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Fight Environmental Crime

A case study on illegal fishing and the role of rights-based fisheries management in improving compliance

Work Package 4 “Case Studies”

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1. Summary

This case study focuses on illegal, unreported and unregulated (IUU) fishing. IUU fishing refers to fishing activities that do not comply with national, regional, or international fisheries conservation or management legislation or measures. IUU fishing activities may all have serious detrimental impacts on marine ecosystems, ecosystem services, and the societies that derive benefit from such services. IUU fishing exerts additional pressure on fish stocks, which may already be under pressure from unsustainable rates of legal fishing activities, and can thereby contribute to the depletion of fish stocks. In addition to these direct impacts on target fish species, fishing activities (and therefore IUU fishing activities) can have direct impacts on non-target commercial species and nonmarketable fish, on protected and vulnerable species, and on habitats.

This case study focuses on the causes, motives and incentives for committing illegal fishing. It considers the role of rights-based fisheries management systems in incentivising or dis-incentivising illegal behaviour. Rights-based management programmes convey and manage exclusive entitlements to an entity – person, company, vessel, community – to fish in a particular place at a particular time. The European Commission defines rights-based management as "a formalised system of allocating individual fishing rights to fishermen, fishing vessels, enterprises, cooperatives and fishing communities". Rights-based systems of fisheries management exist in most EU Member States in some shape or form, and the Commission sought to introduce an EU system of transferable fishing concessions (defined as a revocable user entitlement to a specific part of fishing opportunities allocated to a Member State, which the holder may transfer) in its proposal for the reform of the Common Fisheries Policy (CFP).

Rights-based management is found to be a potential tool to deliver better fisheries management. The adoption of rights-based management can lead to better compliance with fisheries requirements due to the interest rights holders have, their ability to lease extra quotas, etc. However, the benefits of rights-based management depend entirely on the rights being adequately determined. If fishers consider their entitlements to be insufficient or unfairly distributed, then non-compliant behaviour may occur.

Rights-based management is, therefore, a mechanism to be considered within the design of fisheries management. In taking such a system forward it is importance properly to design the catch share systems to ensure the incentives work for compliance as well – i.e. to address or limit social equity concerns.

2. Introduction

This case study focuses on illegal, unreported and unregulated (IUU) fishing. IUU fishing refers to fishing activities that do not comply with national, regional, or international fisheries conservation or management legislation or measures (Agnew & Barnes, 2004). Illegal fishing activities are defined by the international community and the EU[1] as activities conducted by fishing vessels in violation of national laws or international obligations, or activities conducted in maritime waters without the permission of that State. In addition to the activities of fishing operators, illegal fishing is often associated with upstream and downstream criminal activities such as money laundering, corruption, document fraud or handling of

[1] See Article 3, International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, and Articles 2, 3 and 4 of Council Regulation (EC) No 1005/2008 establishing a Community system to prevent, deter, and eliminate IUU fishing.

stolen goods, although these are not explicitly referred included in the official definitions (UNODC, 2011). Unreported fishing refers to activities which have not been reported, or have been misreported, to the relevant national authority or regional fisheries management organisation, in contravention of their reporting procedures. Finally, unregulated fishing refers to activities conducted in areas or for fish stocks in relation to which there are no applicable conservation and management measures, in a manner that is not consistent with State responsibilities for the conservation of marine living resources under international law. IUU fishing is often described as an environmental crime, although technically unregulated fishing doesn't actually involve the breaking of any laws. Nevertheless, the three types of fishing activity are often discussed together and it is not always easy to distinguish between them in the literature. Throughout the case study I aim to make this distinction clear, and specify which types of fishing activity is being referred to.

Importantly, IUU fishing activities may all have serious detrimental impacts on marine ecosystems, ecosystem services, and the societies that derive benefit from such services. IUU fishing exerts additional pressure on fish stocks, which may already be under pressure from unsustainable rates of legal fishing activities, and can thereby contribute to the depletion of fish stocks. In addition to these direct impacts on target fish species, fishing activities (and therefore IUU fishing activities) can have direct impacts on non-target commercial species and nonmarketable fish, on protected and vulnerable species, and on habitats (Dayton et al, 1995; Suuronen et al, 2013; Gascoigne and Willstead, 2009; Pauly et al, 1998; Grieve et al, 2014). Fishing activities may also lead to indirect impacts, such as pollution from discharging organic waste while processing catches, non-biodegradable litter such as lost nets that can continue to ghost fish, emissions of carbon dioxide and other greenhouse gases, and the alteration of trophic structure and function through targeting low trophic level fish and discarding (FAO, 2005-2014; Reeves and Furness, 2002; Heath et al, 2014; Suuronen et al, 2013). Furthermore, IUU fishing obstructs fisheries managers from effectively managing fish stocks in a sustainable manner; because of the uncertainty associated with estimates of IUU catches will impede stock assessments (Watson & Pauly, 2001).

