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Arctic Climate Change
Economy and Society

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ACCESS

Arctic Climate Change, Economy and Society

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Socio-economic settings in the Arctic fishery: Case study from Northern Norway and Northern Russia.

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Introduction

Norway and Russia are key players in the fishing activities in the Barents Sea. Considerable fishing activities occur in the European part of the Arctic Ocean, especially under Norwegian and Russian jurisdiction. The fishing of one of the commercially most important cod and haddock species beyond 12 nautical miles (22 km) by trawl fleet takes place mainly within Norwegian waters (80%), Russian waters and with limited activities within international waters (Southall 2010:8). Only a few species are of commercial interests, but nonetheless, these give basis for one of the largest fisheries in the world (FAO 2011). Although seasonal patterns are apparent, the commercial fishery takes place throughout the year.

The fisheries sector is by far of great importance for rural/urban development in Northern Norway and Northwest Russia. Many coastal inhabitants are involved in the processing, aquaculture, service sector and more recently in related to fishing recreational activities. Diverse fishing activities have been essential in securing basic employment and income in a large number of coastal communities. Maintaining of northern settlements' patterns largely depends on the situation in the sector. As Hersoug points out for the northern Norwegian counties without the fisheries there are few reasons to maintain a heavy public infrastructure (Hersoug 2005:21).

Fishery as economic activity is also encoded with powerful themes of cross-cultural meaning: as the basis for wealth and health and cultural significance of fish/fishing that has its own place in the communities' life. It is essential to many domains or institutions of coastal societies – economic, political, religious, leisure and regarded as crucial to community viability and self-ascribed identity of the residents. Fish that is explicitly valued as a biological fact, an economic good or commodity may also represent essential qualities related to basic human rights, social equity or power.

Objectives. The report presents preliminary results of the research largely based on the anthropological fieldwork in the communities of Northern Norway and Northwest Russia and derived from the local scale contextual qualitative analysis. It addresses issues related to what is at stake, how it is perceived and how fishing societies respond to changes largely through 'cultural lenses'. The investigation thus focuses on the analysis of current state of the domestic fishery sector in two neighboring countries identifying their similarities, specifics and interdependency. In doing so, this comparative study examines changes experienced by Arctic fishing societies and ways these changes are negotiated by communities and beyond the local frame.

Identification of changes, their causes and consequences in their perceptual perspective points a great diversity in interpretations and in acting towards these changes. Research on the current state of the coastal economies in the Barents region turned up in the context of empirical work into the intertwined set of multiple scales of practices, meanings and interpretations that are in interplay across a dynamic seascape of the Barents Sea. All these

aspects are important to consider in an attempt to reach some kind of agreement linking climate change debates, economies and society.

Cultural frame. Theoretical considerations largely taken in account in this report are based on the framing grounded in system of meanings and relationships that mediate human engagements with natural phenomena and processes. As some authors state, this framing is particularly relevant to the study of climate change, which entails movement away from a known past, though an altered present, and toward an uncertain future, since what is recalled, recognized, or envisaged rests on cultural models and values (Roncoli et al. 2009). Without knowing the enacting power of the cultural code and its agency any adaptive, managerial measures may fail. There is a growing awareness that opening many scientific review- and advisory processes to more diverse types of experimental and local knowledge holds more promise for facilitating truly integrated advice (Rice 2005, Edenhofer 2011, Edenhofer and Kowarsch 2012).

Anthropology's potential contributions to climate research is seen in the description and analysis of mediating layers of cultural meaning and social practice, which cannot be easily captured by methods of other disciplines, such as structured surveys and quantitative parameters (Roncoli et al. 2009: 87). Based on this approach the linking biophysical changes, marine resources and fishing societies brings more nuanced connections that may turn out to be transferable across disciplines.

Fieldwork. The format of the fieldwork was focused on multiple sites and different economic activities going on in this Arctic region. It gave a possibility to gain an 'insider's perspective' in a particular setting, where that is a rural declining or flourishing fishermen community, emerging tourist village or regional centre of power. Fieldwork firsthand observations included participation in the veterinary inspection of the salmon farm, visiting a land based Arctic char -, and King crab farms, land based and onboard fish processing factories, fish terminal, participating in cod fishing in the open ocean, recreational salmon fishing and in King crab safaris. Semi-structured interviews included a diversity of actors: from Norwegian and Russian fishermen, resource managers, or farm/factories workers, service sector representatives to tourist agents, scientists, local journalists and indigenous members of communities.

Another underlying material for the analysis presented here comes from variety of sources, ranging from the studying of related academic literature, systematic evaluation of media coverage to interpretation of statistical data and monitoring data provided by Marine Informatics Company in Murmansk (Russia).

1. From environmental shifts to shifts in meanings.

Changes in the marine environment, 'good' or 'bad' fishing periods have been widely perceived in the northern communities to be the order of things. Even extreme events still may be perceived within larger patterns of regularity. In general, the human activities in fishing, social and economic demands have been always adopting new marine resource practices driven by different forces. The environmental stability has never really been the case (Hastrup 2013a: 78).

What is particularly new from the historical perspective in perception of ongoing and expected natural shifts is a shift in meanings. The intensity of the climate change debates strongly influence dominant ideas about the environmental changes. Model projections point on Arctic temperature increase (Polyakov et al. 2010; Overland et al. 2011) which might differ from warming patterns in the previous Arctic warming episodes such as the 1930s (Ahlmann 1948; Drinkwater 2006). Although there are large uncertainties in anticipation of further down changes, there are estimations that they are likely to impact the overall marine ecosystem functioning and services upon which people and societies depend (Doney et al 2012).

Warming Arctic waters have also clearly made the figure of 'climate' not a mere environmental factor. The valuing of the Arctic as a resource has explicitly intensified in the last decade. It has entered into political relations and 'projections' have been 'translated into action' (Hastrup and Skrydstrup 2013). Previously latent disputes over marine boundaries and access to natural resources gradually become more pressing issues. Changing sea water properties bring new issues on the marine governance agenda and policy making. It may address the question of national security and national identity. The High North is Norway's number one foreign policy priority, as it was declared by the Minister of foreign affairs (Norwegian Ministry of Foreign Affairs 2011:5). The Russian government adopted a new Arctic strategy up to 2020 and beyond (Pr. - 1969, Sept 18, 2008), addressing national security and socio-economic development in the region as a main goal to preserve the country's role as a leading Arctic power.

