universität wien

MASTERARBEIT

Titel der Masterarbeit

„SoFISHticated Policy – Social Perspectives on the Fish Conflict in the Northeast Atlantic“

verfasst von

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angestrebter akademischer Grad

Master of Science (MSc)

Wien, 2015

Studienkennzahl lt. Studienblatt:	A 066 827
Studienrichtung lt. Studienblatt:	Masterstudium Anthropologie
Betreut von:	Ao. Univ.-Prof. Dr. Harald Wilfing

SoFISHticated Policy

Social Perspectives on the Fish Conflict in the Northeast Atlantic

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A B S T R A C T

Ecosystem changes currently question the traditional allocation of fishing rights and quotas in the fishery of Northeast Atlantic mackerel and Norwegian spring-spawning herring in the Northeast Atlantic. Variability in the distribution of these highly migratory species escalated in a political conflict between member states of the European Union, Iceland, the Faroe Islands and Norway, which causes an unsustainable fishery. The aim of this study was to investigate the social understandings of stakeholders of this conflict using the Q methodology. The method reduced the complexity of numerous opinions, detected four distinct perspectives and simultaneously categorised the participating stakeholders. Although the perspectives differ in various elements, it seems that the protection of economical interests dominates the conflict rather than the quest for sustainability. The universal call of all stakeholders in this study to clarify the fishing rights in the Northeast Atlantic reveals a gap in the current international fishery management in the handling of abrupt ecological changes.

1. Introduction

Fishing in the high seas requires international regulation and cooperation. Especially highly migratory fish species challenge the fishery management. Along their migration route, widely distributed fish enter various exclusive economic zones (EEZ) as well as international waters. These cross-territorial migrations produce claims to stocks by several countries. An agreement from the United Nations Convention on the Law of the Sea on straddling and highly migratory fish stocks constitutes the legal framework of their exploitation and is in force since 2001 (United Nations, 1995). Fishing quotas based on scientific advice are proportioned among the countries to serve two purposes: the fair sharing of this natural resource between fishing nations and the prevention of overfishing and conservation of the stocks.

Nevertheless, ecosystem variability complicates the allocation of fishing rights and quotas consistently. In recent years, the traditional sharing of pelagic fish species in the Northeast Atlantic has been challenged. This is caused by changes of the distribution of fish, which require that the allocation of fishing rights according to previous situations is reconsidered. Altered conditions caused the development of new fisheries locations, which complicate the acceptance of the existing

long-term management plan of the International Council for the Exploration of the Sea (ICES) (ICES, 2013). The lack of an international agreement, which includes all states involved in the fishery, makes it difficult to secure sustainability of the fish stocks.

1.1 Political Background

The Coastal States of the Northeast Atlantic, Norway, EU nations, Iceland, Faroe Islands and Greenland (both are autonomous islands within the Kingdom of Denmark and not member states of the EU) and Russia have been disputing over the allocation of the total allowable catch (TAC) of Atlanto-Scandian herring and Northeast Atlantic mackerel for several years. In consequence the TAC recommended by ICES were exceeded for both species.

For mackerel, since 2008 attempts to reach an agreement by all parties on the distribution of quotas had no results. In 2008 Iceland unilaterally assigned a national catch ceiling for the fishery of mackerel and in 2010 the Faroe Islands followed. In 2011 Greenland started to harvest both species in Greenlandic waters according to unilaterally fixed amounts. Two years later Greenland's total catches of mackerel already had added up to 52.296 tonnes (Statistics Greenland, 2014).

In 2013 the Faroe Islands quit the long-term management plan for herring. The management plan had been established 1999 for harvesting within safe biological limits. The Faroe Islands unilaterally fixed a national catch ceiling at 17% of the TAC of 619.000 tonnes, the amount advised by ICES for 2013. Thus the Faroe catch alone corresponds to 105.230 tonnes in 2013 instead of 31.940 tonnes based on the sharing arrangement of Oslo in 2007 (ICES, 2007, 2013). Table 1 summarises the observed catches of herring (from 2012 to 2013) and mackerel (from 2006 to 2013) by the countries involved and how much they exceed the recommendations of ICES.

In August 2013, the conflict reached a peak and resulted in sanctions of the European Commission against the Faroe Islands in the form of trade restrictions. The EC is entitled to act against countries performing non-sustainable fishery according to the Trade Instrument (Regulation (EU) No 1026/2012) (OJ, 2012). The measures included an embargo of imports of Faroese Atlanto-Scandian herring and Northeast Atlantic mackerel and their products into the EU. In addition the use of EU ports by Faroese vessels fishing for herring and mackerel was restricted (OJ, 2013). In November 2013, Denmark, on behalf of the Faroe Islands, requested consultations at the World Trade Organization (WTO) and 4 months later a panel was established (WTO, 2014).

The dispute was settled with a first agreement over mackerel in March 2014, signed by Norway, the EU and the Faroe Islands, but not Iceland, Greenland and Russia. The agreement attributes the Faroe Islands a share of 12,6% of the newly agreed TAC (156.240t) (The Government of the Faroe Islands, 2014). The TAC of this agreement exceeds the advice by ICES. Additionally Iceland set its share unilaterally at 16,6% of the total mackerel catch recommended by ICES (167.826t) (Ministry of Industries and Innovation, 2014a).

Concerning fishery of herring, the EU and the Faroe Islands reached an agreement in June without consulting Iceland and Norway (Ministry of Industries and Innovation, 2014b). The EC lifted the measures in August. The Faroe Islands accepted a catch limit of 40.000t for 2014 and thereby doubled their traditional share and (European Commission, 2014). Nevertheless, this agreement is just an interim solution, since it does not include all stakeholder countries, the negotiations over a future distribution of shares will continue.

Table 1. Trend in the catches of herring and mackerel in tonnes

Norwegian-spring spawning herring

	Norway	EU	Iceland	Faroe Islands	Greenland	Russia	Total catches	ICES Advice (TAC)	Exceeded catches
2012	491.005	57.764	120.956	36.190	1.490	118.595	825.999	833.000	-7.001
2013	359.458	39.210	90.729	105.038	11.788	78.521	684.743	619.000	65.743
Share of total catches in 2013	52,5%	5,7%	13,3%	15,3%	1,7%	11,5%			
Changes to previous year	-6,9%	-1,3%	-1,4%	+11,0%	+1,5%	-2,9%			

Northeast Atlantic mackerel

	Norway	EU	Iceland	Faroe Islands	Greenland	Russia	Total catches	ICES Advice	Exceeded catches
2006	121.993	277.847	4.222	12.067	0	33.580	481.276	444.000	37.276
2013	164.607	331.272	151.235	143.001	52.783	80.817	931.732	497.000 - 542.000	389.732
Share of total catches in 2013	17,7%	35,6%	16,2%	15,3%	5,70%	8,7%			
Changes to year 2006	-7,7%	-22,2%	+15,4%	+12,8%	+5,7%	+1,7%			

Source: ICES, 2014

1.2 Biological Background

The initial points of this fishery conflict are changes in distribution patterns of mackerel and herring. Both species migrate further west- and northwards than before. This causes a prolonged fishing season for herring and an intensification of the mackerel fishery, due to higher density in Faroese, Icelandic and Greenlandic waters (ICES, 2013). Moreover, high spatial overlaps of herring and mackerel, most notably in the south-western part of the Norwegian Sea in Faroese and east Icelandic waters, impede clean catches resulting in an increase of bycatch fishery (ICES, 2013; Nøttestad et al., 2013).