In addition to its detrimental environmental impacts, IUU fishing also has significant social and economic effects. By exploiting and depleting fish stocks, it reduces the resources available to legitimate fishing enterprises. This can lead to reduced profits and potentially unemployment. Often IUU fishing affects small scale fishing communities in developing countries, with implications for development and food security (UNODC, 2011). In pure economic terms, the value of fish lost to illegal and unreported fishing is estimated to be between US$ 10 – 23.5 billion annually (Agnew et al, 2009a). The fishing industry has also been identified as vulnerable to international organised crime, and associated with serious illegal activities including trafficking in persons, drugs and arms, smuggling of migrants, and terrorism (UNODC, 2011). There have also been reports of poor and/ or forced labour on board fishing vessels (UNODC, 2011). The UNODC (2011) found several reported instances where there are links between human and drug trafficking with marine living resource crime (particularly in relation to high value, low volume species such as abalone, sturgeon or toothfish) (UNODC, 2011).

IUU fishing is a global problem, but regions vary by how much they are affected by it. Unregulated fishing occurs largely on the high seas (Pew Charitable Trusts, 2013). Agnew et al (2009a) conducted one of the most extensive studies into the size of illegal and unreported fishing, analysing 54 EEZs (Exclusive Economic Zones, which can extend up to 200 nm from the coast) and 15 regions of the high seas, and covering 46 per cent of the global reported marine fish catch. The Eastern Central Atlantic exhibited the highest level of illegal and unreported catches (37 per cent of catches between 2000 and 2003) (Agnew et al, 2009a). In the North East Atlantic, the trends show that IU fishing increased in the early 1990's (up from 10 per cent during the 1980's to 12 per cent) and only started to improve slightly in the early 2000's (dropping to 9 per cent) (Agnew et al, 2009a). This rise in the 1990's was attributed to an increase in fishing pressure resulting from the end of a period of exceptionally high cod recruitment.

In EU waters in the North East Atlantic, fisheries are regulated like in other EU waters, by the EU Common Fisheries Policy (CFP). The CFP aims to promote sustainable fishing, and does so by imposing technical measures (such as gear specifications and area/time closures) and limiting fishing opportunities available

to Member States (in the form of total allowable catches divided among Member States in the form of quotas, or in the form of effort limits expressed as days-at-sea). Although these measures are defined at the EU level, Member States are responsible for the administration of their quotas, inspecting, and sanctioning in the case of infringements.

Recognising that the success of the CFP requires the implementation of an effective system of control, the EU established a Community system for ensuring compliance with the rules of the CFP (Council Regulation (EC) No 1224/2009) – known hereafter as the Control Regulation. The Control Regulation governs the collection of data for managing fishing opportunities, and aims to ensure that only the allowed quantities of fish may be caught. It applies to all activities covered by the CFP carried out by EU fishing vessels or nationals in Member States or Community waters. The Regulation also aims to ensure that the rules are applied across the EU in the same way, with harmonised sanctions. In addition, the Control Regulation brings the control, inspection and enforcement system in line with Council Regulation (EC) No 1005/2008, adopted on 29 September 2008, establishing a Community system to prevent, deter, and eliminate IUU fishing, commonly referred to as the IUU (Fishing) Regulation. The IUU Regulation aims to make sure that no illegally caught fisheries products end up on the EU market. To achieve this, it requires flag States to certify the origin and legality of the fish aiming thereby to ensure the full traceability of fishery products traded to and from the EU. It also creates a black list of IUU vessels and countries that have not controlled IUU fishing sufficiently. A final regulation of importance is Council Regulation (EC) No 768/ 2005 which established the European Fisheries and Control Agency (EFCA) in 2005 to assist the European Commission in facilitating and enhancing cooperation between Member States with respect to their control and inspection activities, in order to try and create a level playing field for the fishing industry. The EFCA uses Joint-deployment Plans (JDPs) as its tool to ensure effective enforcement, by organising the deployment of national human and material means of control and inspection pooled by Member States.

This case study focuses on the causes, motives and incentives for committing illegal fishing. In particular, it considers the role of rights-based fisheries management systems in incentivising or dis-incentivising illegal behaviour. Rights-based systems of fisheries management exist in most EU Member States in some shape or form, and the Commission sought to introduce an EU system of transferable fishing concessions (defined as a revocable user entitlement to a specific part of fishing opportunities allocated to a Member State, which the holder may transfer) in its proposal for the reform of the CFP (COM(2011)417) (European Commission, 2011). Although this proposal was not approved by the Council and European Parliament, Member States are free to implement their own rights-based management systems. As the debate over the usefulness or benefits of such systems continues, it is important to consider the role they play in influencing fishers' behaviour with respect to compliance. Thus this case study will contribute to the debate over rights-based management as well as inform discussions over causes, motives and incentives influencing or this particular environmental crime, by reviewing the evidence available to try to determine to what extent this management tool plays a role in compliance behaviour.

