by-catch regulations alleged to violate the Svalbard Treaty*. March 18. Retrieved from http://site.uit.no/jclos/2014/03/18/norwegian-by-catch-regulations-alleged-to-violate-the-svalbard-treaty/#more-59

Henriksen, T., Hønneland, G., & Sydnes, A. K. (2005). *Law and politics in ocean geovernance: The UN Fish Stock Agreement and regional fisheries management regimes*. Leiden and Boston: Nijhoff Publishers.

Hilborn, R. (2006). Defining success in fisheries and conflicts in objectives. *Marine policy* 31(2): 153–158

Hjerman, D. (2011). The population dynamics of Northeast Arctic cod (Gadus morhua) through two decades: an analysis based on survey data*. Canadian Journal of Fisheries and Aquatic Sciences 61*(9): 1747-1755.

Hjort, J. (1914). Fluctuations in the great fisheries of Northern Europe, viewed in the light of biological research. Copenhagen: EN Commission.

Hoel, A. H. (1998). Political uncertainty in international fisheries management. *Fisheries Research, 37:* 239-250.

Hoel, A. H. (2013). Management of Living Marine Resources in the High North. Barents Watch. Retrieved from https://www.barentswatch.no/en/Tema/Law-of-the-sea/International-Law-of-the-Sea/Management-of-Living-Marine-Resources-in-the-High-North/#_ftnref

Hoel, A. H. (2014). The legal-political regime in the Arctic. In R. Tamnes, & K. Offerdal (Eds.), *Geopolitics and security in the Arctic.* New York: Routledge: 49-72.

Hollowed, A. B., Sundby, S. (2014). Change is coming to the northern oceans, *Science 6:* 1084-1085.

Hønneland, G. (2012). *Making Fishery Agreements Work. Post-Agreement Bargaining in the Barents Sea.* Cheltenham*:* Edward Elgar.

Hønneland, G. (2014). Norway and Russia; Bargaining precautionary fisheries management in the Barents Sea. *Arctic Review on Law and politics, 5*(1), 75-99.

ICES (2014a) Northeast Atlantic Mackerel. Book 9. Advice 2014. Lisbon: ICES.

ICES (2014b). Report of the Arctic Fisheries Working Group (AFWG). Lisbon: ICES.

ICES (2015). ICES Special Request Advice, Book 9. Lisbon: ICES.

Iceland Pelagic. (2013). Mackerel http://icelandpelagic.is/mackerel/

Jeffers, J. (2010). Climate Change and the Arctic: Adapting to Changes in Fisheries Stocks and Governance Regimes. *Ecology law quarterly (37):* 917-978.

Jentoft, S., Kristoffersen, T. (1989). Fishermen's co-management: The case of the Lofoten fishery. *Human Organization, 48*(4): 355-365.

Jentoft, S., Mikalsen, K. H. (2014). Do national resources have to be centrally managed? Vested interests and institutional reform in Norwegian fisheries governance. *Maritime Studies 13(5)*: 10-16.

Jørgensen, C. (2015). Life of cod in changing environments. *Institute of Marine Research*. Retrieved from http://www.hjortcentre.no/en/projects/hjort-centre/news-archive/life-of-cod-in-changing-environments

Kjesbu, O. S. et al. (2014). Synergies between climate and management for Atlantic cod fisheries at high latitudes. *Proceedings of the National Academy of Sciences, 111:* 3478-3483.

Korrpoo, A., Tynkkynen, N., & Honneland, G. (2015). *Russia and the politics of international environmental regimes*. Cheltenham: Elgar

Lyskin, A. (2013). Rossiyskoe sudno “Novoazovsk” zaderzhali v Norvezhskom more za vybros mertvoi ryby. January 13. Retrieved from http://m.newsru.com/world/13jan2014/novoazovsk.html

Maguire, J. et al (2006). *The state of world highly migratory, straddling and other high seas fishery resources and associated species*. Rome: FAO.