Herring

The largest herring stock in the world is widely spread over the Northeast Atlantic (ICES, 2013). Norwegian spring-spawning herring (*Clupea harengus*) belongs to the Atlanto-Scandian herring group, which also incudes the Icelandic spring- and summer-spawner stocks (Toresen & Østvedt, 2000). The stock is characterised by very flexible migration patterns due to large fluctuations in spawning, feeding and wintering areas (ICES, 2014a).

In the past, exploitation rates and environmental conditions have been the most important factors influencing the distribution and migration pattern of herring (Dragesund et. al, 1997; Drinkwater, 2006; Toresen & Østvedt, 2000).

After spawning along the Norwegian west coast in early spring, the adult herring start migration towards feeding grounds in the Norwegian Sea (Devold, 1963). Hatched larvae drift north, entering fjords along the Norwegian coast and the Barents Sea. At age of 3 years, they leave the nursery area, remain in the north-eastern Norwegian sea for 1-2 years until they are mature and finally recruit to the adult stock (ICES, 2014a; Petitgas, 2010). It is estimated that the spawning-stock biomass (SSB) of Norwegian spring-spawning herring was around 4,7 million tonnes in 2013. Due to high fishing pressure and small year classes, the stock is currently declining (ICES, 2014b).

Mackerel

Northeast Atlantic mackerel (*Scomber scombrus*) also belongs to the highly migratory species. Between spawning areas, feeding grounds and overwintering regions mackerel cover widespread distances. The geographical distribution of mackerel has undergone substantial fluctuations through time. In addition, large shifts in timing of pre-spawning migration and spawning occurred in the last 30 years (ICES, 2012).

The spawning area ranges from Biscay to the Norwegian Sea (ICES, 2012). After spawning on the shelf, adult fish from the southern and western stock migrate northward during late spring and summer (Uriarte et al., 2001) to reach their feeding grounds in the Norwegian Sea. During wintertime mackerel start pre-spawning migration from the feeding grounds southward towards the spawning grounds (Reid et al., 1997). Juveniles remain close to the coastal areas until they become mature and recruit at the age of 3 (Uriarte et al., 2001).

The SSB of mackerel increased considerably since 2002 due to strong year classes. For 2013, the SSB remains high with 4,3 million tonnes estimated (ICES, 2014b).

Although the pelagic fish in the Northeast Atlantic are among the best scientifically explored stocks (Coers et al., 2012), commercial fishery were the first to observe an extended occurrence of herring and increased overlaps with mackerel in northern waters (ICES, 2013). Scientific ecosystem surveys induced by this fishers' ecological knowledge (Johannes et al., 2000) confirmed changes in distribution patterns (Nøttestad et al., 2011, 2013). There are several possible explanations for the increased abundance of herring and mackerel in Faroese, Icelandic and Greenlandic waters in recent years, which may occasionally reinforce each other. Which factors actually trigger recent migration patterns is of particular importance for the strategy of the parties involved in this conflict, since the negotiating position of each country depends on the migration nature (Bjørndal et al., 2004; Hannesson, 2012).

i) Changes in distribution caused by vitality status

Changes in distribution patterns usually occur in unstable populations (Slotte, 1999). If the fish or the stock are in a poor condition, migration distance may be reduced (Petitgas, 2010), as shown during the recovery period after the collapse of herring in the late 1960s (Dragesund et al., 1997). The recruitment of strong year classes may also cause an altered migration, when there are not enough older individuals to teach the recruits (Huse, 2002). Furthermore, an increased density of fish implies greater intraspecific competition for food. To avoid competition, the largest and oldest fish move farthest north and west and therefore conduce to a larger expansion (Nøttestad et al., 1999).

ii) Changes in distribution caused by natural environmental variations

The Norwegian Atlantic Current, which carries relative saline and warm water and the East Iceland Current, which brings cold Arctic water are the main elements of the circulation in the Norwegian Sea (ICES, 2011). Due to variations in the strength of the inflow, the temperature is naturally relatively variable in the western and central part of the Norwegian Sea among the years. The difference in temperature between the inflowing water masses generates a hydrographical front, called Arctic front. With a high zooplankton biomass, the Arctic front is a central feeding area in the

Northeast Atlantic for pelagic fish (Nøttestad et al., 2007). When the Arctic front shifts westwards during various periods, the stock probably follows (ICES, 2013).
Higher sea surface temperatures in the Norwegian Sea lead to a reduction of the main prey of herring and mackerel, *Calanus finmarchicus, a copepod* (Fromentin & Plangue, 1996). In fact, the zooplankton biomass in the Norwegian Sea decreased dramatically since 2003 (ICES, 2011), but seems to recover since the record low in 2009 (ICES, 2014c). During the decline, the highest concentrations of zooplankton were found in Faroese and Icelandic waters (ICES, 2013; Nøttestad et al., 2011, 2013). Lower plankton and higher fish biomass increase the interspecific competition between pelagic fish. The expansion in remote areas may reduce high feeding pressure (Utne et al., 2012).

iii) Changes in distribution caused by climate change
Increasing world atmospheric temperatures also lead to an increase water temperature of the oceans, albeit not uniformly. The Faroe Plateau, Iceland Shelf and Norwegian Sea belong to the fast warming, and the Greenland Shelf belong to the moderate warming North Atlantic large marine ecosystems with an increase in sea surface temperature of 0.89 – 1.39°C, respectively 0.45 – 0.87°C, in the last 28 years (Sherman, et al. 2013). The recent rapid warming is probably related to the positive North Atlantic Oscillation (NAO) index (Belkin, 2009). On the one hand it is thus caused by natural climate variability. However, it is assumed that the remarkably strong increase in the NAO index is strengthened by anthropogenic global warming (Stenevik & Sundby, 2007).
In addition, a trend towards an increase of biomass yields in fisheries is recorded for these large marine ecosystems. It is assumed that this trend is caused by an increase of zooplankton biomass in northern areas (Prokopchuk & Sentyabov, 2006; Sherman et al., 2009; Sherman et al., 2013) which in turn is caused by warming of water masses (Richardson & Schoeman, 2004).
Water temperature can also have a direct effect on physiology and behaviour. For example, the long-term development of SSB of herring is positively correlated with warmer conditions in the Barents Sea (Toresen & Østvedt, 2000). And mackerel shows a temperature dependent timing of migration and spawning. Particularly in years with higher water temperatures pre-spawning migration starts earlier (Jansen & Gislason, 2011).
Due to the physiological limits of pelagic fish, climate change may strongly affect them. But the potential for rapid population growth enables a quick adaptation (Rose, 2005).

1.3 Economic background

The Coastal States in the Northeast Atlantic pursue extensive fishery of pelagic fish but the economy of each state depends on this sector in varying extent and is thus differently affected by fluctuations in catch sizes and price.
With a percentage of up to 95% of the total exports (Faroe Islands in 2013) (Hagstova Føroya, 2014) marine products are the core business of the Northern Islands. All of them benefit especially from the increased abundance of mackerel in their EEZ and an infrastructure for the fishery is developing quickly. The mackerel fleet of Iceland for example increased from 16 Single Midwater Trawls with lengths between 50 and 80 meters in 2008 to 37 in 2012 (ICES, 2009, 2013) and the processing type switched from almost entirely reduction to freezing (Statistics Iceland, 2014).

