Important Factors Influencing Rule Compliance in Fisheries - Lessons from Danish Fisheries -

Jesper Raakjær Nielsen[a] and Christoph Mathiesen[b]
Institute for Fisheries Management and Coastal Community Development (IFM)
The North Sea Centre, 9850 Hirtshals, Denmark
[a] jrn@ifm.dk and [b]cm@ifm.dk

Abstract. This paper presents the results of a research project, which has focused on Danish fishers' acceptance of imposed fisheries regulations and their respect for the management system. The analytical framework developed by Raakjær Nielsen (1998) and Raakjær Nielsen and Vedsmand (1999) has been used. The research has focused on three Danish fisheries: the cod fishery in the Baltic Sea, the demersal and Nephrops fishery in Kattegat and the fishery for non-human consumption species in the North Sea.

The research is based on interviews with 56 fishers and a mail survey covering all vessels in the three selected fisheries.

The following factors are concluded to have a major impact on rule compliance in fisheries: 1) the economic gains to be obtained; 2) the risk of being detected and the severity of the sanction; 3) the compatibility between the content of the regulation and the fishing patterns and practise; 4) regulation leads towards stock conservation; 5) norms, in particular the behaviour of other fishers and the moral of the individual fisher. In addition there are some indication, that co-management is important for rule compliance.

Keywords: Compliance, fisheries management, legitimacy, Danish fisheries, fisher´s behaviour.

1. INTRODUCTION

The general tendency in the North Atlantic area is, that the imposed fisheries management regimes have difficulties in protecting the fish stocks from over-exploitation. Problems such as quota busting, data fouling and other non-compliance behaviour are common. The reply from management bodies has been either to impose more restrictive control measures or to ignore the problems. Neither of the strategies are solutions to the problems encountered.

For many years no real attempt has been made to understand the underlying causes that lead to non-compliance behaviour among fishers. Sutinen et al. (1990) was the first attempt to undertake a structured analysis of the subject. In recent years several scholars (eg. Kuperan and Sutinen, 1998; Hatcher et al, 2000; Hønneland 1999 and Raakjær Nielsen and Vedsmand 1999) have followed up on the work initiated by Sutinen. The result has been that the methodology to undertake this type of work has been improved, and due to the resultant empirical findings a more comprehensive body of evidence of the factors leading to non-compliance behaviour among fishers is emerging drawing on examples from several parts of the world. This research hopes to contribute both in relation to methodology development (see Raakjær Nielsen (1998)) and by presenting empirical findings, that can hopefully assist managers in changing the regulations and modes of implementation in order to improve compliance in fisheries.

Three Danish fisheries have been examined: 1) the Eastern Baltic cod fishery; 2) the demersal and Nephrops fishery in Kattegat and 3) the industrial fishery in the North Sea.

The value of the Eastern Baltic cod fishery was around 25 mill EUR in 1998, which is equivalent to approximately 5% of the total Danish landing value. Around 225 vessels above 6 m participated in the fishery in 1997 on a permanent or seasonal basis. The main regulation in Eastern Baltic cod fishery is a TAC regulation, which in a Danish context is divided into fortnightly or annual catch rations. The fishers can on an annual basis freely chose between the two options. The quota regulation is gradually being supplemented by more restrictive technical regulations.

The value of the demersal and Nephrops fishery in Kattegat was around 24 mill EUR in 1998, which is equivalent to approximately 5% of the total Danish landing value.

Around 325 vessels above 6 m participated in the fishery in 1997, most of them on a permanent basis. In the cod and plaice fishery the quota is the main regulation, whereas in the combined Nephrops, sole and cod fishery the mesh size and by-catch regulation is the most important measure.

The value of the industrial fishery in the North Sea was around 100 mill EUR in 1998 and constitutes close to 25% of the total Danish landing value. Around 130[1] trawlers participated in the fishery in 1997, most of them on a permanent basis, but several of the larger vessels primarily above 40 m are also active in the herring and mackerel fishery in some periods during the year. In the industrial fishery by-catch regulation and closed areas are the most important regulations in place.

2. THEORETICAL APPROACHES TO EXPLAINING COMPLIANCE IN FISHERIES

Rule compliance is often analysed and understood from an economic perspective in the fisheries management literature (Sutinen and Andersen, 1985; Anderson and Lee, 1986), assuming that fishers act as rational agents. This is a rather instrumental perspective, which is based on the assumption, that the individual fisher primarily responds to the immediate benefits of compliance or non-compliance behaviour. The decision is based on a calculation of the economic gain to be obtained from by-passing the regulation compared to the likelihood of detection and the severity of the sanction. An identical approach to the general deterrence model was developed by Becker (1968). This set of thoughts has influenced many fisheries management schemes worldwide, where increased enforcement activities have often been the policy option chosen to improve compliance behaviour among fishers.