McBride, M. M. et al. (2014, March 28). Krill, climate, and contrasting future scenarios for Arctic and Antarctic fisheries. *ICES Journal of Marine Science* 71 (7): 1934-1955

MFA Ministry of Foreign Affairs of Russian Federation. 2014. Retrieved from http://www.mid.ru/brp_4.nsf/0/006DE90A851D444844257D7B001D759E

MII a. Ministry of Industries and Innovation. (N.d.) *Iceland's Commitment to Sustainable Mackerel Fishing*. Retrieved http://eng.atvinnuvegaraduneyti.is/subjects/mackerel-fishing-dispute/news/nr/6902#_ftn1

MII b Ministry of Industries and Innovation. (N.d.)Mackerel Fishing dispute: Questions & Answers. Retrieved http://eng.atvinnuvegaraduneyti.is/subjects/mackerel-fishing-dispute/news/nr/6903

MII c Ministry of Industries and Innovation. (2014). Iceland announces a restrained and responsible mackerel quota for the 2014 season. Retrieved http://eng.atvinnuvegaraduneyti.is/publications/news/nr/8164

MII d Ministry of Industries and Innovation. (2014). Continued impasse on Mackerel. Retrieved http://eng.atvinnuvegaraduneyti.is/publications/news/nr/8385

MII e Ministry of Industries and Innovation.(N.d.). Statement from the Icelandic minister of Industries and Innovation. Retrieved: http://eng.atvinnuvegaraduneyti.is/subjects/mackerel-fishing-dispute/news/nr/7248

Molenaar, E.J.(2012). Fisheries Regulation in the Maritime Zones of Svalbard. *The International Journal of Marine and Coastal Law 27:* 3–58

Molenaar, E. J., Effreink, A.G., Rothwell, D. (Eds.). (2013). *Law of the Sea and the Polar Regions: Interactions beween Global and Regional Regimes.* Leiden: Martinus Nijhoff Publishers.

MSC. (2014). Mackerel fisheries unite to start MSC reassessment. Retrieved from http://www.msc.org/newsroom/news/mackerel-fisheries-unite-to-start-msc-reassessment

MSC FCI (2014 b). Food Certification International in its 1st Surveillance audit. Report for FIUN Barents and Norwegian Seas cod and haddock fishery. Food Certification International.

Nedreaas, K. et all. (2014) Human activity and impact. Fisheries and other harvesting. *Barents Portal*. Retrieved from http://barentsportal.com/barentsportal_v2.5/index.php/en/updated-articles-2013/current-status-2013/human-activities-and-impacts-2013/850-updated-2013-fisheries-and-other-harvesting-fish-discards

North, R. (2015). The definitive EU exit plan for Britain. Retrieved from http://www.eureferendum.com/documents/Flexcit.pdf

NSF Norwegian Seafood Federation. 2012. Norwegian fisheries. Tromso: Norwegian Seafood Federation

Numberg, A. (2005). Norway chases Russian trawler. *The New York Times*. October 20

OECD (2012). North-East Atlantic Fisheries Commission (NEAFC). Retrieved from http://www.oecd.org/tad/fisheries/NEAFC.pdf

Opdal, A. F., & Jørgenson, C. (2015). Long-term change in a behavioral trait: truncated spawning distribution and demography in Northeast Arctic cod. *Global change Biology 21*(4): 1521-1530.

Ottersen, G.et al (2014). A review of early life history dynamics of Barents Sea cod (Gadus morhua). *ICES Journal of Marine Science, 71*(8): 2064-2087.

Ørebech, P. (2013). The "Lost Mackerel" of the North East Atlantic - the flawed system of trilateral and bilateral decision-making. *The International Journal of Marine and Coastal Law, 28*(2): 343-373.

Øyvind, Ø., Hønneland, G. (2014). Geopolitics and International Governance in the Arctic. *Arctic Review on Law and Politics, 5*(2): 156-176.

O'Riordan T. 2000. *Environmental science for environmental management*. Harlow: Pearson Education.