3. Literature review

What is illegal activity?

Prior to reviewing the literature on illegal and unreported fishing, it is useful to establish what activities precisely are considered to be non-compliance. By definition, anything that is an infringement of the law is illegal. Illegal fishing therefore covers a wide range of behaviour. According to the IUU Regulation, EU vessels shall be presumed to be engaging in IUU fishing if that have, contrary to the conservation and management measures applicable in the fishing area concerned, been shown to be:

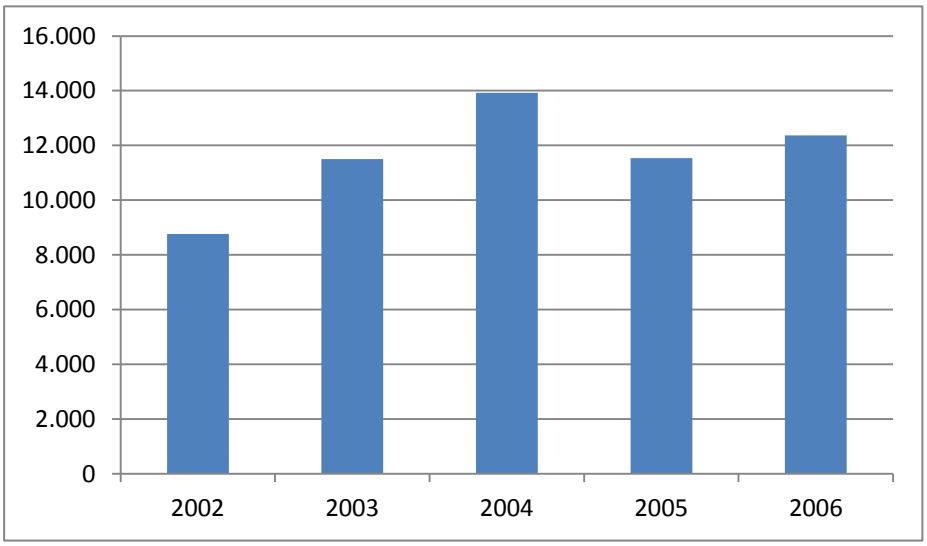
a) Fishing without a valid licence, authorisation or permit issued by the flag State or the relevant coastal State.

b) Not fulfilling obligations to record and report catch or catch-related data, including data to be transmitted by satellite vessel monitoring system.
c) Fishing in a closed area, during a closed season, without or after attainment of a quota or beyond a closed depth.
d) Engaging in directed fishing for a stock which is subject to a moratorium or for which fishing is prohibited.
e) Using prohibited or non-compliant fishing gear.
f) Falsifying or concealing its markings, identity or registration.
g) Concealing, tampering with or disposing of evidence relating to an investigation.
h) Obstructing the work of officials in the exercise of their duties in inspecting for compliance with the applicable conservation and management measures; or the work of observers in the exercise of their duties of observing compliance with the applicable Community rules.
i) Taking on board, transhipping or landing undersized fish in contravention of the legislation in force.
j) Transhipping or participating in joint fishing operations with support or re-supply from fishing vessels identified as having engaged in IUU fishing, in particular those included in the Community IUU vessel list or in the IUU vessel list of a regional fisheries management organisation.
k) Carrying out fishing activities in the area of a regional fisheries management organisation in a manner inconsistent with or in contravention of the conservation and management measures of that organisation.
l) Use of a fishing vessel with no nationality (a stateless vessel in accordance with international law).