The infrastructure of regions, which depend on fishery in Norway, the EU and Russia are strongly oriented towards herring and mackerel. Within the fleet of the EU, Norwegian-spring spawning herring is predominantly captured by Denmark and the UK. The main exploiters of mackerel are Ireland and the UK. Although in these countries fishery rather plays a minor role for the economy, particularly rural and structurally weaker regions live from this sector (Department of Agriculture Food and the Marine, 2014).

Thus, changes in the marine ecosystem may also have a substantial impact on fishery-dependent societies. However, the strength of the impact correlates with the degree of dependence (Hamilton, 1998), community size (Hamilton et al., 2004) and with the range of economic alternatives (Hamilton & Haedrich, 1999). Ecological changes create both, winners and losers (Hamilton, 2003) and are therefore a breeding ground for conflicts. But according to neo-realistic and postmodern theory of international relations, conflicts also have an ideational background, as they reinforce national identities and are an attempt of obtaining control over mutual dependencies (Diez, 2008; Roloff, 2008).

The purpose of this study is to investigate the social perspectives behind the conflict in the Northeast Atlantic regarding the policy for fishing of herring and mackerel. In order to identify the driving factors behind the conflict, the range of distinct parties and their understandings was examined.

2. Method

The goal of this study is to analyse opinions on the current disagreement over the fishery of herring and mackerel in the Northeast Atlantic, to identify patterns of opinions, group them into so-called "perspectives" and identify their variety. In order to do so, a bottom-up method popular in discourse analysis in political sciences (Reed et al., 2009) was used.

Q methodology, which was invented in the 1930s by William Stephenson, has its roots in psychology (Webler et al., 2009). It works with fragments of the discourse reality, which have to be valued in relation to another by participants of the study. As a method which allows the quantification of qualitative data, it is located at the interface between these approaches (Müller & Kals, 2004). It enables the analysis of subjectivity in a statistically interpretable form (Barry & Proops, 1999). Because this allows the comparison of viewpoints on polarising themes, Q methodology is becoming increasingly popular in research on sustainability (Curry et al., 2013) and was already used in the field of fishery to investigate fishers' biases (Carr & Heyman, 2012).

The characteristic of the Q method is that participants construct so-called "Q sorts" by sorting given statements. These expressed sorting patterns are subsequently compared and the resultant correlation matrix is mathematically reduced to a small set of factors, which represent alternative understandings of an issue (Stainton Rogers, 1996). Thus, participants which range the statements in a similar way, share a distinct perspective (Stenner et al., 2000). Thereby, the outcome of the Q method doesn't remain at the level of individual orientations but it detects patterns of perceptions shared across stakeholders and connectivity between single statements. In this way, the breadth of understandings above an issue can be captured. Webler et al. give a detailed guidance of the usage of Q method in environmental research (Webler et al., 2009). This study adheres in the implementation

to this instruction. Further statistical evaluation is based on Watts and Stenner (Watts & Stenner, 2012).

2.1 Procedure

The first step in Q method is the collection of a "concourse". A concourse should cover the whole volume and breadth of discussion on the topic of study (Brown, 1986). "Statements", i.e. short sentences voicing an opinion, should express all attitudes. In this study the concourse relies mainly on written media like newspapers, websites, blogs and social networks and additionally on informal interviews with Faroese.

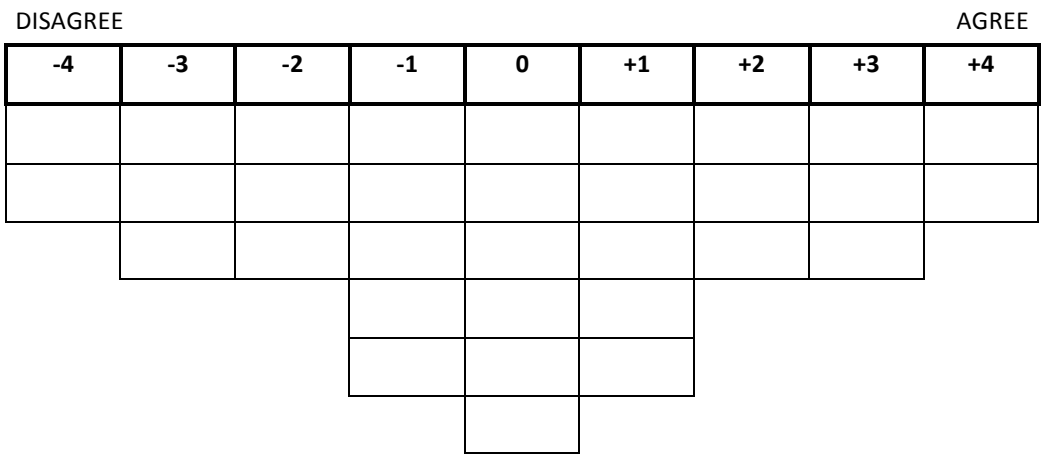
Around 120 potential statements were extracted from the concourse, generating eight categories: sustainability, economy, social, justice, sanctions, fishery management, diplomacy and politics. In order to take all categories into account, four statements were selected from each category. Care was taken to select easily understandable and to a certain extent interpretable statements (Webler et al., 2009). These requirements and the practical application of the Q method reduced the final Q sample to 32 statements.

The internationality of the topic implies English as language of the discourse. The statements are assumed verbatim from the concourse. It was tried to balance positively and negatively distinguishable statements.

For the survey, the participants were asked in the first step to split the randomised statements into three piles: one pile for statements they tend to agree, one for disagreement and one for statements they have neutral attitudes about. Next, the respondents sorted the statements on a grid containing 32 cells, ranging from -4 (disagree with) to +4 (agree with). Forcing a nearly normal distribution, the statements that represent the perspective best need carefully be selected and all statements have to be placed in relation to each other. Figure 1 illustrates the forced sorting pattern.

In consideration of the geographical distribution of the participants of the study it was not possible to perform the Q sorts personally with the participants. Instead, Flash Q (Braehler & Hackert, 2007), a freely available online-based sorting tool was used. Flash Q is very comfortable for the participants, but unfortunately it didn't run stably with each Internet browser. The number of persons who were not able to open the survey is unknown.

Figure 1. Sorting pattern



2.2 Q participants

It is important to point out that it is not intended that Q participants represent the distribution of opinions across a large target population. Rather, they represent the range of views among an issue (Webler et al., 2009). Therefore, Q participants are selected from main interest groups with well-formed opinions. In this study, the identification of stakeholders resulted mainly from newspaper reports, personal conversations and online search by use of snowball sampling. Official statements and announcements on governmental websites have been initial points for the latter. During the search this step was adapted continuously (Frischknecht & Schmied, 2009). 131 identified stakeholders from the Coastal States involved in the dispute from the field of politics, industry, fishery, science and from environmental NGOs were contacted. Table 2 lists them according to nationality and type. All stakeholders were selected to have consolidated knowledge about the conflict.

The ideal number of Q participants is determined by two considerations. The expectable perspectives that form the concourse determine the lower end. At least three stakeholders for each perspective should take part. The number of Q statements gives the upper end. For statistical reasons, it is useful to have one Q participant for every two till three Q statements (Webler et al., 2009). The number of statements is part of the experimental design and therefore known, however the number of perspectives has to be estimated.