Pettersen, T. (2012) Russia protests detention of Russian trawler. Retrieved from http://barentsobserver.com/en/business/russia-protests-detention-russian-trawler-02-08

Piling, G. et al. (2009). *Public Certification Report for Norwegian North East Atlantic Mackerel fishery.* Derby: Moody Marine Ltd.

Regulations 2014. Regulations relating to fishing for cod in the fisheries protection zone around Svalbard in 2014.

Rudolff, B. (2010). T*he EU as fishing factor in the Arctic. Stocktaking of institutional involvement and existing conflicts.* Working Paper. Berlin: SWP

RÚV (2014). Makrílsamningur kemur á óvart 12.03.2014

Sadovy de Mitcheson, Y. (2009). Biology and ecology consideration for the fishery manager. In K. L. Cochrane, & S. M. Garcia (Eds.), *A fishery manager's guidebook (2nd edition)* (pp. 21-51). Rome: FAO and Wiley-Blackwell.

Seafish (2013). *Mackerel. Industry Briefing note* 2013 Retrieved from http://www.seafish.org/media/750990/seafishguidancenote_mackerel_201301.pdf

Seafish (2014), *CLG e-alert summary*. December 2014. Retrieved from

http://www.seafish.org/media/Publications/SeafishCLG_NewsSummary_201412.pdf

Southall, T. 2010. *The Barents Sea cod and haddock fishery. Public certification report. Food Certification International*. Retrieved from http://www.msc.org/track-a-fishery/fisheries-in-

the-program/certified/north-east-atlantic/barents-sea-cod-and-haddock/assessment-downloads-1/Public_Certification_Report_-_Final_-_BSCH.pdf

SPFA. N.d. *Mackerel dispute Q&A*. http://www.sff.co.uk/sites/default/files/Mackerel%20QAv%204.pdf

Sputniknews 2015. *Russia and Norway to Sign Arctic Ecosystems Conservation Declaration*. Retrieved from http://sputniknews.com/environment/20150123/1017284050.html

Stokke, O. S. (2010). Barents sea fisheries – the IUU struggle. *Arctic Review on Law and Politics, 1*(2): 207-224.

Stokke, O. S. (2014). International environmental governance and Arctic Security. Tamnes, R., Offerdal, K. (Eds.), *Geopolitics and Security in the Arctic. Regional Dynamics in a Global World.* London: Routledge: 121-146.

Strategy 2014. Strategy of Russian presence on the Archipelago of Spitsbergen until 2020, N-1676-p, September 3.

Tamnes, R., Holtsmark S.G. (2014). The geopolitics of the Arctic in historical perspective. In R. Tamnes, & K. Offerdal (Eds.), *Geopolitics and Security in the Arctic. Regional Dynamics in a Global World.* London: Routledge: 12-48.

Undercurrent news (2015) New Fisheries Iceland chair: Industry needs political stability. January 22. Retrieved http://www.undercurrentnews.com/2015/01/22/new-fisheries-iceland-chair-industry-needs-political-stability/

Waldman, J. (2014). How Norway and Russia Made A Cod Fishery Live and Thrive. *Environment 360. Retrieved from* http://e360.yale.edu/feature/how_norway_and_russia_made__a_cod_fishery_live_and_thrive/2806/

Wegge, N. (2015). The Emerging Politics of the Arctic Ocean: Future Management of the Living. *Marine Resources Marine Policy 51:* 331-338.

Weissenberger, J. (2013). Briefing. North-East Atlantic fish stock disputes. Retrieved from http://www.europarl.europa.eu/eplibrary/North-East-Atlantic-fish-stock-disputes.pdf

Worldfishing and aquaculture. (2013). ICES advice may help Iceland in mackerel dispute, October 5. Retrieved http://www.worldfishing.net/news101/industry-news/ices-advice-may-help-iceland-in-mackerel-dispute

Zilanov, V. 2013. *Is Russia Losing the Arctic*? Moscow: Algoritm (in Russ.)