Measuring non-compliance

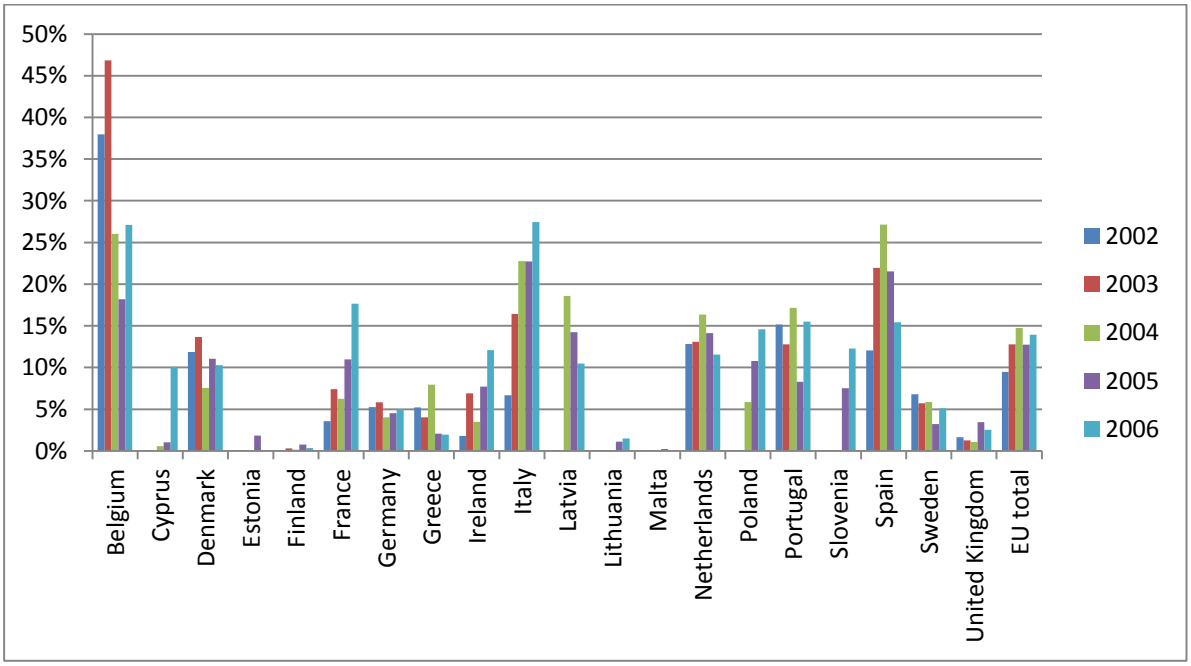
Clearly it is impossible to quantify infringements with any degree of accuracy: they are known to take place in different forms and some violations are detected but others go unnoticed. Several sources of literature were identified providing data on the number of CFP serious infringements reported by Member States to the Commission (see European Commission 2004; 2005; 2006; 2007; 2008; Agnew et al, 2009b). This data spans the years 2002 to 2006, and over this time period the number of serious infringements detected by Member States has not changed significantly (see Figure 1). Unfortunately the Commission has not published any more recent data. Furthermore, this data largely precedes the establishment of the EFCA, and this may have led to some changes in detection of infringements as a result of their activities (Blomeyer and Sanz, 2012).

Figure 1 Serious infringements with the CFP per year, as reported by Member States (EU total)



Source (raw data): European Commission 2004; 2005; 2006; 2007; 2008; Agnew et al, 2009b.

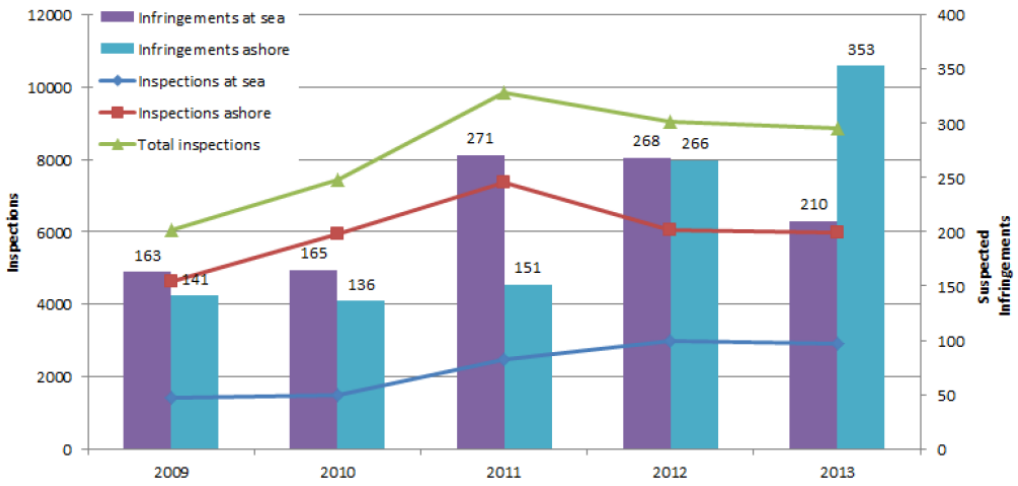
Figure 2 Serious infringements with the CFP, as reported by Member States (% of infringements out of number of active vessels)



Source (raw data): European Commission 2004; 2005; 2006; 2007; 2008; Agnew et al, 2009b.

Other more recent sources of data on infringements are the EFCA annual reports, which provide comprehensive data for the JDPs, in terms of the number of inspections undertaken and the detected infringements (e.g. ECFA, 2013). Although Member States are able to carry out inspections on their own, the joint efforts through JDPs make up a significant proportion of all inspections (Blomeyer and Sanz, 2014). As a consequence the coverage of this data is reasonable – although it varies by region: the NAFO and NEAFC JDP accounts for 100% of inspections, whereas the JDPs in the Baltic and the North Sea account for around 30% of Member State inspections (Blomeyer and Sanz, 2014).