Climate change discussions have served to reconfigure the ways of thinking and talking about the weather variability and environmental changes on the local level. The intensity of the debates over the past few years has also served a rethinking of nature as a socially embedded fact. There is a growing awareness that modeling nature's course is integral, even essential for many realms of social life – economic, political, religious, juridical, moral (Orlove and Caton 2010; Strang 2011; Hastrup 2009, 2013, 2014). In their concrete forms biological changes may have an influence on how people become knowledgeable and acquire skills. It can influence knowledge transmission that is important component of well-being of fishing communities and family. It may result in a new kind of engagements with natural elements, for example, with new invasive species or shifts in fish communities. Availability, prestige of the job in the fishery sector, out- and in population migration can cause new dynamics and reshape a community's life.

Predicted changes in the biophysical properties of the Arctic Ocean due to climate change, emerging of new fields of maritime activity, the prospects of more intensive uses of the sea water, competing demands for lucrative fish stocks and the increased presence of maritime powers and users of the ocean – all these changes bring growing concern about the price of this development for fishery. This is a new situation for the 'fishing' societies when observed and predicted biophysical changes are embedded into a broader economic, political and societal framework of 'climate change'.

2. Linking climate change, economies and society: challenges of research

2.1. From top-down approach to the 'social life' of climate change models.

Addressing environmental and economic changes from the societal perspective and integration of empirical material into climate science within the task 3.4 reveals several challenges. First generation of impact and adaptation studies has come largely from the physical sciences with climate change scenarios derived from global climate models. Top-down scenario-driven approach focuses heavily on the qualitative, rational treatments of climate change issues and future climate. Nowadays 'non-technical' constituents of climate change issues, where the materiality is subordinated to interpretations become a more recognizable aspect of contemporary academic impact studies and policy expertise.

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Bringing the social component into the 'climate' research has been developing fast in the last years. For example, anthropological studies engage in the climate change research analyzing various aspects of human-nature relations (Strauss and Orlov 2009, Stammler-Gossmann 2010, 2012; Strang 2011; Chruikchank 2012; Hastrup 2014). They trace the different forms of valuing natural phenomena, explore the rules and institutions that govern resource use and shape politics, and examine the multiple, often conflicting knowledge systems. Recent anthropological research brought a number of case studies from Norway on the social resilience of local fishing communities (Broch 2013), perceptual view on the fishing rights among Sami and non-indigenous groups (Søreng 2013), and local knowledge of fishermen (Ween 2012). However, the cultural framing of the effect of changes in the

seascape on the fishing society and fishery in general and in the Barents region particularly is a field, where research is still in its infancy. Linking people, economies and changes is a challenging task in terms of theoretical framing, availability of empirical data and comparative accounts, and methodological bridging between different aspects that may form diverse entity.

2.2. Convergence.

The multidisciplinary discussion around climate is going across different representations of climate changes and reasoning. Identifying of areas of synergy in multidisciplinary research is one of the main obstacles of merging low resolution models and generalizations derived from case-to case assessments. Interdisciplinary projects have to deal with types of data that are rarely comparable. Local accounts that may offer more precise and detailed local picture of environmental changes with a solid base of reality do not fit easily within academic frameworks. Even on the regional scale and in case of referring to the same objectives (i.e. ice thickness or fish abundance), scientific and local knowledge might represent an unequal way of configuring nature. For example, criteria for safety and risk assessment in relation to moving on the ice or travelling in the sea may be defined differently by local residents and scientists (Stammler-Gossmann 2010)

Ice conditions for the vessels movement can be evaluated differently by the scientists using low-resolution satellite map and vessels captains using informal channels of close monitoring (personal conversation). Local and scientific estimates of fish or marine mammal stocks may refer to different measures (Hastrup 2013; Wee 2012) and it makes not easy a reaching an agreement between 'biological' and 'social' numerical records.

Multidisciplinary frame of studies brings also a challenge of convergence of quantitative, measurable parameters and empirical data that may be grasped conceptually, but cannot be measured numerically. It is difficult for example, to quantify an important aspect in the Arctic community's life like informal economic activities or informal generalized reciprocity codes. It is not easy to measure quantitatively fishermen solidarity in the open waters and other unwritten rules of the sea like informal sharing of information on where to fish. Also the value of sentient meaning of the nature for people expressed in oral traditions is still a challenging task to mobilize these insights to get a broader comprehensive picture of climatic effects for the society (Schaffner 2012, Cruikshank 2012). Developing social indicators of sustainability for Arctic, as the ASI report states, was extremely difficult even in a relatively easy cases like well-being in comparison with measures of factors like fate control and contact with nature (ASI 2010).

2.3. Complexity.

Another challenge in the socio-environmental studies is dealing with the diversity of the people involved at different levels of economic-social domains – professional fishermen, coastal residents, decision makers, development agents, indigenous groups, representatives of economic sectors related to the fishery. Different actors may act upon different ideological

filters, different reasoning behind the same data, diverse informational inputs and measures. At the same time their fishing activities may differ in their diverse sector targets, relation to the vessels composition, main fishing ground locations, and attitudes to the fishing. Possible outcome of the climate change projections may be shaped in terms of everyday practices, a social construction or a field of political action.

2.4. Climate vocabulary

Furthermore, the climate change studies operate with a broadly used conceptual vocabulary – sustainability, human needs, ecosystem health, vulnerability etc. Depending on how societies understand these concepts, they may act towards environmental changes and exploit resources. However, although researchers' community or political institutions share a similar lexicon, concepts are often imbued with different meanings (Miller et al. 2010). There is still some conceptual vagueness that makes challenging to 'operationalize' in a practical setting (Gallopín 2006, Gunder 2006).

Furthermore, using the same vocabulary in integrative research on human-environmental relations doesn't promise the same meaning at the different national levels. Semantic misunderstandings may occur even because of the difficulties in equivalent translation. For example, in Russian version the word 'sustainable' may be sometimes mixed up with the notion 'stable'. Definition of 'resilience' is a new theoretical and linguistic puzzle in the Russian scientific field. There are also attitudinal differences, which demands greater attention in developing place-based methods of research.