Table 2. Contacted Stakeholders itemised by country and type*

Country	Stakeholdertype							
	Politics	Fishery Industry	Fishery Management	Fishery	Diplomatic Relations	NGO/NPO	Science	Sozial
European Union	9	13	8	11	2	7	4	
Norway	7	1	4	1	2		1	
Faroe Islands	5	8	6	2	1			1
Iceland	15	4	2	4	2			3
Greenland	2		2	1				
Russia					2			
undefined			1					
Total	38	26	23	19	9	7	5	4
Participants			**4**	**4**	**1**	**2**	**3**	

*Participants are printed in bold

2.3 Assumptions

It is just as impossible to know a priori how many perspectives exactly there are in a concourse as which perspective stakeholders represent. Nevertheless, it is assumed that stakeholders from Norway,

Russia and the European Union share similar points of view, because of their historically allocated fishing rights for herring and mackerel. On the other side, the perspectives of stakeholders from Iceland, Greenland and the Faroe Islands will be related, due to their recently developing and intensifying fishery of these species. It is assumed that the conflict overlies the economical mainstay of the stakeholders and rather produces groupings towards nationalities. A third view is expected to be shared by stakeholders with no direct financial interest, like members of NGOs and scientists. According to that, the number of Q participants for this study should range between 9 and 16.

2.4 Statistics and Factor Interpretation

The freely available software PQMethod 2.35 (Schmolck, 2002) was used for statistical analysis. The goal of Q methodology is the intercorrelation and factorisation of the constructed Q sorts. Thus, a factor in Q methodology is produced by particular arrangements of the statements (Webler et al., 2009).

For this purpose, principal component analysis was performed on the correlation matrix. To avoid meaningless factors, the Kaiser-Guttman criterion (Eigenvalue > 1.00) seemed to be insufficient (Watts & Stenner, 2012). Brown suggests the acceptance of factors with two or more significant factor loadings (Brown, 1980). A significant factor loading at the 0.01 level is calculated by $2.58 \times (1/\sqrt{}$ number of statements). Therefore, for this study a factor loading is considered to be significant at $\pm$ 0.46. A third indication is Humphrey's rule, which defines a significant factor by the cross product of its two highest loadings. The cross product should exceed twice the standard error (SD = 0.18) (Brown, 1980). Once the final set of factors was defined, varimax rotation was performed on them (Webler et al., 2009). The end product of this factor extraction are factor loadings, which show to which extent each Q sort is typical of that factor. Based on this factor loadings, 'ideal' Q sorts are produced. For each factor, one ideal Q sort was calculated by weighted averages using all significantly loading Q sorts. If Q sorts are confounded, which means that they load significantly on more than one study factor, they are not included in the calculation of the ideal Q sorts. Thus, each ideal Q sort represents one "social perspective", that comprises the participants' subjective expressions (Webler et al., 2009). If one factor contains both positively and negatively significantly loading Q sorts, it is called a bipolar factor. For convenience it is split up in two perspectives according to the instruction of Schmolck (Schmolck, 2014).

The ideal Q sorts were narratively interpreted and additionally considered in the light of comments provided by quotes of the participants. This method exceeds the detection of key statements and individual sorting patterns. The goal is to capture the meaning of each factor in order to reveal the distinct understanding behind it. As factor interpretation is a hermeneutic process, it is not devoid of subjectivity. Therefore, the ranking of each statement within a factor is noted in brackets (number of statement : ranking score) (Stenner et al., 2000). It is also important to note that the zero line, which is in place with statements the participants have neutral attitudes about (0-column in the grid), was sometimes slightly shifted to the left or right. This happens if the participants agree with more statements than they disagree with and vice versa. These shifts have to take into account in the interpretation.

3. Results

14 of the 131 persons asked to participate in the study actually responded (see Table 2). This low number is nevertheless sufficient for meaningful analysis (see Methods chapter).
Principal component analysis resulted in 5 factors with an eigenvalue greater than 1.00. All factors contain at least two significant factor loadings. Considering that factors 3, 4 and 5 are borderline, Humphrey's rule was additionally applied. Thus, the final set of factors consists of 3 factors, which are considered to be meaningful. Together they explain 55% of the study variance. One factor is a bipolar factor (factor 3) and therefore contains two perspectives (perspective C and D). This means that the attitudes towards the 32 statements at test can be grouped into 4 different perspectives (A, B, C and D). Table 3 illustrates the correlation of each Q sort with each perspective: 7 participants load significantly exclusively on 'factor 1' and therefore share 'perspective A', 3 on 'factor 2' ('perspective B') and 3 on 'factor 3', whereby 2 persons share 'perspective C' and 'perspective D' only represents the attitude of one person. One Q sort is confounded and therefore excluded from the calculation of the ideal Q sorts.

Table 3. Loading scores of each participant on the three factors, sorted by factor and magnitude of loading score*

Participants work context	Stakeholder type	Loading scores on factors				
		A	B	C	D	Variance explained
Factor 1						24%
ICES	Science 1	**0.70**	0.30	-0.09	0.09	
Environmental NGO**	NGO 1	**0.66**	-0.08	0.41	-0.41	
Deepwave	NGO 2	**0.67**	-0.20	0.22	-0.22	
Nordic Council of Ministers	Science 2	**0.50**	0.35	0.38	-0.38	
Danish AgriFish Agency	Fishery Management 1	***0.52***	0.00	***0.49***	*-0.49*	
Pelagic Catching Industry (EU)	Fishery 1	**0.60**	0.01	-0.07	0.07	
Ministry of Industry, Trade and Fisheries (Norway)	Fishery Management 2	**0.62**	0.34	0.09	-0.09	
Norwegian Fishermen's Association	Fishery 2	**0.61**	0.20	0.14	-0.14	
Factor 2						15%
Mission of the Faroes to the EU	Diplomatic relations	-0.12	**0.75**	0.20	-0.20	
Federation of Faroese Fishing Vessels	Fishery Management 3	0.14	**0.77**	-0.16	0.16	
Shetland Fishermen's Association	Fishery 3	0.40	**0.52**	0.09	-0.09	
Factor 3						16%
University of York	Science 3	0.42	0.14	**0.64**	*-0.64*	
Ministry of Fisheries (Faroe Islands)	Fishery Management 4	0.04	0.19	**0.82**	*-0.82*	
Fishermen's Union (Faroe Islands)	Fishery 4	0.12	0.42	*-0.65*	**0.65**	

*a loading score greater than 0.46 is statistically significant at the 0.01 level. Factors passing this threshold are printed in bold.
**wished to remain anonymous

Table 4 lists all 32 statements and their ranking scores according to the sorting pattern of the calculated ideal Q sort of each perspective. These ideal Q sorts are described in the following section. Direct quotes from additional comments from participants are italicised.