Figure 3 Trends in the inspections and results (infringements) of Joint deployment Plans, 2009 - 2013



Source: EFCA (2013) pp. 33

However, it should be recognised that there are issues with data on the number of inspections and detected infringements. Firstly, these relate to outputs and they do not actually demonstrate trends in compliance. The number of serious infringements is also reported as a percentage of the number of active vessels, however as a metric for measuring trends in compliance it is flawed as making real sense of data on infringements can only be achieved in light of information on the fishing effort, the area fished, the time period, and the amount of control/inspection effort. Nevertheless, these data can provide some insight into overall trends, and they do highlight that infringements with the rules of the CFP continue to be a concern.

Rights-based management

Rights-based management programmes convey and manage exclusive entitlements to an entity – person, company, vessel, community – to fish in a particular place at a particular time. The European Commission defines rights-based management as "a formalised system of allocating individual fishing rights to fishermen, fishing vessels, enterprises, cooperatives and fishing communities" (European Commission, 2007b). There are numerous different types of right-based management schemes. For example, fishing rights (also known as catch shares (Bonzon et al, 2013)) can be based on quota, fishing effort, or access to fishing territory. They can be held by individuals, groups, communities or regions. They can be fully transferable, non-transferable, or somewhere in between (with regulation of the market, or safeguards to limit transfers in certain situations) (Bonzon et al, 2013). Most well-documented rights-based management schemes are quota-based, and the majority are also transferable, meaning that participants can buy, sell and/or lease shares (Bonzon et al, 2013). Transferability increases flexibility enabling a fishery to adjust to annual fluctuations in the catch limit.

By providing exclusive access, rights-based management systems aim to address the Tragedy of the Commons, articulated by Garret Hardin (1968). Managing resources under a common pool or open access (i.e. the opposite of a rights-based approach) typically results in a drive to short-term overexploitation. By contrast, allocating access rights within a fishery provides a means of internalising externalities arising from the common property nature of fish stocks.

For EU Member States, the EU is responsible for limiting total fleet size and for fixing catch and effort levels. It also decides on technical measures such as restrictions on gear types and characteristics in order to provide additional protection to fish stocks. The EU distributes the total allowable catches and effort units (days-at-sea) amongst Member States according to the principle of 'relative stability'[2]. National authorities then distribute and manage fishing licences, quotas, and effort allocations at the national or regional level. Thus the decision over whether to employ a rights-based management approach is up to the Member States' discretion.

Limiting access to a fishery automatically creates a market for fishing rights, reflected for example in higher prices for vessels that come with a license as opposed to those that do not. By introducing transferability formally into the rights allocation system, you can ensure greater transparency, legal certainty, security, and it enables the authorities to establish formal safeguards and regulation of the market (European Commission, 2007b). This was one reason that the Commission proposed rights-based management as a management option within the CFP (see European Commission, 2007b). However, transferability is also one of the most controversial aspects of rights-based management systems. There are now numerous examples for RBM scheme implementation in various specific fisheries and localities, in

[2] 'Relative stability' is the principle according to which the EU allocates total allowable catches into national quotas. Under this system, total allowable catches for each fish stock are shared out between the Member States of the EU according to a fixed allocation key based on their historic catches.

Europe and beyond. These experiences provide numerous lessons on good practices and the limitations and risks of these tools.

The literature is clear that there are several important advantages to RBM systems. Research and experience has shown that rights based management systems can:

- Alter the economic incentives of fishers, who no longer compete for their catches, so that highly competitive fishing no longer takes place (Beddington et al, 2007)
- Stabilize fishery landings and catch limits (Essington, 2010; Essington et al., 2012)
- Enable the industry to settle on a fleet capacity that optimises individual economic yield to vessels or cooperatives (the more efficient fishers will buy out their less efficient counterparts, and in so doing increase the returns to the fishery overall) (Beddington et al, 2007; Coelho et al, 2011)
- Allow flexible and extended fishing seasons (Coelho et al., 2011)
- Increase the profits and value of fisheries (Newell et al., 2005; Grafton et al., 2005; Grimm et al., 2012)
- Enhance the quality of landings and improve markets (by avoiding landings gluts) (Coelho et al, 2011)
- Improve the safety of operations (resulting from extended seasons and ending the race-to-fish) (Coelho et al, 2011; Grimm et al., 2012)
- Reduce the likelihood of overfishing (Costello et al., 2008; Melnychuk et al., 2012) and prevent, and even reverse, the collapse of fish stocks (Costello et al., 2008)
- Alter fishers' relationships with management actions that protect and enhance fish populations, because the value of a quota share increases as stocks become more abundant (Beddington et al, 2007).
- Promote successful community-based co-management of fisheries (Gutiérrez et al., 2011)

Despite the numerous advantages of rights based management approaches, they are not without their potential problems. Given that transferable rights have the effect of reducing fleet capacity to optimize economic yield, this can lead to concentration of property rights (Coelho et al., 2011; Sumaila, 2010). In economic terms, this is not considered a problem because the proponents of transferable catch shares expect such concentration to take place (this is how they achieve economic efficiency). This can also mean that the job structure changes from fewer part-time jobs to more full-time jobs (Sumaila, 2010). As the number of quota owners declines over time this can have implications for employment levels, barriers to new entrants into the sector, and income disparities. Sumaila and Watson (2002) report concerns of monopolisation within a fishery and big players becoming bigger mainly because they have more effective lobbying machinery, rather than because they are more economically efficient than small-scale operators.