2.5. Uncertainties

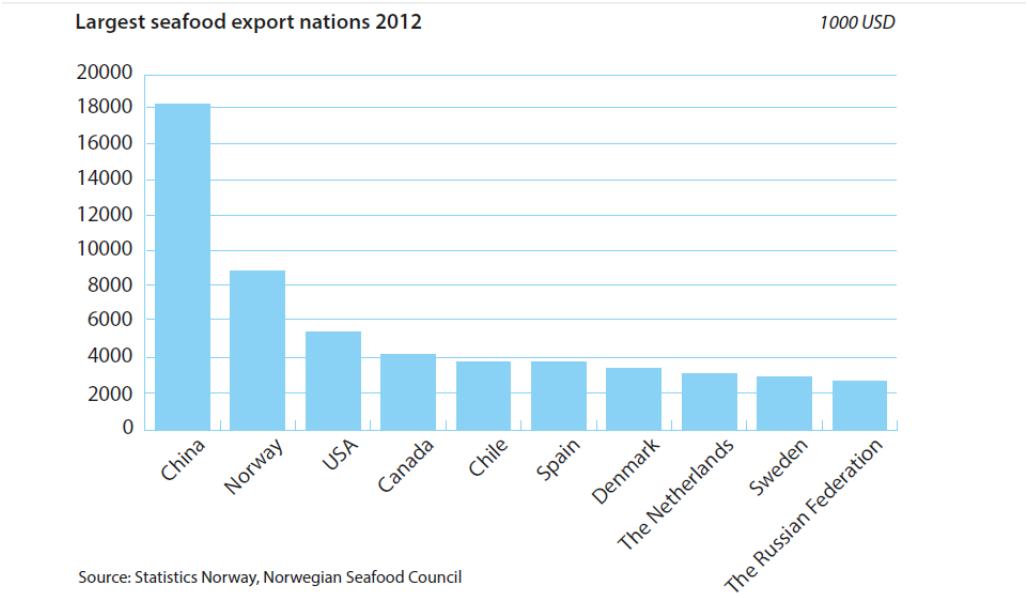
Most well-known statement in relation to the direct impact of climate change on fisheries refers to the changes in the geographical distribution of fish stocks as a result of increasing ocean temperatures. Simplified scientific knowledge (Rice 2005) has been taken on the political climate change agenda and spread by mass-media. However, the current state of knowledge highlights that the influence of climate changes on the stock status of living marine resources involves more than changing their distribution range (Shamray and Lepesevich 2011). Drawing lessons from existing ecological studies, we can say that forecasting of major changes in the marine ecosystem has huge uncertainty over what those changes will be ((Misund and Skjoldal 2005; Mueter 2009; Sarmento et al. 2010; Howell et al. 2011; Mueter et al.2011; Joint et al 2011; Doney et al. 2012; Aschan et al 2013). It is now largely recognized that it is a complex issue (Hoel 2011: 202), which not always may be closely linked to climate change (Skjoldal 2004; Allison et al. 2009; Brander 2007; 2010).

Given the uncertainties over future marine production and consequences for fish stocks, relation between natural variability and predicted climate change it is not surprising that projections of impacts on human societies and economies are also uncertain. Until now most of the attention has focused one-dimensionally only on scientific uncertainty about the status of exploited resources. The effect of uncertainty generated on the human side of fisheries science and management has been hardly considered. For the latter one a recent study

concludes that human behaviour is the key source of uncertainty in fishery management (Fulton et al 2005).

3. Socio-economic settings in the primary sector of the fishery

Fishery sector and aquaculture are by far of great importance for two neighboring Barents regions in the northeast Norway, Finnmark and in northwest Russia, Murmansk region. Both countries belong to the most important and influential player with large fishing fleet. Norway became the first country in the world to establish a Ministry of Fisheries in 1946 (Norwegian Ministry of Fishery 2007). The fishing industry today with the share of 7 percent is the second largest export sector in Norway after the oil and gas industry (Norwegian Ministry of Fishery 2013: 7). For many years Norway has been among the world's top two or three exporters of fish and fish products. (Norwegian Ministry of Foreign Affair 2011:11; FAO 2012: 71). Russia was the main export market for Norwegian seafood in 2012 (Norwegian Ministry of Fishery 2013:6)



Russia is also among leading producers of fish and was accounted among largest seafood export nations (Norwegian Ministry of Fishery 2013: 5). It is also an importer and a rapidly developing seafood market. According to the FAO statistics the increased European production of fish between 2004 and 2010 is all attributable to a rise of almost 50 percent in catches of the Russian Federation (FAO 2012:8). Moreover, an increase of more than 40 percent above present level may be expected (FAO 2012: 21).

On the both side of the northern border fisheries provide livelihood and income for many people in Finnmark county and Murmansk region engaged in the primary production sector, aquaculture, in processing, packaging, marketing and distribution, boat maintenance. There

is a service sector that involves supply, tourism, retail, transport, and administration. Although the structure of the fishery sector and fishing efforts in Northeast Norway and Northwest Russia have very distinct characteristic, several factors make economy of both neighboring regions strongly dependent on each other: close cooperation between different segments of the sector, sharing common fish resources like King Crab and salmon in the coastal activities, landing 'Russian' fish in the Norwegian terminals, fish trade and labor flow.

3.1. Fishing activities in Finnmark (Norway).

Finnmark county is both the northernmost and easternmost county of Norway. The county has the largest area and smallest population of all Norwegian counties. Residents of Kirkenes (69° 43' 30" N, 3444 inhabitants), municipal center of Sør-Varanger community in Finnmark, are basically not directly involved into primary sector, but the whole community life is strongly related to the fishery. Ice-free, deep water port of the town is an important service port for the northern Russian fishing fleet. Particularly in 1990s and until 2010 Kirkenes has been intensively used as a second base for fishing operation of Russian vessels from Murmansk. Their presence has decreased since reduction of excessive formalities on landing in the home port, amnesty for fishing vessels modernized abroad and introduction of new legal regulations that obligate to bring the catch from the national economic zone to Russia.

Russian vessels in Kirkenes, photo: Stammler-Gossmann

Nevertheless, border town of Kirkenes remains an important base for the fishery operations and Russians are the main customers of several agencies offering full service from landing fish at the local fish terminal, customs clearance to ship repair and resupply of fuel and food. “Seamen’s club” is the most popular place for the Russian fishermen for meeting and spending free time. Most stores of Kirkenes employ Russian-speaking personnel. You can meet fishermen reading Russian newspapers in the municipal library that offers big collection of books and films in Russian.

In opposite to Kirkenes, many of small coastal communities in Finnmark are still directly dependent on marine harvest. According to the statistics of the Norwegian Directorate of Fisheries Finnmark belongs to the northern counties that have had the highest number of registered fishermen in Norway in 2013 (Norwegian Directorate 2014:6). In 2012 the Register of Fishermen placed Finnmark with 1099 fishermen as number four in the list by 19 counties of persons having fisheries as their main occupation (Norwegian directorate 2013: 26).