Table 4. Factor arrays

No.	Statements	Factors			
		F1	F2	F3/C	F3/D
1	It's not the guy who is fishing 5% who is destroying the stock, it is the guy who is fishing 95%.	-3	0	+4	-2
2	It is the lack of an inclusive five-party agreement on allocation of this shared stock which jeopardies its sustainability.	+1	+1	+1	-1
3	Let's now focus on working hand in hand towards sustainable fisheries in the North-East Atlantic	+2	+1	-1	+3
4	The EU is determined to use all the tools at its disposal to protect the long-term sustainability of stocks.	-3	-2	-3	-4
5	This is not just about sustainability, it's about who has the right to fish.	+3	+3	+4	+1
6	Fishing or prospecting in areas beyond national jurisdiction needs internationally-agreed rules.	+4	+2	+2	-4
7	It is crucial that the Faroe Islands has recourse to an international mechanism, such as the WTO's dispute settlement procedures.	0	+2	0	+1
8	The appointment of an international mediator could help broker an agreement in an objective and neutral fashion.	0	-3	+1	-2
9	This move from Brussels seriously undermined the efforts of the coastal states to find a solution through diplomacy and dialogue.	-1	+4	0	-1
10	We believe that all possibilities for negotiation must be exhausted before resorting to sanctions.	+1	0	0	0
11	While I am pleased that action is now being taken I am disappointed that we have reached this point.	-1	-4	-1	-3
12	The sanctions are damaging, but most of all damaging to the atmosphere.	-1	-1	-1	+1
13	I am satisfied that we can soon consider the herring dispute as something of the past	-3	-3	-1	0
14	It's very hard for a little nation to have their points of views coming through the system.	-4	0	-4	0
15	The extreme action is not the way to solve a disagreement between friendly countries.	0	+3	+3	-1
16	We can learn from the 'cod wars' that we must solve this dispute diplomatically rather than through an economic war.	+1	+1	+2	-1
17	Today the EU gets angry about the fish around the Faroese waters but tomorrow or next month the fish can move to Greenland or somewhere else.	0	-1	+1	0
18	The Atlantic regions may be at the geographic periphery of Europe, but they are by no means peripheral to Europe's interests.	+1	+4	0	+3
19	The time has come to adapt joint herring management to better reflect the realities of the fisheries and legitimate rights of all coastal states.	+1	-1	+1	+1
20	It is difficult to see what purpose these measures serve other than to protect fishing industry interests within the EU.	-2	+3	-1	0
21	EU's demands that Iceland reduce its mackerel catch, shows why the country needs to maintain its independence.	-2	-1	-3	+2
22	Right now the Faroese are not existing as a state, as a country and of course it's very difficult for all the others to take Faroese seriously.	-4	-1	-2	+3
23	This embargo touches the Faroese more socially than economically because it brought some social tensions between Denmark and the Faroes.	0	-3	-2	-1
24	Iceland and the Faroe Islands seem to neglect the dependency that coastal communities in the Union and Norway have on the stock.	2	0	-4	+2
25	Our challenge as responsible fishery managers is to recognize the obvious changes that have taken place in the marine ecosystems in the Northeast Atlantic region by modernizing and adapting our joint management to better fit the realities.	2	0	+3	-3
26	I am firmly convinced that the old sharing among the coastal states regarding Atlanto-Scandian herring was totally unfair.	-2	+2	0	+1
27	Multilateral management of shared fish stocks should always be based on the best available scientific information on the size and behaviour of the stock.	4	-2	+3	-3
28	Unilateral actions are definitely not the way to go.	0	0	-2	+4
29	It is different how big you are. The big one is pushing the small one. That is international policy.	-1	-4	+1	+2
30	This confrontation will set a precedent for future climate conflicts.	-1	-2	0	-2
31	Because a lot of money is behind it, the mackerel stock is caught into a swirl of policy.	+3	+1	-3	+4
32	We don't want a mackerel war, but we don't want an agreement at any price.	+3	+1	+2	0

3.1 Perspective A

Perspective A is defined by statistically significantly correlated Q sorts with factor 1. Factor 1 has an eigenvalue of 3,36 and explains 24% of the study variance. Eight participants are significantly associated with this factor: both respondents from NGOs, two scientists, two from the field of fishery management and two from fishery associations. All participants are from the European Union or Norway.
Perspective A can be summarised as: All parties are responsible for a sustainable fishery. An analysis of the statements given for sorting is:

A joint fishery management should govern the allocation of the stocks. But the required modernisation of the management and the reflection of the distribution is a challenge for fishery managers (the factor item ranking of statement 25 is +2, later this will be abbreviated to 25:+2). Nevertheless, at least the old sharing of herring was fairly proportioned (26:-2). However, fairness is a mainspring for this dispute. To gain a fair, sustainable solution, the fishery management should be adapted in collaboration (19:+1) and based on scientific research (27:+4).

> "*When politics come into play, biology gets on the back seat.*" (Science 1)
> "*[Science is crucial] because one cannot negotiate with the environment.*" (NGO 1)

The exploitation of global commons needs international rules (6:+4). The lack of their acceptance leads to the current conflict. However, the sovereignty of the states involved is irrelevant for this disagreement (22:-4; 21:-2).

> "*In the Northeast Atlantic region Iceland, Faroe Islands and Norway are as much superpowers as the EU where (pelagic) fisheries is concerned.*" (Fishery 1)

Also small nations can be politically heard and internationally accepted (14:-4; 22:-4) and they are able to enforce their interests (29:-1).

> "*It is always possible to take a society, population, region, nation, community, state seriously. One only has to want it.*" (NGO 1)

One respondent stated, that important parameters in global fishery are the validation as Coastal State and the distribution of the EEZ (Fishery 2). But this full acceptance also implies that even an attribution of a small portion of the total catches doesn't release a nation from its responsibility for the entire stocks (1:-3).

> "*[…] you cannot hide behind an argument that you only fish a small proportion.*" (Science 2)

It is clear that the current political conflict originates from the economic power and dynamics potency of the fishery sector (31:+3). Nations developing new infrastructures for fishing herring and mackerel disregard the dependency of the hitherto established fishing communities in the traditional coastal states (24:+2). Nevertheless, the trade measures of the EC do not only aim to protect these industries (20:-2). One respondent thinks that the EC exerts pressure to finally reach a multilateral agreement (NGO 1). Therefore, although the sanctions are more or less accepted, the motive of

sustainability of the EC is seen critically as a pretext. However, the sanctions should not be a bar to future negotiations (9:-1). In favour of sustainability, the states should collaborate (3:+2).

3.2 Perspective B

Perspective B is defined by correlation of Q sorts with factor 2 whose statistical significance is well above the threshold of ±0.46. With an eigenvalue of 2,1 factor 2 explains 15% of the variance. Three participants load significantly on this factor: one from the field of diplomatic relations, the second is working in fishery management and the third in fishery. The first two respondents are from the Faroe Islands and the latter is from the Shetland Islands, EU.

Perspective B can be summarised as: Friendly nations should find a compromise in a dispute with dialogue. It is characterised by the following combination of statements:

The trade measures have doubtless economic reasons. The EU is trying to preserve their own fishing industry (20:+3). In this way, the EU represents their interests in the Northeast Atlantic (18:+4). But with this step the EU jeopardises the diplomatic relations (9:+4) with a friendly "neighbour nation", the Faroe Islands (15:+3).