4. Case presentation

Factors affecting compliance

Non-compliance is unsurprisingly a complex issue, with numerous processes interacting to influence the levels of it. However, for many years little research was undertaken to establish the underlying causes for non-compliant behaviour amongst fishers (Nielsen and Mathiesen, 2003). Traditionally, a purely economic approach was applied, accounting, in its simplest form, for monetised costs and benefits of non-compliant behaviour only (Becker, 1968, in Eggart and Ellegård, 2003). According to this approach, a fisher will weigh up the expected net benefits from non-compliance, including the expected penalty in the case of being caught and convicted, with the expected net benefits from compliance, and choose their behaviour based on the most beneficial outcome (Eggart and Ellegård, 2003). The OECD (2005) identifies a number of economic drivers of IUU fishing that follow this rational:

a. *Overcapacity of fishing fleets (caused by management failures).* According to the OECD (2005) excess capacity has the potential to be 'an extremely powerful driver' of IUU fishing, particularly in fisheries exploiting higher value catches, because if vessels are not offered incentives to remove

themselves from the fleet, they will face large costs which can only be mitigated through engaging in IUU fishing. The motivation to engage in IUU will also increase if there is little or no regulation of capacity, and there is no consideration of the ability of fishers to generate an income (OECD, 2005).

b. *Market demand and price for IUU fish.* The higher the price of a fish species the more likely it is to be targeted illegally, and the economic gains from IUU fishing f high-value species are often significant. For example, estimates of the cumulative financial losses from IUU fishing of Patagonian toothfish in the Antarctic amounted to USD 518 million between 1996 and 2000, which compared to an estimated legitimate turnover of USD 486 million over the same period (Miller, in OECD, 2005 p. 38).
c. *Levels of sanctions*. In the absence of severe penalties, IUU fishing can be a lucrative option. The OECD (2005) argues that very few countries have levels of fines that are effective deterrents, and suggests that the forfeiture of catches and vessels could have a greater deterrent effect than fines. They also note that many vessels use fake operating companies, the names of which they change frequently, to avoid paying fines when they get caught. Nonetheless, there are instances when even high sanctions do not pose a sufficient disincentive, for example when the perpetrators suffer from extreme poverty.
d. *Economic and social conditions of fishers*. OECD (2005) reports that in a number of fisheries IUU fishing activities are carried out by fishers from developing countries with poor economic and social conditions. It should be recognized that the same can apply in developed countries (Personal communication: Clark, 2014). Additionally, people from poor economic and social conditions are employed on IUU vessels in situations where they are exploited and have no social protection.
e. *Level of monitoring, control and surveillance activities.* Unsurprisingly, the level of monitoring, control and surveillance activities can have a significant effect on IUU fishing, by providing positive signals to legitimate fishing operators and discouraging potential non-compliance. This is not directly an economic incentive but it is an important factor to consider in weighing up the risks and potential costs of non-compliance.

The OECD (2005) also reports that the choice and design of management regimes is a key driver of IUU fishing. This appears to be a governance-related rather than an economic driver, however the rationale behind their argument is economic in nature, arguing that management regimes drive IUU fishing, through the way in which they determine the income that fishers will be able to make, and the higher the legitimate income the less likely they will engage in illegal activities. This is linked to point (a) and the importance of introducing capacity management. The OECD does not however explain which management regimes are more conducive to legitimate behaviour or not, although the economic argument they use suggests the management regime that produces the highest level of income would be the best.

An alternative approach is to take into consideration other social factors, described by Eggart and Ellegård (2003) as 'co-management' or 'cooperative action theory'. This approach emphasises the role of legitimacy of regulations, institutions, etc in making fishers comply with the rules. According to this theory, fishers will be more likely to comply if they perceive the regulations or decision-making process that has produced the regulations as legitimate. Another aspect of this approach is the perceived behaviour of others. According to the theory, fishers are more likely to comply, despite potential benefits of non-compliance, if they perceive others to comply and/or they can expect informal sanctions from their peers in case of violation.