While statistics show the general reduction in the total number of fishermen in most of the counties, Finnmark’s numbers for people with fishing as a main occupation increased from 1022 in 2008 to 1099 in 2012 (Norwegian directorate 2013: 26). The primary cod fishing industry in three visited settlements on the northeastern coast, Bugøynes (69° 58' 25"N, 230 inhabitants), Mehamn (71° 2' 0" N, 708 inhabitants) and Gamvik (71° 3' 0" N, around 100 inhabitants) (Statistics Norway 2012) has been always a main economic activity. Bugoynes and Mehamn are located in naturally favorable surroundings of fjords, whereas the Gamvik, the northernmost settlement in European mainland is on the coast of open Arctic Ocean. Bjørnvatn (69° 40' 1" N, 2493 inhabitants) is a coastal settlement along Langfjord, where the open pit iron ore mine is operated by Sydvaranger Company, but fjord fishing combined with farming is a traditional activity of some residents with Sea Sami background.

A characteristic of coastal communities in northeastern Norway is that, traditionally local fisheries have been small-scale and family based, having developed their own distinctive forms of social organization. Involvement of close or extended family’s or friends’ group is still important in small villages in recruiting for example fishing crew members, in spite of participation in occupational fishery associations. The quota for the small boats in these villages is given to the boat’s owner, who has to be Norwegian. That is why in the primary production formal contractual relations with foreign workers are rare, although for the bigger vessels the relations may be different. However, in general to get a job on a Norwegian fishing vessel for the non-Norwegians is not easy. As the Norwegian Labour and Welfare Service (NAV 2013) puts this information for the foreign job seeker in the fishery sector: ‘These jobs are mainly filled throughout an internal network’.

Eastern Finnmark coast offers year around access to fish, which come near the shore, but the largest cod fishing takes place from spring until late summer. As emphasized by the residents of the coastal communities, in a household where man is fully engaged in fishing, it is important that wife has a job in another sector, mainly as a teacher, nurse, administrative worker or in service. Other residents may combine seasonal fishing with farming. However, while some coastal communities, particularly on the western coast are diversifying their economies, for example through tourism activities, commercial fishing has been an economic mainstay supporting these eastern rural economies for generation.

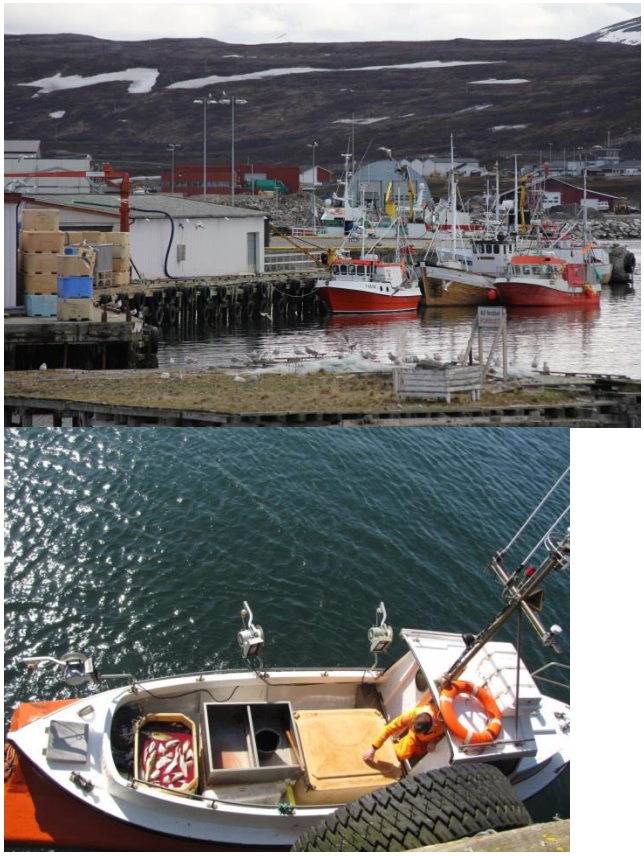
Nowadays, fluctuations in fish prices, changing conditions of domestic fish stock, low prices on raw fish, high operational costs in Norway, high taxes on processed seafood and limited possibility to sell fish abroad are identified by small fish enterprises as main components of income insecurity. It may discourage young people, who otherwise would like to be involved in fishing activities on the full-time basis (personal conversation).

However, last years of very good fishing season and high income have made fisherman job more attractive for the younger generation as expressed in one interview: 'My husband works at the processing plant, but he would like to be a fisherman. In one day you can catch so much fish and fishermen can earn so much. However, he is seasick and have to stay on the land' (personal conversation, June 2012). Villagers of Gamvik were happy after years of closure of the port activities, 'to see again small boats coming and going and sounds of the seagulls'. The development in the small scale fishery of the Finnmark coast indicates rising interest in participation in fishing activities.

3.2. 'We are waiting for fish': small-scale coastal fishing

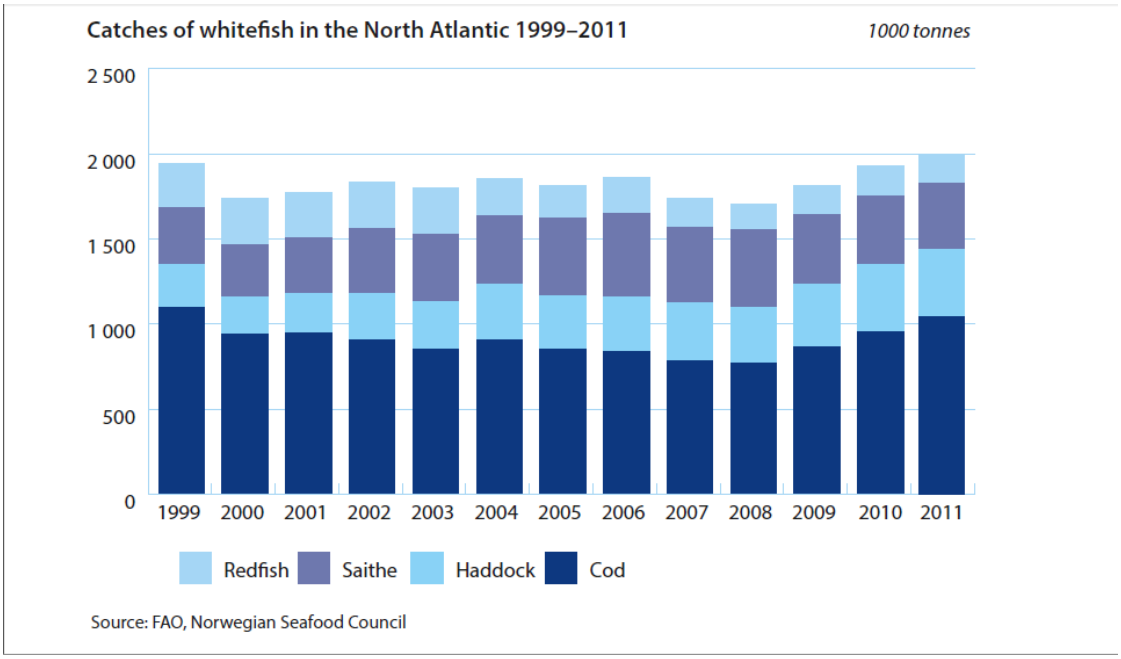
'We are waiting for fish', may Norwegian fishermen in the north say. They do not need to fish in the open ocean. Most commercially important fish stocks arrive at the coast and fjords of Norway in search for food and reproduction. Thus it is possible to catch fish as Nilsen describes it close to the shore as adult or mature fish and with simple gear and low effort (Nilsen 1998: 85). Although Norway has a diversified fishing fleet from small boats to large trawlers, in the northern regions it is dominated by small and partly very small coastal vessels fishing close to the shore and on the adjacent fishing grounds. While the total number of registered vessels in Norway constantly decreases, the numbers of registered vessels in Finnmark shows increase: 910 vessels in 2010; 935 in 2011; 940 in 2012 (Norwegian Directorate 2014)