> "*Introducing sanctions was an extreme deviant from normal course of action in the cooperative spirit of the North East Atlantic fisheries […] and infuses anti EU sentiments in the North Atlantic. […] A major disappointment to those of us who see the Faroes as an integral part of Western Europe.*" (Fishery Management 3)

A sustainable exploitation needs collaboration (3:+1) under international rules (6:+2). Even so, a unified strategy in fishery management coping with ecological reality and all coastal states doesn't play a prominent role (19:-1; 25:0). Furthermore, there is no need for a scientific basis in the management (27:-2). Nevertheless, the traditional allocation of the quotas is seen to be unfair (26:+2).
In the political system even small states can be heard (14:0) and taken seriously (22:-1). They are also able to make a stand against bigger players (29:-4).

> "*Faroe has proved adept at making its viewpoint known.*" (Fishery 3)
> "*Small powers can push large ones if they go the right way about it, and it matters enough to them.*" *(Shetland Fishermen's Association)*
> "*Naturally, bigger players carry more weight. But in the long run even bigger players can't neglect the facts […] in the sea.*" (Fishery Management 3)

Although an international mediator is not required (8:-3), the Faroe Islands demonstrated their power with the submission of a request for dispute settlement at the WTO (7:+2).

> "*Fortunately, it proved in the end that at least sometimes formality/legality wins over size.*" (Fishery Management 3)

3.3 Perspective C

Factor 3 explains 16% of the variance and has an eigenvalue of 2,24. This factor is a bipolar factor. Consequently, it represents two perspectives. Perspective C is defined by Q sorts positively significantly correlated with factor 3. Perspective C represents two scientists from the EU and one fishery manager from the Faroe Islands.
Perspective C can be summarised as: The biggest exploiter threatens sustainability. It is characterised by the following elements:

Especially, harvesting in international waters needs to comply with rules (6:+2). However, ecological changes have to be integrated in fishery management (25:+3). The latter should always be based on research (27:+3) and reflect the reality of fish distribution (19:+1). As one respondent stated, the sea is especially dynamic currently (Science 3). These circumstances have to come into account in modern fishery management. And all parties have to reckon the possibility of further migration shifts (17:+1).
The national portion of the endangerment of fish stocks is depends on its percentage of exploitation (1:+4). But in the end,

> *"fishing mortality has no nationality. […] [if] the total announced catch exceed the TAC, it is the total catch that leads to overfishing, not the percentage of total mortality each nation stand for."* (Fishery Management 4)

The EU is not in the position to claim that sustainability is its main motive (4:-3).

> "*The EU has a terrible track record on fisheries management. Sustainability is rarely the most important consideration."* (Science 3)

Neither are sanctions considered as a justified way to deal with a friendly nation (15:+3). Instead of sanctions, all parties should learn the lessons from the cod wars and their final diplomatic settlement (16:+2). Maybe an neutral mediator could help to solve the conflict (8:+1).
Small nations are more exposed to pressure in international policy than bigger states (29:+1). But it is also possible for the Faroe Islands and Iceland to communicate their perspectives successfully (14:-4), because they are fully respected as fishing nations.

> "*They act on the same level as Norway and EU according to the fishing rights and not to country size.*" (Fishery Management 4)

Also, there is no need for political independence of the Faroe Islands and Greenland to act autonomously (21:-3; 22:-2). But unilateral strategies may help to clarify the own position (28:-2). Due to their national economic dependence on fishery, the solo efforts of the Faroe Islands and Iceland in fishery are justified and both Nations do not ignore relevance of fishing for other communities (24:-4).

> "*When discussing dependency the countries have to take into account the nations dependency on the stocks and not only the fishing communities."* (Fishery Management 4)

But anyhow, the economic aspect is not the mainspring for this conflict (31:-3). Nor, is the focus of this perspective on collective protection of sustainability (3:-1).

3.4 Perspective D

Perspective D is defined by negatively significantly correlated Q sorts with factor 3. Thus only one participant, a fisherman from the Faroe Islands, produces perspective D.
Perspective D can be summarised as: Pay attention who you trust. An analysis of the statements given for sorting is:

Small nations have little influence in international politics (29:+2). To gain attention in the political arena, it may help if these nations achieve statehood (22:+2). For acting autonomously, it is important to preserve independency (21:+2). The trade measures dampen the relationship between the Faroe Islands and the EU (12:+1). The recognition of ecological changes in the Northeast Atlantic is not a challenge for fishery management (25:-3). But because a lot of money is associated with fishery (31:+4), the respondent thinks that large corporations impede an official agreement on quota for prevailing their interests (18:+3).:Although the old sharing was unfair, unilateral actions should cease (28:+4), because

> *"[it] is better to work it out together."* (Fishery 4)

And therefore, it is not necessary to involve an international mediator (8-2).
The focus should now be to collaboratively achieve sustainability (3:+3), since for the viability of the stocks, only the total catches count (1:-2). However, fishery management should not necessarily be based on scientific advices (27:-3). Also, each country should be allowed to lay down its own fishing rules in international waters (6:-4). In this way, skipping the Faroe Islands can be avoided.

> *"I don't trust EU. There is a lot of corruption."* (Fishery 4)

Even at EU level,

> *"[the] member states should make their own rules."* (Fishery 4)

The EU should not act as one, big unit when it comes to sustainability (4:-4).
Because the fishery is such an important economic sector for the Northern Islands, they sometimes forget that other fishing communities also depend on these resources (24:+2).

3.5 Consensus between the four perspectives

Comparing the four perspectives, it is evident that there is general agreement about a few statements. In the following, the brackets show on which statement the text refers. Table 5 lists the consensus statements; the calculated z-scores show how similar the statements were ranked.
It seems that the importance of good international relationships between the states involved takes a back seat behind the enforcement of economical interests (statement 12). Also sustainability doesn't seem to be the driving force for this dispute.

> *"If it was sustainability, then the dispute would be about TAC not about country allocation."* (Science 2)

Rather the main interest, for traditional communities as well as for new developing infrastructures is the establishment of legal regulations for the exploitation of the resource fish (5) in order to achieve reliable framework conditions.

At present the greatest danger for the stocks in the Northeast Atlantic is the absence of an agreement integrating all states (2), which would prevent national solo efforts. Although nobody wants this conflict about resources to escalate, every state wants to see its interests forced through this conflict (32). Against this background, the strategy of the EC to impose economic sanctions, is not seen to be an appropriate approach to gain sustainability (4; 11). Before sanctions are implemented, a consensus and agreement should be aspired (10). The reaction of the Faroe Islands to call in the WTO is justified (7). Further it is not seen that the embargo affects the relationship between Denmark and the Faroe Islands (23). Furthermore, to solve the conflict will be a long process (13).