Increased enforcement activities can reduce or even prevent non-compliance behaviour among fishers, but there are limits to the amount of resources (human and capital) that can be used on enforcement activities, in particular if the aim is to strike a reasonable balance between the costs of enforcement activities and the profit to be obtained from fishing activities.

Kuperan and Sutinen (1998) argues, that even in situations where the cost of enforcement is reasonable it can be questioned whether increased enforcement actually will reduce the number of violations. Fishers are often creative in finding ways to avoid getting caught during illegal fishing by observing the activities of the enforcement agency and by keeping each other informed hereof.

Sutinen et al. (1990) explain that the high level of non-compliance behaviour in the East coast groundfish fishery in the US could partly be explained by relatively low economic sanctions compared to the large economic gain to be obtained from illegal fishing. Thus, instrumental incentives are important factors for fishers' behaviour towards compliance. However, several empirical studies (Hatcher, 2000; Hønneland, 1998 and 1999; Kuperan and Sutinen 1998) indicate, that explaining compliance behaviour in fisheries is more complex than what is offered by the instrumental approach.

A normative approach holds as a supplement to analyse and explain the incentives among fishers for non-compliance behaviour. Thus, the influence of norms and what the fisher considers as fair and moral behaviour become important aspects. Fishing is a commercial and highly competitive business, nevertheless a variety of non-monetary incentives: practical knowledge, social pressure and moral has an impact on fishers' behaviour (Jentoft, 1998; Maurstad, 1998)

Even strict economic transactions are embedded in social structures which influence the decisions and behaviour of the economic agents (Granovetter,1992). .

Norms are often defined as the typical actions; attitudes and the expectations among fishers concerning the behaviour and attitude of peers. Furthermore, norms are seen as social pressure which creates both positive and negative sanctions (Giddens, 1984; Goul Andersen, 1998). Hoffman (1977) demonstrates that moral is usually considered to be based on a normative internalised obligation to follow what is personally considered right or wrong. Moral is thus establish through interaction with other individuals and groups, but differs from norms by representing individual values based on personal reflections (Giddens, 1984).

The lack of compliance in many fisheries despite increased enforcement activities has drawn the attention to the importance of legitimacy of fisheries management. Jentoft (1989:139) emphasizes in this respect that 4 factors are important 1) content of the regulations; 2) distributional effects; 3) making of the regulations and 4) implementation of the regulations, where the hypothesis is, that"the more directly involved the fishermen are in installing and enforcing the regulation, the more the regulation will be accepted as legitimate". Legitimacy is here perceived as a normative phenomenon, and differs from moral in the sense that legitimacy is linked to a political authority (system),

[1] In this research only the 95 vessels in the range of 24-40 m are included.

while moral may or may not be (Tyler, 1990).

Finally, one can expect that the procedural approach taken by the enforcement agencies and the Court towards rule breakers has a strong influence on the legitimacy of the management system compared to how fishers perceive the actual sanction (Jentoft, 1990; Sagdahl, 1992 and Tyler, 1990).

These components of legitimacy were incorporated into an overall analytical framework by Raakjaer Nielsen and Vedsmand (1999).

3. FACTORS INFLUENCING COMPLIANCE IN DANISH FISHERIES

3.1 The survey

The survey has been designed to combine quantitative and qualitative methods. In order to get a general picture of the fishers' attitudes towards compliance behaviour and acceptance of specific regulations, personal experience with enforcement agents and court system, perceived risk of being detected and sanctioned, a questionnaire was mailed to all vessel owners in the three selected fisheries. In total 638 fishers received the questionnaire of which 154 returned it giving an average response rate of 25%[2]. The questionnaire was followed up with more in-depth semi-structured interviews with 56 fishers in order to obtain a more thorough understanding of the factors leading to compliance respectively non-compliance behaviour. The duration of most interviews was1-1½ hours. The interviews were conducted at the wharf, on board the vessels, in the private homes of the fishers or in office space of local fishermen's associations or fishermen's cooperatives. The fishers were chosen randomly with a broad geographical distribution. Furthermore representatives from the Departement of the Ministry of Food, Agriculture and Fisheries and the Directorate for Fisheries and the 6 heads of the regional enforcement bodies relevant for the 3 cases were interviewed.

The analytical framework developed by Raakjær Nielsen (1998) and Raakjær Nielsen and Vedsmand (1999) has been applied. This framework focuses in particular on six factors: 1) industry structure; 2) control and enforcement; 3) content of regulation; 4) norms within the fishing industry and moral of fishers and 5) the decision-making procedures. The following presentation of the findings will focus on the most important factors influencing rule compliance in the three cases.