These naturally given advantages of coastal fishing in Norway offer other advantages for fishermen. Shorter distances and shorter fishing effort give the possibilities to stay with the family and participate fully in the community's life. In terms of selling it may take only two days from the fish is caught to it is ready for sale. In the small coastal villages of Finnmark, where are few employment alternatives, the fleet of small vessels is particularly important for the men's employment. Nilsen underlines that these traits of the marine system help to understand the socio-economic development the North Norwegian coast in general and the relatively strong position of the coastal fishing over years in this region (Nilsen 1998: 89)



Small scale Norwegian coastal fishery, photo: Stammler-Gossmann

Moreover, what is special with the Norwegian setting is that commercial fisheries are dependent upon a few key species. Although the Norwegian fleet is targeting more than 70 species, 90% of the catch is covered only by ten species (Hersoug 2006:18). Cod is the most preferable fish and cod fishing has been always the most important in terms of value of landed catch (Statistics Norway 2013).



Key species of concern in northeastern communities include also King Crab and salmon. While cod vessels may be considered as all-year-round vessels, landing catches at least seven months a year as defined by Hersoug (Hersoug 2006: 22), sea salmon fishing in fjords and rivers has a definitive seasonal features. While coastal fisheries are generally more specialized, the salmon fishing takes place alongside farming and other employment (**Søreng 2013).**

3.3. Fishing activities in Murmansk region.

While the Norwegian fishing industry and related sectors are based in small communities along the coast, in the neighboring Murmansk region all fishery related activities are based in the regional capital of Murmansk. The region belongs to the most highly industrialized areas in the North. Murmansk, the regional capital, is the world largest city north of the Arctic Circle with 302,468 residents (Murmanskstat 2013a) and the only ice-free port in the Russian North.

Northwest Russian fishery complex encompasses different components of the value chain, inherited from the Soviet era: harvesting, processing production of fishing gear, repair of vessels, grid organizations, education, academic and applied research and retail. This region accounts or 16 percent of the overall fish and seafood harvest in Russia (Muran 2013). In Soviet times fishing sector employed around half of the city with the population about 500 000 (Helin 1964: 401).

As in Norway the number of actors has been significantly reduced, but the sector is still of great importance for employment. Number of the fishery related enterprises in 2012 was 191 (including 46 processing plants) and it provided income for an estimated 7,9 thousand

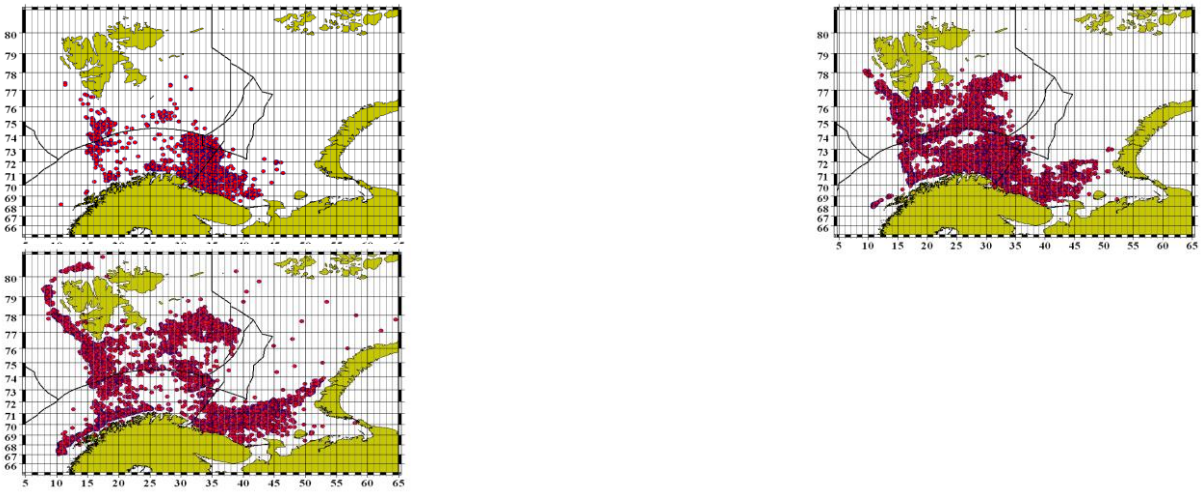
persons (Zabolotski 2012). In GDP of the region fishery and aquaculture accounted from 6,8 to 7,8 percent in 2009 -2011 (Murmansk Statistics 2012).

Its greatest glory Russian fishery experienced in 1980s when the Soviet Union was the world's second most important fishing country behind only Japan operated by the world's largest fishing fleet. After several post-Soviet years of deep restructuring of the management system, legislative base, integration into international regulation framework, the state of Murmansk fishery as the whole Russian fishery sector may be characterized as more stable (Zabolotski 2012). However, in spite of positive development dynamics in some segments of the industry (e.g. turnover, catch and export statistics, salaries increase) the experts point that this processes will still take many years.

While the socialist Northern fishery system was based on global harvesting and deliveries to Russian ports, the new system is based on catches in closer waters of the North Atlantic, the Barents and Norwegian Seas and access to global markets. In the Soviet the major focus was made on pelagic species of fish as mackerel and herring. The main trend since early 1990s has been towards concentrating fishing efforts on commercially important stocks, that generate relatively high income primarily cod.

Because of the specific of the distribution of the young and mature fish, when the young and smaller fish is in the Russian part of the Barents Sea, the basic Russian catch comes from the outside of the Russian Economic Zone, mainly in the area along the northwestern coast of Norway and around Svalbard. 62,3 percent of the harvesting activities of the Murmansk fleet occur in the Exclusive Economic Zones (EEZ) of other countries, 24,5 percent in the Russian EEZ and 13,2 percent beyond of the EEZs (Zabolotski 2012).