Table 5. Consensus Statements*

No.	Statements	z-Scores			
		A	B	C	D
2	It is the lack of an inclusive five-party agreement on allocation of this shared stock which jeopardies its sustainability.	0.74	0.47	0.33	-0.45
5	This is not just about sustainability, it's about who has the right to fish.	1.36	0.92	1.58	0.45
7	It is crucial that the Faroe Islands has recourse to an international mechanism, such as the WTO's dispute settlement procedures.	-0.12	0.64	0.00	0.45
10**	We believe that all possibilities for negotiation must be exhausted before resorting to sanctions.	0.36	0.37	0.00	0.00
32	We don't want a mackerel war, but we don't want an agreement at any price.	0.98	0.61	0.71	0.00
4**	The EU is determined to use all the tools at its disposal to protect the long-term sustainability of stocks.	-1.04	-1.07	-1.36	-1.81
11	While I am pleased that action is now being taken I am disappointed that we have reached this point.	-0.70	-1.56	-0.68	-1.35
12	The sanctions are damaging, but most of all damaging to the atmosphere.	-0.63	-0.35	-0.52	-0.45
13	I am satisfied that we can soon consider the herring dispute as something of the past	-1.11	-1.31	-0.49	0.00
23	This embargo touches the Faroese more socially than economically because it brought some social tensions between Denmark and the Faroes.	-0.62	-1.46	-0.87	-0.45

*all listed statements are non-significant at p>0.01, those flagged with Asterisk (**) also at p>0.05

3.6 Differences between the four perspectives

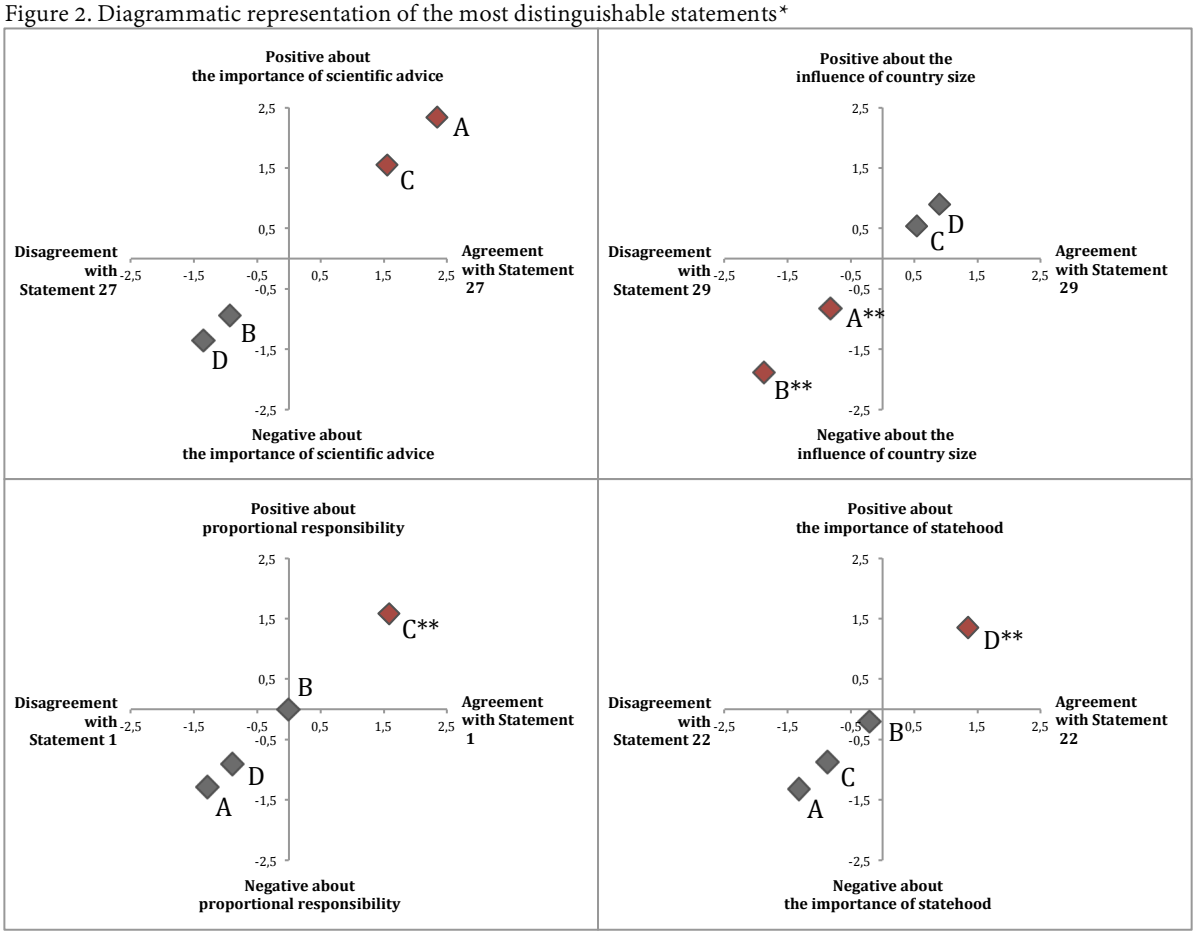
A science-based policy for fishery is especially polarising. In contrast to perspective A and C, perspectives B and D don't agree with the necessity of scientific advices for fishery (27). Figure 2 illustrates the differences between the perspectives.

Perspective A doesn't see the quotas portioned unfairly. And in common with perspective B its angle is contrary to perspectives C and D in respect of the disadvantaged treatment of small nations (29). Whereas, perspective B strongly agrees that the sanctions impede a settlement (9) and are dedicated to protect the fishing industry of the EU (20).

Perspective C differs strongly from the others in a few statements. This viewpoint understands unilateral actions as justified (28) (in marked contrast to perspective D) and economic interests not as decisive factor (31). It also thinks that Iceland and the Faroe Islands don't ignore the other fishing nations (24), because they are exploiting just a minimal part of the total catches (1). Furthermore, only the respondents of perspective C agree, that an international, objective mediator could help compounding the conflict (8). Additionally, the relevance of this dispute as a precedent for future climate conflicts is also distinctive for this perspective.

Perspective D is different from the other factors in its position that statehood and independency is advantageous especially for small nations in international politics (22, 21). Furthermore it differs strongly in respect to the necessity of consistent rules in international waters (6). Also the recognition of obvious changes in the marine ecosystem is not seen challenging (25).

Figure 2. Diagrammatic representation of the most distinguishable statements*



*the axes represent the z-scores, red points indicate significance at the 0.05 levels, Asterisk (**) also at 0.01

Discussion

With the identification of four distinct perspectives, the study reduced the complexity of numerous opinions about the current fishery conflict in the Northeast Atlantic and simultaneously categorised stakeholders. The findings do not reveal simple black and white thinking. Contrary to the assumptions, neither the side arguing in favour of traditionally grown infrastructures (EU, Norway), nor the parties developing new fisheries (Faroe Islands) build homogeneous groups. Unfortunately

no one of the identified stakeholders of Iceland, Greenland and Russia took part in the survey. Nevertheless, the tendency towards a group separation can indeed be recognised and it is assumed that the missing participants would strengthen this sound.

The nature of highly migratory fish creates competition beyond national borders. Contrary to Carr and Heyman findings of fishers' biases distinguished from other stakeholder groups in fishery management (Carr & Heyman, 2012), the occupational background doesn't unite stakeholders' perspectives. In this dispute, rather ecological changes seem to be linking and dividing, according on whether one stays at the winner or looser side (Hamilton, 2003). Consistent with the postmodern understanding of conflicts (Diez, 2008), nationality is also a remarkable category. For example, the constructed Q sort from a Danish participant, which loads significantly on factor 1 and 3, illustrates the intermediate position of Denmark between the Faroe Islands as part of the Danish Kingdom and its membership to the EU in an excellent way.