A few studies have attempted to investigate the importance in practice of these different factors (Hatcher and Gordon, 2005; Eggart and Ellegård, 2003). Hatcher and Gordon (2005) conducted an empirical investigation into the factors affecting UK fisheries compliance, specifically compliance with quota limits, to compare the significance of various social and moral factors versus more 'conventional' economic incentives. They included such factors in their model of individual violation as financial incentives to violate, deterrents to violation, a set of variables related to personal moral judgements about violation, a set of variables related to the perceived behaviour and opinions of others, and a set of variables representing the legitimacy of the regulatory system, including the regulations themselves as well as the institutions and processes. An earlier model using the same data concluded that there was evidence that compliance with quotas was positively associated with a personal norm of fair shares, the perception of

compliance by other local fishers, and a feeling of personal involvement in the quota management system (Hatcher et al, 2000). However, the alternative model employed in Hatcher and Gordon (2005) (which the authors argue is richer and more robust) found that levels of quota violations in the fishery appeared to be driven by financial incentives. Indeed, they observed that variables related to involvement or participation all had near-zero coefficients, although there was some support for the importance of local structures given that the index of support for Producer Organisation rules was association with lower violation levels (Hatcher and Gordon, 2005).

Eggart and Ellegård (2003) conducted a similar investigation in Sweden. They surveyed fishers from the Swedish industrial and small scale fleets to gauge the fishers' attitudes towards the fishery management regulations, including the means and measures to control it, their perception of the risk of control, and their perceptions of the overall compliance with fisheries regulations. They observed that Swedish fishers are far more compliant than would be expected given purely economic considerations. Views concerning the existing regulatory framework were unfavourable: 24% considered the existing management to work badly, about a third considered controls to be completely ineffective, and a majority perceived themselves to have too small an influence on the development of the management policy (Eggart and Ellegård, 2003). Fishers estimate that 90% of the catch in their fishery is reported, and although this implied 30,000 tons of unreported landings, a considerably higher degree of violation would be expected in a situation with low legitimacy of regulations, low risk of controls, and mild penalties, if the equation were based on economic incentives alone (Eggart and Ellegård, 2003). Nevertheless this points to a compliance problem in the Swedish fishery, and of course this estimate of unreported catches (only one aspect of non-compliance) may not be particularly robust and could be an underestimate. Given that interviewees (including industrial fishers themselves) pointed to industrial fisheries (fisheries for herring and sprat destined for fish meal) as the main culprits for violating regulations, the authors suggest that the culture of profit-maximisation within these large-scale fisheries, leading to higher investments, greater capacity, and more advanced technology, has meant that economic considerations are more important influences on compliance than moral obligations and peer pressure (Eggart and Ellegård, 2003). This is in contrast to the small-scale gillnet fishers who the results suggest are more likely to comply. The authors postulate that this may be because they mainly come from small harbours in the south and west of Sweden, fish more traditionally, and are therefore more susceptible to peer pressure and have a greater sense of moral obligation (Eggart and Ellegård, 2003).

The impacts of rights-based management on compliance

As discussed in the previous section, compliance is a complex issue and there are numerous factors that can potentially play a role in driving illegal behaviour. Rights-based management systems employ incentives to change the behaviour of fishers and their patterns of exploitation, therefore it is likely that they would also influence fishers decisions over whether or not to comply with regulations. The following section present the different ways in which rights-based management may incentivize or discourage compliance and the evidence available to support this.

Given that rights-based systems improve the profitability of fisheries, this should automatically discourage illegal activity. OECD (2005) reports that overcapacity is a very powerful driver of illegal fishing, as well as the economic and social conditions of fishers. Right-based management has been shown to reduce the capacity of fishing fleets and increase the economic situation for those remaining in the fishery. In addition, rights-based management systems convey exclusive rights to the person, community or vessel in question. This exclusive right, if it is conveyed for a sufficiently long period of time, provides the quota or rights holder with a sense of ownership over the resource. Coelho (2013) argues that the advantage of these private-property -based forms of management is that they are self-enforcing: 'as fishers are given almost private property rights to the resource based, some sort of auto-regulation is guaranteed'. The sense of ownership should give the property rights users the perception that the results of their actions will affect the net economic benefits that result from resource extraction (Coelho, 2011). This self-regulation

argument is based on the economic approach to compliance of Becker (1968) described above, and is often extended beyond simply obeying the rules, to lobbying for lower TACs or at least, not lobbying for higher TACs in contravention of scientific advice. In theory this so-called ownership engages fishers in compliance with the regulations and diminishes enforcement costs (Coelho, 2013). Furthermore, inadequate enforcement may reduce the value of the property right (by increasing the supply of fish, and potentially reducing the stock biomass in the longer term thereby making shares of the catch worth less in the future). This has been seen to prompt stakeholders to take collective action and fund their own monitoring programmes with a tax on landings and quota (Branch, 2009). In the British Columbia groundfish fishery, for example, fishers actually pay for 100% onboard observer and dockside coverage, to wipe out any misreporting of catches (Turris, 2000). This example supports the argument that fishers might be more willing to pay for enforcement, to report violators, and to reach collective agreements on acceptable behaviour in order to protect the value of their quota. (Branch, 2009)

Other arguments in support of rights-based management as a tool for greater compliance are:

- Under the more flexible rights-based systems where tradability of fishing rights is permitted, there should less need for fishers to infringe the law because they can lease quota from others to cover their short term overages.
- The long-term ownership of access rights provides an opportunity to increase sanctions through the confiscation of such rights for either a long period of time or indefinitely
- They influence the amount of enforcement that is required, because they reduce the number of participants in the fishery and thereby allow more intensive monitoring of landings and discards, and increase the probability of detecting illegal activity (Branch, 2009).