While fish catch in adjacent waters of Svalbard according to the Russian expert Zilanov comprise 5-8 percent of the Norway's annual catch, it makes around 20-25 percent of annual Russian catch. It increases up to 50 percent during the cooler years when fish like cod, haddock, and capelin migrate more westwards (Zilanov 2013:44). Analysis of the Marine Informatics database (Murmansk) shows a clear change in the operational location of the Russian fleet due to changes in cod distribution far eastwards until Novaia Zemlia and far westwards to 80 degrees northern latitude in the northwestern part of Svalbard waters. This aspect that the main fishing effort of the Russian fleet take place mainly outside of the national waters, makes is particularly sensitive to changes in the international regulations.



1985 2000 2012

Arctic cod fishing: Russian fleet distribution, 1985, 2000, 2012. Source: Marine Informatics database.

From the early 1990s until the recent time the most of the cod catch was delivered abroad. In 2008 44 percent of vessels registered in the Murmansk harbor did not land fish in Murmansk (Popov 2008:18), thus depriving land-based employees of workplaces and the Russian treasury of incomes. Volume of delivery has had a certain increase since introduction in 2008 regulation on obligatory delivery of all fish caught in national waters to Russian ports. Still, main part of the fish harvest by Murmansk fishermen that operate in the distant waters goes abroad.

They are forced by better fish prices and services offered abroad, complicated and time-consuming landing in the Murmansk harbor. As reported by the Russian fishermen 'it may take only half an hour to go through the custom control and land the fish in Kirkenes'. Fish terminal in the port has also employed a Russian staff to ease the procedure. Landing in Murmansk harbor may take up to two days 'until fish can get spoiled'. As for 2013 Russian fishermen reported that even fuel price difference between Murmansk and Kirkenes is not so big any more, but for that you get a fuel of a better quality in Norway (personal conversation).

The situation with Russian vessels that were built or modernized abroad can be seen as part of a regional pattern. Most of the vessels in Kirkenes are so called 'foreign brand' (*inomarki*) that were bought outside from Russia. They do not go to the home port because of the high import duties and value added tax (up to 23 percent from repair or modernization costs) that they have to pay entering Murmansk harbor. The introduced 'amnesty' for this kind of ships did not solve the problem. Changes in the federal law of 2009 lessening the tax burden applied only to the trawlers modernized before September 2008. It did not consider that some vessel's facilities should be changed almost every year. It reduces the fleet flexibility in rebuilding in case of target species changes and need for new facilities. The existing Russian shipyards are still not able to compete with the prices, quality and services for example on the Croatian shipyards. More than 80 vessels, around 30 percent of the regional fleet, bought and modernized abroad (Guliaev 2012) land their catch outside of Russia.

Sharp decline of the sector at the beginning of the century has had a considerable negative impact on the romanticized image of once very attractive and well-paid in the Soviet planned economy job in the distant waters fishing. Currently the prestige of work in the fishery is

increasing due to increased cod quota and increased possibilities of more stable and higher income. Some experts may relate it also to the delayed plans in development of the Stockman gas field, when fishery sector overcomes the euphoria of the expected development of oil and gas sector in the region (personal conversation).

Interviews conducted in both of the regions show that employment in the sector is seen as possibility to generate a higher income and raise living standards for the fishermen and their families to a level commensurate with other social groups. A comparison with possibilities in other economic sectors is particularly important for the distant water fishing community in the Murmansk region. By the Russian fishermen the transportation sector has been always considered as an alternative to the job on board of the fishing vessel. Obstacles in recognizing for example diploma of captain or navigator of a fishing vessel is seen as a limitation of cross-sector flexibility in a search for another job during the hard time in the fishery sector. However, big city offer definitely more alternative opportunities for work than in tiny Norwegian communities.

Nevertheless, the young graduates of the Murmansk Fishery College prefer to search for a land-based job than be away from home for months in the primary production segment. Current uncertainty around the future of quota is also a factor that may lower the attractiveness of job. The current 10-years fishing quota is based on historical records of fishing (period and volume of fishing) and lasts until 2018. There is a fear in the sector that after 2018 this principle of quota allocation may be replaced by principle favoring the new vessels and quota auction (personal conversation). According to the regional statistics 81 percent of all vessels of the Murmansk fleet are still older than 20 years (Zabolotski 2012). With the new principle these vessels will be largely disadvantage in favor of newer ships. Ship owners have become less confident with their future and ongoing quota discussions are hampering more long-term investments. Getting a bank loan has become also more difficult.

3.4. ‘We are following fish’: large-scale fishery

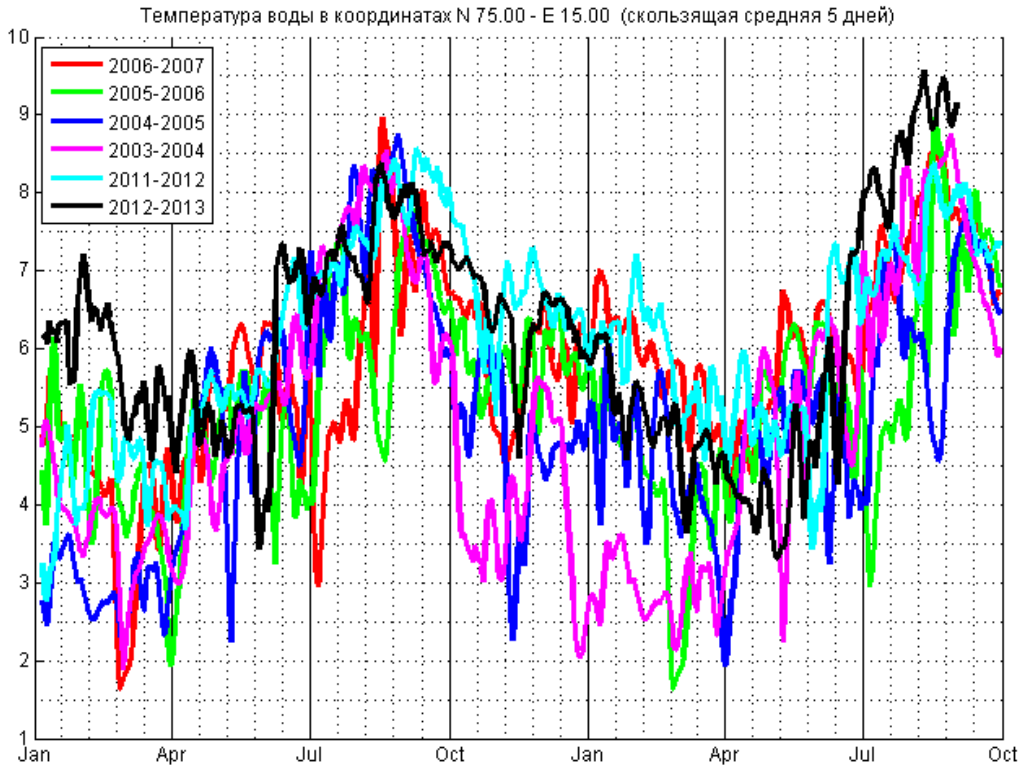
In opposite to the Finnmark’s fishermen, whose fishing grounds allow going not so far away from their home, Russian fishermen have to spend months follow fish in the open sea. It is considered as one of the main challenges of the job in the harvesting sector. As it was already mentioned the majority of the region’s catch is harvested from the 200-mile coastal areas of foreign countries and in open part of the ocean outside 200-mile zones. While Norwegian fishing is carried out mainly by long-liners, Russian fleet is composed mainly by trawlers. Trawlers are more productive with dense population of fish and may change location quickly if the stock has moved (Grekov and Pavlenko 2011). These features determine the patterns of vessels’ movement – Russian fishermen have to literally follow fish to make harvesting more productive.