As the biggest player in mackerel fishery, the EU has the greatest motive for conservation of its stocks (Hannesson, 2012), just as Norway in the fishery of herring. The endeavour of the EU and Norway to maintain the status quo of catch quantities by making the Northern Islands discharge their duties regarding responsibility, connects the understandings of fishery managers and fishermen of Norway and the EU and indirectly of members of NGOs. In official statements and for justification of the trade measures against the Faroe Islands, the EC uses the achievement of sustainability as the main argument (OJ, 2012). Regardless what the main motivation behind the sanctions is, the result is that sustainability issues attract attention, which in turn matches with the principal concern of environmental NGOs in the Northeast Atlantic. Nevertheless in common with the other three perspectives, the role of the EC as guardian of sustainability is questioned. As the EU is criticised for its own fishery management, sustainability is not considered as driving motive. Thus, against a priori assumptions the viewpoints of members of NGOs and scientists have indeed common grounds with the fishing industry, as long as the latter defends a sustainable fishery.

Even more surprising is the composition of stakeholders, which share perspective B. Although the Shetland Islands and the Faroe Islands are direct opponents in this conflict on catch quotas, their views overlap to a certain degree. First of all, the external circumstances as small island communities, which depend on fishing, place them in a comparable situation. Secondly, science is viewed with suspicion. In the general public debate (concourse, see Methods chapter) the Shetland Islands condemn the Faroe Islands, Iceland and Greenland for their unilateral fishing effort. Although the sanctions pursued an undiplomatic strategy, the Shetland Islands are not satisfied that the EC dropped the sanctions in 2014 without an internationally agreed solution. This move to come to an accommodation with the Faroe Islands may result in reduced quota for the Shetland Islands. The dissatisfaction with the EU policy is common to the participants sharing perspective B. In addition this surprising connectivity, which resulted in perspective B, may be an indication, that the Nordic countries partially may feel closer to each other than to the community of states they belong to.

The relation of climate change and recent distribution changes are most likely considered in perspective C. Although reasonable prove for a correlation of warming water masses and increasing fishery biomasses in the Northeast Atlantic exists (Prokopchuk & Sentyabov, 2006; Sherman et al., 2013; Toresen & Østvedt, 2000), the effects of climate change may be too uncertain and complex to be considered in actual fishery management. Due to large uncertainties, it seems to be too early to label this dispute as climate conflict. For the political strategy of each country, it is crucial which

environmental factors influence the recent changes in fish biomass (Hannesson, 2012). Because all three possible explanations, vitality of the stocks (Huse, 2002; Nøttestad et al., 1999), climate change (Stenevik & Sundby, 2007) and natural environmental variations (ICES, 2013; Nøttestad et al., 2013;ICES2011), are plausible, each country is able to pick the most suitable for their interests beneficial. Climate change induced shifts would imply longer-term changes in the Northeast Atlantic. These circumstances would be advantageous for the northern islands, contrary to the EU and Norway, which in consequence would have to accept permanent declines in their quotas. The absence of an agreement between the EU and Iceland in mackerel fishery and between the Faroe Islands and Norway in herring fishery, indicate that the EU and Norway rather assume that vitality is responsible for the current distribution shifts. For them, this trigger would be more convenient, as an aggressive fishery could impair the state of the stocks resulting in smaller quantities in the waters of the conflicting parties (Bjørndal et al., 2004; Hannesson, 2012). As the Faroe Islands are in a superior negotiation position in mackerel fishery (Hannesson, 2012), the EC draws on trade measures to exert pressure.

Perspective D is quite the opposite of perspective C and an excellent example how political understanding and social perception may differ. Especially, the self-assessment as small nation is seen differently. On the political surface (perspective C) the weight as fishing nations is beyond dispute and important for acting as serious negotiation partner. Though in detail, the relevance of the country size and its independence are the most distinguishing topics between the Faroese participants, with the role of science coming a close second. Thus, the conflict is indeed substantial for strengthening national identity (Diez, 2008) of a state which is placed between autonomy (having an own parliament) and dependence (being part of the Danish Kingdom) at the same time.

Contrary to perspectives A and C, in which science is seen to rise its voice for the conservation of the environment, perspectives B and D are very suspicious of science in fishery management. Thereby, right besides cooperation, scientific advices are the basis of the fishery of highly migratory species as defined by the United Nation Fish Stocks Agreement (United Nations, 1995). Especially new countries, which enter established arrangements regarding fishery rights, have to contribute to a collaborative atmosphere. On the other side, the original contracting parties have to allow arguments on the allocation of quotas if justified. Ecosystem surveys should provide a framework for the negotiations. It is thus all the more important to take the reservations towards science serious. The commentaries of the participant who produced perspective D and informal interviews with Faroese indicate, that instead of recognising the role of science per se, scientific neutrality is questioned. Scientific advices from their own national research institutes are indeed accepted. But research beyond the own boarders is blamed as being manipulated from politics. At least, politics has always room for interpretations. Although this study clearly revealed that the fishing industry partly distrusts science, the causes merely point in the direction of neutrality. Further studies would be necessary to analyse the relationship between the fishing industry and science in detail. Such an investigation becomes even more important in the light of ecosystem changes. As fishermen are able to detect ecological variances much faster than the slower scientific system, especially in fisheries based on insufficient data, the acknowledgment of fishers' ecological knowledge is of particular importance (Carr & Heyman, 2012; Johannes et al., 2000). In turn, science has to assess extreme shifts in fleet behaviour correctly (ICES, 2013), as external circumstances may determine them, like the compensation of declining fish stocks (Hamilton & Haedrich, 1999).

The involvement of so many countries, which politically and economically depend on the natural resource fish to various degrees, already creates a highly complex management problem. Abrupt ecological changes imply an additional challenge. It shows that the conflict originates from the lack of legal regulations in times of ecological changes. The inflexibility of the present management system to respond to these changes leads to unilateral responses, which in turn leads to catches exceeding TAC (ICES, 2014a) and unsustainable fisheries. To intensify collaboration of stakeholders, to increase faith of scientific advices and to provide quicker responses, a stakeholder advisory mechanism on issues of pelagic fish within the Northeast Atlantic Fisheries Commission as suggested by Coers et al. (2012) could be expedient. Modernising the fishery management as well as resolving the current conflict has to emanate from within the system, as shown by the scepticism about the added value of a mediator from outside.

Conclusion

Ecological changes create winners and losers (Hamilton, 2003), as illustrated by the conflict about the fishery of Norwegian spring-spawning herring and Northeast Atlantic mackerel. Recently, changing distribution patterns lead to the development of new fisheries and losses of catch within traditional infrastructures. So, changes in the marine ecosystem of the Northeast Atlantic cause a dispute about the allocation of quotas.

In order to reduce complexity, the goal of the study was the identification of different ways of understanding of the problem and possible solutions. The study illustrates that a limited number of four perspectives unites distinct parties and stakeholders in the conflict on fishing quota for herring and mackerel. Each perspective shows a distinct point of view. Although nationality indeed influences the understandings of stakeholders, the range of views within one nation became apparent. Even being part of the winner or looser side doesn't place stakeholders automatically in different categories, as they may share views on external circumstances like country size and dependencies.

While the fish stocks of herring and mackerel are currently harvested above the TAC, it seems that sustainability is only superficially the main concern of this dispute. The driving motives are the defence of economical interests and the strong competition to achieve the best bargaining position for negotiations in the political attempt to clarify fishing rights.

Handling the effects of environmental changes on original circumstances requires an internationally accepted procedure. Although a role of the conflict on fishing quota in the North Atlantic as a pioneer example of how to solve conflicts of climate change induced is denied, the chance should be used to lay down rules in dealing with these shifts cooperatively.

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