3.2 Industry structure

Industry structure includes the character of the fishery: economic factors, fleet capacity, fleet composition, demography and the geographical dispersal of the fishery. Economic factors and the capacity of the fleet came out as the overall most important factors influencing non-compliance behaviour in Danish fishery. Economic factors and the capacity of the fleet are closely related and determine the profit to be obtained from fishing activities. This is found to be a precondition for compliance behaviour as respectively 98% for the Baltic Sea, 94% for Kattegat and 93% for the North Sea of the fishers reported that the profit to be obtained from fishing based on the allocated catch rations has major or medium impact on their compliance behaviour.

During the last 3-5 years Danish fishers have obtained good profit from fisheries within the present regulation. There has thus been a balance between the fishing capacity and the economic requirements of the fleet, and consequently the incentives to undertake illegal fishing have been low. Nevertheless, we have found that even in situations where catches or fish prices are high fishers will continue fishing after having caught their catch ration if the probability of detection is low.

Thus, opportunistic behaviour influences compliance behaviour. However, the better the general economic performance in the fishery is, the higher the gains from illegal fishing need to be before fishers violate the regulations. This opportunistic behaviour is quite different from that of chronic violators, a small group of fishers (2-5%)[3] continuously breaking the regulation if they obtain an economic gain.

In our study we have not found any significant influence on compliance behaviour related to fleet composition, demography or the geography of the fishery. We have, however, found weak support, that elderly fishers are more against all types of fisheries regulations than younger fishers, as they began fishing when no regulations except technical measures were applied. We have only slight indications that the geographical distribution of the fishery has an influence on compliance behaviour among fishers.

[2] The rates of return were 32%, 20% and 18% respectively for the fisheries in the Baltic Sea, Kattegat and the North Sea.

[3] Chronic violators consist of a small group, which the enforcement agents estimate to being 2-5% of the fishers.

3.3 Control and enforcement

The type and extent of control and enforcement and the detterent effect from this, is considered to have a large impact on the compliance behaviour among fishers. In the 3 Danish fisheries respectively 90% for the Baltic Sea, 79% for Kattegat and 100% for the North Sea of the fishers reported that the risk of detection compared to the economic gain from illegal fishing has major or medium impact on their compliance behaviour. This a very strong indication that economic incentives are the driving force behind non-compliance behaviour in Danish fisheries.

The type of enforcement influences the non-compliance behaviour of fishers. A common statement in the interviews was that in order to avoid non-compliance behaviour it is important that the enforcement agencies take immediate action when illegal activities are taking place, in particular among the chronic violators, because if those fishers can get away with bypassing the rules it creates strong incentives for the other fishers to follow their examples. Thus the deterrence aspect becomes very important.

The sale of undersized Nephrops in the Kattegat fishery is a good illustration hereof. In many years it has been commonly accepted by both fishers and enforcement agencies that fishers sold a small amount of undersized Nephrops, just to cover the cost of buying cigarettes. However, some fishers/buyers began to develop a market for undersized Nephrops, and today an organised high-price black domestic market exists, because immediate action was not taken to prevent the sale of undersized Nephrops. Fishers obeying the regulation could watch fellow fishers making a substantial black profit from illegal activities, and determined to follow.

The enforcement agents have for several years seen, what is named paper control[4], as an efficient instrument to undertake enforcement. There has, however, been a considerable time delay (2-3 years) from violation to detection. In these particular years (late 80ies and early 90ies) the interpretation of many fishers was, not unreasonably, that the authorities had decided to close their eyes for the illegal fishing activities. Within the EU fishing industry and administration it has for a long period been a public secret that a considerable degree of illegal fishing was taking place. For several years there was no real political will among the member countries to enforce EU regulations in spite of the fact that they are obliged to do so.

Based on the Danish experiences, the lack of political will to ensure enforcement has had a negative impact fishers' moral towards non-compliance behaviour. Several fishers have seen this development as an excuse for breaking the rules. Thus, the lack of political will to deal with the problem contributes to the moral erosion and hereby encourages non-compliance behaviour.

In general, enforcement agents are perceived as legitimate among the fishers, both as an authority and by the procedures applied. The enforcement agents explain this development as a result of daily communication with the fishers. Through dialogue the officials and the fishers have come to understand and respect the work of the opponent. The importance of communication and persuasion as a control mechanism (discursive measures) and its positive influence on legitimacy is also stressed by Hønneland (1998) in a study on compliance in the Barents Sea fisheries.

The reduction of the fleet during the past ten years, promoted by the EU scrapping subsidies, has diminished the economic incentive for rule violations and thus reduced the number of conflicts between the enforcement agents and the fishers.

Regarding the procedures of court trials against rule breakers, fishers generally feel that they are up against the "system", that they are often not listened to, and that the authorities do not understand the premises of fishing. In a study of civic compliance and legitimacy (Tyler, 1990) it was found that the procedure of trial hearings (to be heard) was of greater importance than the content of the penalties given (e.g. the size of economic sanctions).