Distant fishing needs bigger and more autonomous vessels with engines and storage facilities sufficient to permit fishing far away from home ports. From the 214 fishing vessels registered currently in Murmansk 12 belong to the large size vessels (up to 120 m in length) , 122 are medium sized (up to 60 m in length) and 68 are small (Vasiliev 2008: 38; Muran 2013:11). One-day operational costs of a big trawler (100 m) are around 30-50 thousand dollars. A modern big trawler has around 100-120 people on board, a middle-sized one around 40. Fishing can take a long time – up to 6 months.

Russian large scale fishery, Marine Informatics database.

The established in 1950s-1960s large-scale distant-water fishing was in line with the official fisheries policy based on the principles not only economic profitability, but also political motives. Also nowadays maintaining of the big trawler fleet, in spite of high operational costs, environmental impact and reduced fishing areas (Grekov and Pavlenko 2011) is considered as important component of the Russian strategy 'to remain active in distant parts of the world ocean' (Zilanov 2013a: 97).

Russian fishery in the Barents Sea has another important feature; it is carried out throughout the whole year. In difference to the Norwegian fishing activities in Finnmark that have distinct seasonal focus when mature fish migrate close to the Norwegian coast particularly in February-March, Russian efforts have less seasonal character. For example, cod fishing around Svalbard takes place almost whole year. Different targeted species are harvested in different time and in different parts of the Barents and Norwegian Seas. Current northwards trend in the distribution of commercial fish stocks determines intensified fishing in the Svalbard Fisheries Protection Zone. It brought much sensitivity to the issue of the peculiar legal status of Svalbard (Zilanov 2013).



Svalbard. 75°N, 15°E. Water temperature: 5 day measuring interval, 2007-2013. Source: Marine Informatics database (Murmansk)

To bring fish from the distant areas means that fish should be either chilled on ice (up to 10 days) or frozen. Long distance fleet is supported by refrigerated transport ships that reload the fish and also supply with fuel, food etc. Two or three smaller vessels can hire together one transport ship to sustain their operations. Greater fuel consumption may be compensated by greater harvest up to 100 t a day (personal conversation).

4. Fish processing sector and community

4.1. Processing industry in Finnmark

North Norwegian coastal communities have always been characterized by a greater number of fish and few people. As far as efficiency in the harvesting and aquaculture sectors as well as export rate have risen substantially, Norwegian processing industry has a greater demand for workers, who would be able to perform monotone physical labor at lower rates. In visited fish factories and farming companies the most of the work was in baiting fishing hooks, slaughtering, filleting and packing. Local Norwegian residents show little interest for this sector. The companies in eastern Finnmark are dependent on foreign labor mainly from East Europe and particularly from Russia.

As a result, one-third of employees in the fish processing industry in Norway are foreigners (NORUT 2012, Friberg 2012, NAV 2013). The Head of Information at the Norwegian Seafood Federation means that 'If we would not have access to the foreign labor, we would never have seen the coastal communities we see today. (quoted by NORUT 2012). The requirement for foreign labor is unlikely to reduce in the future.

The Norwegian fish processing sector becomes an ethnic niche for the Russian, Polish and Tamil workers. Foreign workers may bring new working patterns like in case of Tamils described by Finstad (Finstad 2004). Net migration has particular importance for Arctic places, where the arrival of newcomers can quickly reshape community life (ASI 2010: 41). Study of rural communities in Norway demonstrates that relatively small changes in the population dynamics in the sparsely populated Arctic areas may reshape the community life. Presence of Russian people in Kirkenes brought new economic dynamics to the town, but also raised issues of integration into the Norwegian society. Temporary jobs hinder integrative process and may build an isolated segment of the community's life.

Some trained Russian workers of one of the factory, whose manager would like to have them for a longer time, cannot stay longer than for two years because of the visa regime. They have to leave Norway every three months to renew their residency permit and every two years and stay in Russia for one year before coming back. The in-migration may indicate an economic revival or growth, but may also be perceived at the local level as certain disturbance on the community's way of life. At the same time the newcomers may experience some stress because of the lack of language skills, different cultural background, and lower wages (Sandelson 2014).

The labor market demands only for unskilled workers. However, the interviewed young seasonal workers of a processing plant in a tiny village were in fact unskilled for a provided job, but had a higher educational degree and came from the very urban area. Hard, underpaid job and not so vibrant life outside of the factory were perceived by foreign workers as a challenging factor for their stay. There were almost no contacts between newcomers and locals.

In the Arctic to a greater degree than elsewhere, net migration often dominates population structure and change. Russian people from Murmansk region, who were attracted by better paid job in the fish processing in Finnmark at the beginning of 2000s and got a Norwegian residency nowadays constitute rather 'silent' and not fully integrated group of the society. Although demography/migration is an appropriated indicator related to sustainability, its

application is not straight forward task. Not all statistics in Norway and Russia, for example, are sensitive to the ethnic components of migration and bigger interpretational effort may be demanded. Still, the effort to make a progress in this issue is essential to understand how to keep Arctic communities and specifically fishery sector viable.

4.2. Fish processing industry in Russia.

Situation in the processing industry in Murmansk region reveals a different picture. While the lack of labor force is a main challenge for the Norwegian sector, Russian processing plants lacks of raw material. Russian vessels continue to land fish in the foreign ports. Onshore fish-processing facilities, once the largest in the country, now operate at only a small fraction of their capacity. The cut-off supply to the home market has led to high unemployment among land-based workers. It continues to remain underdeveloped although more investment is flowing into the sector (Muran 2013:11) and more of the catch has returned to Russian ports after introducing of mentioned above regulations on fish deliveries.