In practice, many rights-based management systems continue to have problems with illegal behavior (Coelho, 2013). Illegal activities commonly reported to be present in the absence of effective control and enforcement are data fouling (i.e. high-grading and under-reporting of catches) and quota busting (Coelho, 2011). This suggests that the ownership effect, or net gain expected from ownership, is not sufficient to outweigh the net gains from committed an offence.

This may partly be due to the fact that not all fishers will have what they consider to be sufficient entitlement to fishing rights. To differing extents, in many fisheries the actual fishers can be leasing quota from quota-holders (so-called 'armchair fishers' or 'slipper skippers') and may be less likely to obey regulations for the same reasons that rented apartments are often poorly maintained compared to those inhabited by the owners (Branch, 2009). In this case, it is possible that the long-term economic interests of the quota-holder, or the long-term interests of the fish stocks, do not outweigh the short-term economic gains from exceeding the quota. Who holds the quota and who leases it will depend largely on the initial allocation of rights, and the degree to which they have been transferred since then, if transferability is permitted under the system. This point links closely to the driver of illegal fishing referred to by Eggart and Ellegård (2003) as the legitimacy of the management structures. While the economic impacts of tradable rights are positive, concerns are raised about their social impacts in terms of fairness and equity (Davis 1996). By concentrating the quota in the hands of fewer people, they can potentially become quota landlords controlling the market. If this is perceived as unfair, it can help people to legitimise illegal activity (along the lines of stealing a loaf of bread to feed a starving family). Thus apart from the equity concerns there may also be an enforcement rational to regulating the markets for quota to avoid over-concentration.

Nevertheless, there is evidence that fisheries managed using rights-based systems do perform better with respect to sticking within quotas. Melnychuck et al (2012) conducted a global meta-analysis of 345 stocks to assess whether fisheries under catch shares were more likely to track management targets set for sustainable harvest than fisheries managed only by fleet-wide quota caps or effort controls. They observed that over-exploitation occurred in only 9% of stocks under catch shares compared to 13% of stocks under fleet-wide quota caps, and 41% of stocks under effort controls (Melnychuck et al, 2012). They conclude that the reduced variability of catch share fisheries around their respective target catch rates was likely due to the incentive which placed the responsibility for not exceeding quota on the individual. Similarly, Grimm et al (2012) studied 15 major catch share fisheries of the United States and British Columbia, for, among other things, compliance with total allowable catches. They observed that of the 86 TACs set in the

studied catch share fisheries since implementation, only five (6%) were exceeded, and by an average of only 7% (Grimm et al, 2012).

5. Conclusions and policy implications

Several sources of literature identified in this study show that there is an issue with the number of CFP serious infringements reported by Member States to the Commission. The challenge for addressing such infringements is:

- To ensure fishers know their obligations.
- To be able to track and identify non-compliance
- To have the enforcement mechanisms in place to tackle non-compliance and act as an incentive for compliance.
- To adopt systems that encourage compliant behaviour.

Rights-based management is a potential tool to deliver better fisheries management. The adoption of rights-based management can lead to better compliance with fisheries requirements (such as TACs) due to the interest rights holders have, their ability to lease extra quotas, etc. It has, for example, been shown that catch shares increase compliance in meeting catch limits (Branch, 2009; Melnychuck et al, 2012; Grimm, 2011). However, there are few reports on whether ITQ fishers better respect fisheries regulations like area closures, seasonal closures and minimum landing sizes (Branch, 2009). Also, the benefits of rights-based management depend entirely on the rights being adequately determined. If fishers consider their entitlements to be insufficient or unfairly distributed, then non-compliant behaviour may occur.

Rights-based management is, therefore, a mechanism to be considered within the design of fisheries management. In taking such a system forward it is importance properly to design the catch share systems to ensure the incentives work for compliance as well – i.e. to address or limit social equity concerns (See Grimm 2012).

Finally, even with the design of fisheries allocations which are less likely to result in non-compliant behaviour, effective enforcement and control of fishing activities is still essential to the ultimate success of nay management system in place (Commission of the European Communities, 2007b). Without adequate enforcement, TACs may be exceeded under any management system.

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