3.4 Content of regulation

Fishers' acceptance of regulations (content legitimacy) is particularly influenced by whether the implementation of the regulation ensures that the distributive effects are considered fair, whether the imposed regulations are perceived as meaningful, whether there is compatability between the regulation and the traditional fishing patterns and practices.

3.4.1 Distributive effects

[4] A comparison of fishers' logbook data and tax reports, sales scripts from the buyer and custom clearance from exporters.

In the cases we have studied in detail we have not observed any major conflicts between various fleet segments related to distributive effects. Generally the vessels participating in the three fisheries we have studied are relatively homogeneous, and have similar interests. Distributive effects have thus not, to any large degree, influenced the compliance behaviour of fishers. However, we have observed some latent or potential vested interests/conflicts among fishers with smaller vessels versus larger vessels. This has most clearly been expressed in the Baltic Sea cod fishery and to a lesser degree in the Kattegat fishery. In a compliance perspective it is important for the administrators to strike a balance which is considered as fair by both owners of smaller and larger vessels. We have several indications from owners of smaller vessels that if they perceive their share of the quota to be small compared to larger vessels, they have only limited incentives to comply with their catch ration. If they overfish their quota they view the biological consequences as rather limited, and what is perhaps more important they do not want to comply with a regulation which is perceived unfair. Owners of larger vessel have on the contrary indicated, that they in situations with low catch rations have large incentives to overfish their catch ration, and they do not differentiate between distributive effects giving the smaller vessels a larger proportion of the quota and the fact that too many vessels participate in the particular fishery. In this case the non-compliance is a consequence of overcapacity. Raakjær Nielsen (1997) has explained the distributive effects of the regulation of the cod fishery in the Baltic in more detail.

3.4.2 Meaningful regulations

An essential incentive for compliance is that the imposed regulations are perceived as meaningful. Fishers will not comply with regulations that are not perceived by to conserve the stocks. In the 3 Danish fisheries respectively 88% for the Baltic Sea, 86% for Kattegat and 100% for the North Sea of the fishers reported that they found it morally wrong to discard fish that is already dead. This is a very strong indication, that fishers will not discard fish even if they have exceeded their catch ration. This is supported by reports from fishers, as only 20% for the Baltic Sea, 15% for Kattegat and 9% for the North Sea found it wrong to land more than the allocated catch ration. In the industrial fishery in the North Sea the combination of ban of discard in Norwegian waters and Danish by-catch regulations is so irrational and inconsistent[5], that fishers will simply not comply voluntarily.

Danish fishers have in general severe difficulties in understanding the usefulness of discard of fish, as it does not conserve the fish stocks. The incentive for compliance is closely related to the fishers, accepting biological meaningfulness in complying with the regulation. Fishers accept that regulations need to be based on scientific advise, but there is a prevailing distrust of the work of the biologists, and the fishers find that their practical knowledge should be integrated in the stock assessment process. Fishers argue that biologists misunderstand the fluctuations and spatial movements of the stocks because of their research methods. Academics (e.g Pálsson, 1995) have pointed out that through daily routines the fishers build up a holistic and intuitive knowledge of the dynamics of the marine ecology. Although seldom in literate form, this practical knowledge has appeared to hold unique information, which can be a valuable contribution to science based resource management as argued by Maurstad and Sundet (1998) is the case in Norwegian fisheries.

The lack of confidence in the marine biological research and the meaninglessness of the imposed regulations undermines the legitimacy of the management system, which can have negative impacts on the incentive to comply with regulations, these findings are supported by findings in other studies Hatcher et al., (1998) and Kuperan and Sutinen (1997).

It is not surprisingly that Danish fishers find regulations based on technical measures and input control more meaningful than the present output quota based regulation. 85% for the Baltic Sea and 75% for Kattegat reported that they found it wrong to violate the minimum landing size for fish[6], and respectively 77% for the Baltic Sea, 59% for Kattegat and 21% for the North Sea completely or partially

[5] Due to the discard ban in Norwegian waters, by-catch in the industrial fishery such as pollack has to be gutted, iced and stored in the hold. The catch is deducted from the Danish quota in Norwegian waters. When the vessel returns to Danish waters the amount above the Danish catch rations should be discarded in order to comply with the Danish regulation. From a fisher's perspective this combination is a stupid regulation which makes no sense at all.

[6] There is no minimum landing size on industrial species. However, 82% of the industrial fishers reported that they found it acceptable to break the minimum landing size regulation. This can be explained by the fact that fishers do not want to discard fish and therefore they are landing fish below the minimum landing size together with the industrial species instead of discarding it.

agreed that closed areas protect the fish stock against overfishing. The North Sea industrial fishers are very reluctant towards closed areas, as they have been subject to several closed area regulations[7], which have placed important limitations on their fishing possibilities. 57% for the Baltic Sea, 67% for Kattegat and 71% for the North Sea completely or partially agreed that days at sea regulation is a better measure to regulate the fishery in order to protect the fish stock against overfishing.