However, as reported by the central Russian newspaper in 2013 about 80 percent of the regional processing industry has been left without fish and the volumes landed have dropped by almost 50 percent within few months (Izvestia 2013). The background for this critical situation in the sector is related this time not to the processes in the distant water fishing, but to specifics of coastal fishing.

The definition of 'coastal fishing' is fuzzy and allows according to the governmental Decree (No.886, November 26 2008) in 200-miles Russian exclusive zone. Expanding the fishing area as a reasonable step to support coastal fishery turned out to bring a new challenge: the further away a fisherman goes, the longer and more expensive it is to transport fish back to the shore. Fishermen came up with a solution – to process and freeze the fish on board and reload to a transport ship (Barentsnova 2011). This practice was legalized by changes in the Federal Law on Fishery, which came into force in 2013. The result has been that the fish caught by coastal fishing vessels has been sold to the foreign companies via ship-to-ship operations. According to Izvestia of the 15 companies which previously delivered their catch for Murmansk plants, only three are left (Izvestia 2013).

An internal tension around delivery between fish harvesting and fish processing segments of the fishing industry in Murmansk region is not the only problem that latter is facing currently. There is no guarantee that landed in the Murmansk harbor fish will be processed in the region. Fishermen are more attracted by more lucrative prices on fish offered by the processing plants in other Russian regions (for example Moscow, Saint Petersburg) that employ low-paid migrants from former Soviet republics. Higher cost for operating processing facilities and labor force in this Arctic town makes Murmansk factories less competitive. While the regional 'Association of the workers of the processing industry' requires guaranteed catch quota for the sector, occupational organizations of fishermen do not see incentives to sell fish under the market prices.

One of main objectives of the 'Federal Program on the Development of the Russian Fishery Industry 2013-2020' (Decree no.315-P, March 3, 2013) is to make a shift in the fishery sector from focusing on primary production and exporting of raw materials to the added value fish production. On the regional level, finding the balance between the onshore and offshore activities seems to be in the current situation one of the most challenging task of the processing sector. Until now some introduced regionally adaptive measures like some social guarantees for the workers and certain tariff reductions, did not bring positive changes in the sector.

Preliminary findings:

What is learned from the study in these northern regions is that tracing the dynamic relationship between climate and society means understanding of also non-linear impacts of 'climate signals' at scales relevant to human activity. Analysis of socio-economic settings in the Arctic fisheries illustrates that how much fish will be caught, and where the fish will be landed has a most significant impact on the economy of two advanced fishing nations and neighboring countries – Russia and Norway. Increased abundance of the key specie of the Arctic fisheries, the Arctic cod, has increased total allowable catch for cod in the Barents Sea. The catch statistics of both countries demonstrate steady growth in the last few years.

Spatial variations in abundance or where fish is caught has been rather secondary aspect in economic terms. Norwegian and Russian fleets follow their traditional patterns of 'waiting and follow fish' movement respectively. Finnmark fishermen use the competitive advantage of their coastal vessels being located close to fishing ground. Limited mobility of Norwegian longliners is compensated by greater efficiency of harvesting in conditions of scattered fish population. Murmansk fleet fishes traditionally mainly in the distant water using advantages of high mobility of trawling. Longer distances to the fishing grounds, higher fuel costs for the large scale fleet are compensated by greater volume and value of catch.

Analysis of primary and secondary production show internal sensitivities between different components of the fishery sector. How much of the caught fish will land in the domestic harbors is crucial for Norway, the second biggest seafood exporter in the world. Great total value of foreign landings makes a significant contribution to the national industry. At the same time much of fish needs more labor force onshore. The analysis demonstrates that lack of workers in the processing industry is one of the biggest challenges in Northern Norway. Strong dependence on foreign employees brings further changes in the traditional processing activities and communities life.

Positive quantitative changes in primary production not necessarily mean a linear response in the secondary production. In the neighboring country good harvesting performances of the Murmansk fleet do not contribute to a greater regional landing statistics. While shortage of labor force is a troubled factor on the Norwegian coast, on the Russian side shortage of fish has brought regional processing sector to the critical point and has caused certain internal conflict within the sector.

While internal tension between primary and secondary production sectors constitutes the major problem in the regional fishery sector in Russia, in northeastern Norwegian fishery tensions arise within the primary sector between coastal cod, salmon and King crab fishing, recreational fishing activities and fish farming[1].

Interdependency characterizes not only relations between different units of the whole fishery sector, but also between two national economies. Changes in neighboring domestic sector may have consequences for another one. When Russian trawlers switched from fresh to frozen-on-board fish and changed their landing patterns, it had dramatic consequences for processing companies in Finnmark. However, need for modernization of fishing vessels bought abroad, high domestic import, higher prices for fish and availability of better harbor services still bring Murmansk fishermen to close Norwegian port. As far as the most important fish stocks migrate between Norwegian and Russian waters and consequently decisions taken in management of shared resources directly influences fishing activities. Close pragmatic cooperation between Norway and Russia will continue to be priority in the years ahead.

The empirical material of study shows that every important fisheries decision is embedded in the societal context and has social outcomes. Once it is a part of everyday practices, a social construction or a field of political struggle. Resource users may react in a manner that is unintended by the resource managers. Salmon farming started on the Norwegian coast as a government-supported activity to save the wild salmon and create jobs has turned out today for the local fishermen into a question: Is the aquaculture supporting for the maintenance of biodiversity or is threatening the viability of wild species? As it was shown on the example of Murmansk processing sector, good governmental intention to support this sector through allowing coastal fishermen to go far away from the coast has had in opposite a disastrous consequences.

Social consequences on the local level may materialize in terms of unemployment, occupational change, migration or reconsidering the boundaries between different economic sectors and between groups. Where human-nature relations retain strong cultural ties in the local economies, it may be seen as an important aspect of the quality of life that shape motivation and ability to act towards changes.

The ethnographic accounts collected during the fieldwork also illustrate that the local perception does not make direct linkage between cause-and-effect towards climate driven changes. Change may be largely viewed as natural attribute of the sea water and as autonomous in relation to human beings. Slow changes in climatic means seem to be relatively unimportant for fishermen, who permanently have to deal with changes.

The main social discourse of possible impact of climate change in Arctic fisheries is focused not on the causality between water temperature increase and fishing strategy, but on the

[1] Research on this issue is in the evaluation process and will be integrated into following reports

political 'projections' that may cause rivalry between the states, economic sectors and groups. 'Political' climate change is currently one of the major consequences of the Arctic warming waters for domestic fisheries.

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