3.4.3 Complementarity - compatibility between regulation and the practical fishery

In the 3 Danish fisheries respectively 90% for the Baltic Sea, 95% for Kattegat and 100% for the North Sea of the fishers reported that practical difficulties to comply with the regulations have major or medium impact on their compliance behaviour.

An illustration hereof is the regulation by fortnight catch rations in the Baltic cod fishery that often places the fisher in a difficult situation, because he may have a good catch at the end of the period when the ration is almost caught and cannot start using the following catch ration or the opposite, that he cannot transfer (keep) the amount not caught within the period to the following period. This gives strong incentives to misreport landings, because as explained above fishers do not discard fish voluntary.

Fortnightly catch rations is an example of how an output based regulation intended to limit the nominal landings per species creates incentives to non-compliance behaviour or if complied with results in a waste of resources. This unintended irrationality lends some weight to the argument of considering alternative forms of regulatory measures in order to improve the flexibility in the regulation and hereby overcome the dynamics in the fishery and fluctuation of the resource accessibility. Regulating fishers' activity and/or input instead of an specific output or in the case of output regulation introducing a larger time horizon in the regulation. These alternative regulatory measures are likely to increase compliance behaviour among fishers (Raakjær Nielsen and Vedsmand, 1999).

In the demersal and Nephrops trawl fishery in the Kattegat the mismatch between the by-catch regulation of in particular cod and the mesh size regulation (70 mm in the cod end) have created a situation, where the regulations are incompatible with the practical fishery. This fishery is a mixed fishery, where the combination of several species in the catch during most of the year makes the fishery profitable. The by-catch regulation has been introduced to avoid a directed cod fishery using small mesh sizes, however this is only a problem in the first quarter.

3.5 Norms and moral among fishers

Norms in the sense of typical behaviour/attitudes and the expectations about the actions and opinions of others can have tremendous influence on subjects in a social setting (Axelrod, 1986). Likewise the moral (personal norms), understood as the personal ethical view on what is right or wrong, affects the behaviour of the person concerned in particular situations.

Despite the potential economic gains to be obtained from undertaking illegal fishing, the level of compliance may remain high if there is a mutual trust (norm) among the fishers to comply (Young, 1979). In Danish fisheries norms seem to influence compliance behaviour among fishers, positively as well as negatively. On one hand, non-compliance with quota allocations and by-catch regulation is commonly accepted, on the other hand there appears to be a strong norm to comply with the minimum landing size of fish and not to catch juveniles.

In case of bypassing quota regulation fishers' attitude (norm) is found to a large degree to be influenced by the consequences of non-compliance behaviour of fellow fishers. If fellow fishers successfully bypass the quota regulation the individual fisher will do the same in order not to lose respect among his peers and ensure his share of the "extra profit". In the case of breaking the norm by catching and/or landing juveniles there is evidence that some sort of social pressure will be in place to prevent the illegal activity. This has been the case in the industrial fishery in the North Sea, where it is unacceptable to land juveniles of cod, haddock and pollack.

Even in the case of a regulation where the norm strongly encourages compliance behaviour, the norm can easily be override in a specific fishery, if there is a high economic gain to be obtained. The Nephrops fishery in Kattegat as explained earlier is a good example hereof. Although fishers in general have strong feelings about compliance with the minimum landing size, the vast majority of the

[7] In particular "The Norway pout box" and "The Wee Bankie", the first box was introduced to protect haddock and pollock and the second primarily to protect seabirds. Both boxes have created conflicts between British and Danish interests. The regulation is by Danish fishers perceived as being based on politics and not science.

Nephrops fishers now land undersized Nephrops to an organised black market, and what is happening in the Nephrops fishery is very similar to breaking quotas/catch rations, where the norm among fishers is to seek economic gains through non-compliance behaviour.

Little evidence is found that non-compliance behaviour will lead to social pressure/sanctions from fellow fishers or the community as a whole, with the exception of oral comments which in some cases have been quite effective. The enforcement agencies do receive reports from fishers (more or less anonymous) conc. fishers who do not comply with the regulation, but the general attitude among Danish fishers is not to interfere with the behaviour of others.

Once the habit of fishing and the moral has changed towards a pure instrumental approach it is difficult for external authorities to reverse this development (Hønneland, 1999) albeit not impossible to influence (Goul Andersen, 1998). Sutinen et al. (1990) argue that the moral might be strengthened by educating the fishers on the biological consequences of non-compliance. In a Danish context the implication hereof is that the present biological approach (TACs) is perceived as appropriate by fishers. Due to a combination of several factors the biological advice on TAC has become uncertain, and there is now an increased recognition that the management system needs to implement a more robust approach than the present TAC approach. Many Danish fishers feel they are taken as hostage of an illegitimate management system, and thus feel it morally correct not to comply.

The findings clearly indicate, that if fishers have broken the regulation once they tend to do it again, and non-compliance behaviour rapidly becomes the norm. The relatively high compliance in Danish fisheries at the time of the research was primarily due to good legal fishing opportunities, which resulted in a (highly) profitable fishery for the majority of most Danish fishers. However, it was clearly stated by the majority of fishers, that if the situation changes, and they can get away with illegal fishing this will happen.

3.6 Decision making procedures

Like in many European countries the fishers in Denmark experience that fishery policy decisions are made at central governmental and EU level, without real involvement of the affected users. The increasing mental distance between fisher and decision-maker impedes the building up of procedural legitimacy and legitimacy of regulations.

The findings of the present study indicate that when fishers feel involved in the decision-making they have a stronger incentive towards compliance, an observation which is supported by results from several other studies (Lilburn, 1986; Young et al., 1996; Jentoft and Kristoffersen, 1989) arguing that co-management may have a positive influence on legitimacy and the actual level of compliance (Kuperan et al., 1998). A larger involvement of fishers in the decision-making process including knowledge creation conc. the status of the stocks should create incentives for compliance through social pressure because of the collective nature of decisions (Symes, 1995).

4. DISCUSSION AND PERSPECTIVES

In this research we have tried to determine important factors influencing rule compliance in fisheries based on an analysis of three Danish fisheries. Despite differences across the three Danish fisheries the analysis clearly points out five factors of major importance influencing fishers compliance/non-compliance behaviour, and we have found indications that a seventh factor might have an influence:

- Economic gains to be obtained
- Deterrence and sanctions
- Compatibility between regulations and fishing practices and patterns
- Efficacy of imposed regulations
- Norms (behaviour of other fishers), and moral
- Perception of being part of the decision-making process (indication).

The findings of this research generally supports the view, that instrumental incentives including economic gains and detterence are crucial for the behaviour of fishers.

Our findings clearly demonstrate that economic incentives (gains) are the most important single factor influencing compliance behaviour in Danish fisheries. Our findings support the observations made by Sutinen et. al (1990) that the large majority of fishers has an opportunistic approach to non-compliance and will consider non-compliance behaviour in situations where there is a large economic gain to be obtained, including an assessment of the risk of detection and following sanction (economic). Despite, a relatively low probability of being detected in the landing situation, fishers know that they can always be detected at a later stage due to paper control and thus there appears to be a strong deterrence effect in many Danish fisheries.

Even if the instrumental incentives are important and relevant they do not rule out empirical recognition of the importance of normative aspects. Fishing is an economic

activity embedded in a socio-cultural structure involving norms, moral, traditions, competition, etc. The study clearly shows that the actions of fishers are influenced by the behaviour and attitudes of other fishers and not least by what is expected by others. The experience of hunting and the expectations of a good catch remain central incentives for fishers behaviour. Thus, in situations where the regulations are inconsistent with fishing practices and patterns it will create strong incentives among fishers to undertake non-compliance behaviour. The implementation of output based regulations like quotas/catch rations are often in conflict with the mentality and prestige of fishers, as it undermines the socio-cultural norms in the fishing communities. Implementation of by-catch and mesh size regulations that are not compatible with fishing practises are likely to be bypassed by fishers, as these regulations are difficult to enforce. Furthermore, compliance with these regulations will often lead to discard of fish, which the majority of fishers find morally wrong and irrational.

The research has demonstrated that compliance is influenced by fishers' perception of the meaningfulness and efficacy of the regulation, e.g. effects on the protection of stocks or confidence in biological recommendations.

The general displeasure with the regulations clearly point out a lack of legitimacy of the management system. There is indication, that fishers feel decoupled from the decision-making process and in particular lack involvement in the stock assessment process.

A striking observation in relation to compliance behaviour among fishers is that non-compliance behaviour influences the moral perception of the individual fisher. In the late 80'ies and early 90'ies most Danish fisheries were in crisis, and in order to survive economically non-compliance with the quota regulation/catch rations became common among fishers. At that time many fishers had moral reservations about non-compliance behaviour (Raakjær Nielsen, 1992). Several years of a high degree of non-compliance behaviour has eroded fishers' moral. Almost a decade later fishers' attitudes to non-compliance behaviour have remained unchanged. Presently (1998-99) the economic income to be obtained in most Danish fisheries is quite good, and fishers therefore have little incentive to break the catch rations. However, it is most likely that if and when the situation changes, the vast majority of the fishers will have no moral reservations about resuming non-compliance behaviour, and actually find it morally right to do so. It appears as if it is almost impossible to rebuild moral once it has been eroded. At least the Danish experiences demonstrate that a decade is not enough time. An explanation could be that the long distance from the fishers to the politic decision arenas has decoupled the fishers from the decision-making system, at least at grassroots level. This has resulted in a common lack of responsibility for the management measures, which supports and is supported by the norm where non-compliance behaviour is commonly accepted if this is the way to survive economically.

4.1 Lessons learnt

Ensuring compliance in fisheries will depend on the ability of the management system to establish an incentive structure, which will adjust the six factors towards inducing compliance behaviour among fishers. Based on the Danish experiences it is clear, that the instrumental approach is an important tool, but also that it cannot stand alone. It is also important to ensure the support from the fishers to the imposed regulation in order to ensure a much higher degree of voluntary compliance behaviour among fishers, and the challenge is to improve the legitimacy of imposed regulations and the management system in general.

The lessons from Denmark clearly indicate that output based regulations will create situations, where fishers have large incentives for non-compliance behaviour. This is caused by the fact, that the management system has not been able to control the fishing capacity. Controlling fishing capacity is a precondition for ensuring compliance behaviour, as pointed out by Copes (1986) fishers almost always find ways to bypass the regulations if they want to.

In order to avoid moral erosion it is important that enforcement agencies take immediate action to prevent non-compliance behaviour in the fishery from developing. What happened in years where the enforcement agencies closed their eyes, when fishers bypassed their catch rations was actually an incidental disservice to both the fishers and the enforcement service, because this undermined the morals and norms that support compliance behaviour on both short and longer terms.

The Danish experiences also highlight the importance of improving the compatibility between the regulation and fishing practices and fishing patterns, and here again less rigid regulations adjusted to the seasonal patterns and variations should be considered. This is however not an easy task, as the fishers are creative in circumventing regulations or make the impression, that this or that particular regulation is inappropriate. However, we will based on Danish experiences (see Raakjær Nielsen and Vedsmand 1999) argue that it will be possible in dialogue with fishers to improve the regulations with compromising on the conservation aspect, but due to higher flexibility

obtain a higher degree of voluntary compliance.

In this respect it should be considered, if regulation based on input control could replace the present output regulation. An input control appears in a Danish context to be more in line with fishers values and compared to an output regulation it is less costly to control. In addition the present quota system applied in EU is not working well for various reasons such as the large uncertainties in the stock assessment process and thus the setting of TACs. Which again undermines the legitimacy of the management system among fishers having a negative impact on compliance behaviour.

In order to improve compliance behaviour in fisheries, fishers have to be drawn more into all processes of management. Here the challenge is to develop appropriate institutional structures, including researchers, administrators, enforcement agencies and fishers that will overcome the present barriers for fisheries management.

Control and enforcement has been demonstrated to be an important factor for compliance behaviour. In Danish fisheries it has not been the tradition to integrate control and surveillance perspectives in drafting regulations. Based on the Danish experiences we would argue that both the efficacy of the enforcement activities and the legitimacy of the regulation can be improved by reallocating enforcement activities on regions and periods where it is critical that the regulations are complied with, but also that regulations are adjusted to address the relevant management problems.

In the combined demersal and Nephrops fishery in Kattegat, the management problem basically boils down to avoid large by-catches of cod in the 1. quarter. In such a situation management should focus on the critical issue, and integrate the enforcement perspective in order to ensure compliance. Enforcement activities should thus be high in this period. It is further crucial that violators are caught and sanctioned immediately in order to avoid establishing a norm of non-compliance behaviour in the fishery.

References

Anderson, L. G. and D. R. Lee, Optimal Governing Instruments, Operation Level, and Enforcement in Natural Resource Regulation: The Case of the Fishery. American Journal of Agriculture Economics 68(3), 678-90, 1986.

Axelrod, Robert, An Evolutionary approach to Norms. American Political Science Review, 80(4), 1986.

Becker, G. S., Crime and Punishment: An Economic Approach. Journal of Political Economy 76(2): 169-217, 1968.

Copes, Parzival, Critical Review of the Individual Quotas as a Device in Fisheries Management, Land Economics 62(3): 278-91, 1986.

Giddens, Athony, The Constitution of Society, Polity Press, 1984.

Goul Andersen, Jørgen, Citizens and the Laws, Rockwool foundation Research unit, Aarhus University Press, 1998. (In Danish)

Granovetter Mark, Economic Action and Social Structure: The Problem of Embeddedness. The Sociology of Economic Life, Westview Press, 1992.

Hanna, Susan S., User Participation and fishery management performance within the Pacific Fishery management, Council. Ocean & Coastal Development, 28(1-3), 23-44, 1995

Hatcher, Aaron, Shabbar Jaffry, Olivier Thébaud, and Elizabeth Bennet, Normative and social influences affecting compliance with fisheries regulations, Land Economics, 2000 (forthcoming)

Hoffman, M, Moral internalisation: Current theory and research. Advances in Experimental Social Psycology 10,, 1977.

Hønneland, Geir, Enforcement and Legitimacy in the Barents Sea Fisheries, in David Symes (ed.), Northern Waters, Management Issues and Practice,, Fishing News Books, 1998.

Hønneland, Geir, A model of compliance in fisheries: theoretical foundations and practical application. Ocean & Coastal Management 42, 699-716, 1999.

Jentoft, Svein and Trond I. Kristoffersen, Fisheries Co-management: the Case of the Lofoten Fishery. Human Organisation 48(4), 355-365, 1989.

Jentoft, Svein, Fisheries co-management. Delegating government responsibility to fishermen's organizations. Marine Policy 13(2): 137-154, 1989.

Jentoft, Svein, Legitimacy of the Fisheries Management,

manuscript of a lecture given at the University of Tromsoe, 1990. (In Norwegian!)

Jentoft, Svein, Comedy of the Commons, Ad Notam, 1998. (In Norwegian)

Kuperan, K. and Jon G. Sutinen. Blue Water Crime: Deterrence, Legitimacy, and Compliance in Fisheries. Law & Society Review 32:309 337, 1998.

Kuperan, K, N. M. R. Abdullah and R. Pomeroy, Measuring Transaction Costs of Fisheries co-management, Paper presented at the Seventh Common Property Conference of the International Association for the Study of Common Property Conference, 10-14 June, Vancouver, Canada, 1998.

Lilburn, B., Management of Australian Fisheries: Broad development and alternative strategies. In Nina Mollet (ed.) Fishery Access Control Programs Worldwide. Alaska Sea Grant report, No. 86-4. 1986

Maurstad, Anita, Technical capacity versus capacity in use - challenges in defining efficient fisheries regulations, IIFET 98 Proceedings, vol. 2., 1998.

Maurstad, Anita, and Jan H. Sundet, The invisible cod - Fishermen´s and Scientists Knowledge, in Commons in a Cold Climate, Jentoft, Svein, ed.,Unesco,1998.

Pálsson, Gisli, Learning by fishing: Practical Science and Scientific Practice, in World Bank Publication, 1995.

Raakjær Nielsen, Jesper, Structural Problems of the Danish Fishery Sector - In a socio-economic perspective, University of Aalborg, Ph.D thesis, 1992. (In Danish)

Raakjær Nielsen, Jesper, Compliance and Legitimacy in Danish Fisheries Management , An analytical framework, IIFET 98 Proceedings , vol 2, 1998.

Raakjær Nielsen, Jesper, Socio-economic effects of the Danish quota system, in Gisli Pallson and Gudrun Petursdottir (eds.), Social Implications of Quota based systems in Fisheries, TemaNord 1997:593, Nordic Council of Ministers, 1997.

Raakjær Nielsen, Jesper, and Tomas Vedsmand, User Participation and Institutional Change in Fisheries Management: A viable alternative to the failures of “Top-down” driven control?, Ocean and Coastal Management 42 (1):19-37, 1999.

Raakjær Nielsen, Jesper, and Tomas Vedsmand, Compliance and Legitimacy in Danish Fisheries Management, An analytical framework, in Compulsion and Legitimacy in Fisheries Management, TemaNord 1999:517, Nordic Council of Ministers, 1999. (In Danish)

Sagdahl, Bjørn K., Resource Management and Problems of Legitimacy: A study of governing problems with management of Norwegian Cod , in NF-report 15/92-20, 1992. (In Norwegian!)

Sutinen , J, A. Rieser, and J. R. Gauvin, Measuring and Explaining Noncompliance in Federally Managed Fisheries, in Ocean Development and International Law 21, 335-372, 1990.

Sutinen, J. and, P. Andersen, The Economics of Fisheries Law Enforcement, Land Economics 61(4), 387-97, 1985.

Symes, David, Alternative Models for Fisheries Management: in an Ideal World, in Working paper. School of Geography and Earth Resources, University of Hull, 1995.

Tyler. T. R., Why People Obey the Law, Yale University Press, New Haven and London, 1990.

Vedsmand, Tomas, Danish Fisheries Management and the Development of the Fishing Industry, PhD-thesis, University of Roskilde and the Research Center of Bornholm, 1998. (In Danish!)

Young, Oran, Compliance and Public Authority, A theory with international applications, The Johns Hopkins University Press, 1979.

Young, J. A., A. P. Smith and J. F. Muir, Representing the individual fishermen: an attitudinal perspective on one PO’s membership, Marine Policy 20(2):157-16, 1996.