Is Fisheries Governance Possible?

Governability and Governmentality in Norwegian Fisheries.

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Abstract

Are there limits to the governability of a fishery? The establishment of a 200 nautical mile economic zone in Norway in 1977 made it possible to change from an open-access regime to a more closed one. In this process, the former self-regulating Norwegian fishing industry, to a large extent, accepted and adapted an explicit, hierarchical form of state-run governance. However, the process of change did not stop there. Since the turn of the millennium, we have seen the creation of a *cybernetically organised* fishing industry, where control, regulation and governance have become re-embedded in the industry. This article explores this radical new development and perspective on fisheries governance and governability based on lessons learned from technological and organisational changes in the Norwegian fishing industry.

Keywords: fisheries governance, governability, governmentality, cybernetic organisation

Introduction

While there is a consensus that resource governance regimes are necessary in order to avoid the ecological and economic destruction of the world's fisheries (Bavington 2009; Caddy and Cochrane 2001; Hannesson 2004; McGoodwin 1990), a similar consensus does not exist regarding what kinds of arrangements and specific measures should be established in order to achieve a more successful system of governing fish and other living marine resources (Apostle et al. 2002; Hutchings and Ferguson 2000; McLeod and Leslie 2009; Nielsen and Holm 2007). Since the 1970s, single-species fish stock management based on expert knowledge, state intervention and regulation has been the dominant approach for managing the North Atlantic fisheries. This idea of management considers nature and society as separate, with management functioning as an instrument to protect nature from devastating human activities (Berkes 2010; Caddy and Cochrane 2001; Pálsson 2006). Several lessons have been learned from this experience with expert-based management. While efforts to rebuild overexploited stocks seem to have had positive effects (Worm et al. 2009), the diversity, complexity, dynamics and vulnerability of aquatic resources have made them difficult to manage. Thus, the rather narrow single-species management perspective has recently been challenged by more holistic approaches that focus on the limits of the governability of fisheries systems (Berkes 2010; Bromley 2008; Caddy and Cochrane 2001; Jentoft 2007). In an article from 2007, Jentoft asks, "What exactly makes fisheries systems governable, or not?" (Jentoft 2007:367). Jentoft's analysis is based on what is known as the Interactive Governance approach (Kooiman et al. 2005), which sees governance as a continuous, developmental process that takes the complexity, dynamics and interactions of what he calls "the system-to-be-governed" and the "governing system" into account (Jentoft 2007:360). Jentoft does not provide a full answer to the question but, in his analysis, he indicates that the limits of governability are related to how well, from his point of view, the socially constructed governing system corresponds to and interacts with the system-to-be-governed. That governability depends on the governing system's ability to cope with the properties of the system-to-be-governed is a view that the Interactive Governance perspective has in common with several other of the more integrated and holistic perspectives on fisheries management, inspired by resilience thinking, ecosystem approaches and sustainability science (see Berkes 2010:16, Table 2). These perspectives all emphasise the complexity and diversity in the system-to-be-governed. However, it is easy to become overwhelmed by the uncertainty and the lack of knowledge that are inevitably the result of holistic analyses. Thus, as Berkes (2010) points out in relation to applying resilience thinking, the move from theory to

practical application has been difficult. Although the more holistic approaches give a new understanding of system complexity, the contribution to understanding what makes systems governable is poor.

While I agree that it has proved difficult to identify all of the important ecological and social aspects of the fishing industry when making them into viable governable objects, the article will seek to show that this problem does not necessarily lead to limitations when it comes to governability. This article asserts that governability is not limited by system properties but rather it is achieved through the objects and instruments that are deployed in order to make it possible. While the holistic perspectives (Berkes 2010; Jentoft 2007) reject the reductionism that is a fundament for modern natural resources management, the article will show that the reductionism is still essential to Western fisheries governance, because it is what makes it possible to govern people. Consequently, the question is not how difficult the fisheries are to govern, but instead, how governance practices and arrangements are put to work. Moreover, the claim is that inside the existing and changing regime, governance is not only possible, but something that is actually developing in new and unexpected ways.

This analysis begins by examining some of the fundamental changes that occurred in the Norwegian fishing fleet and in the governance system that followed the Atlantic herring (*Clupea harengus*, Clupeidae) stock collapse of the 1960s. This collapse represented the beginning of what Petter Holm (2001) labels as an invisible resource management revolution that contributed to a fundamental restructuring and reorganisation of technical, political, social and cultural relationships in the Norwegian fishing industry (Holm 2001; Johnsen 2004; Johnsen et al. 2009a).

This article mainly focuses on processes of change to the society/nature relationship in the Norwegian fishing fleet, and I do not claim that everything in Norwegian fisheries is necessarily radically transformed. Still, the development in fisheries governance in Norway may in many aspects be regarded as quite radical, but as a case it illustrates ongoing processes in the European Union (EU) and coastal states around the North Atlantic (Eliasen et al. 2009; EU Fisheries 2011; Johnsen and Eliasen 2011; Johnsen et al. 2009a). Thus, the case serves as a good example of how governability can be achieved. The article is structured in the following way. In section two, the theoretical and methodological framework for the article is presented, while the organisational, technological and managerial development of the Norwegian fishing fleet is the theme for sections three and four. In the closing sections, some possible implications for the future governance of the fishing industry are discussed.

Theoretical and Methodological Framework

The co-production of governing systems and governed objects

As indicated by several authors (Berkes 2007; Berkes 2010; Caddy and Cochrane 2001; McGoodwin 1990), fisheries governance is about the regulation of how humans can relate to and exploit their fishing resources. Conventional understanding of resource governance assumes that there is a separation between the environment, the people who manage the resource, and those who are managed, the fishers (Berkes 2010; Jentoft 2007; Kooiman et al. 2005). Inspired by Berkes (2010), the author uses "fisher" instead of fisherman. Key elements in *natural resource governance* involve the interactions of what is seen as a socially constructed governing system and a natural system-to-be-governed. This dualism stems from the mechanistic and rationalistic world view that developed with industrialism, where nature became something that humans acted upon from outside, through technology, knowledge and organisation (Latour 2004; Pálsson 2006). Actions are regulated through interventions based on knowledge feedback. In this respect, governance is in principle a cybernetic system or process. The system elements and processes are illustrated in Figure 1. However, recently, the mechanistic perspective where a socially constructed governing system acts upon a natural system of objects to be governed has been seen to be a problematic way of thinking. Therefore, new perspectives seek to redefine these relationships and to integrate environmental, humanistic and societal elements into more politically informed perspectives for fisheries governance. These perspectives consider basic social values, ethical principles and ecosystem complexity as related and see the system-to-be-governed as a socio-ecological system (Berkes 2010; Jentoft 2007; Kooiman et al. 2005). Moreover, in the conventional perspective, governance has been exercised through hierarchical top-down organisation, with the governing system as a Hobbesian almighty governor on top, governing in a rational way based on the best available knowledge. Governability will in this respect depend on the extent to which the governing system is able to cope with the properties in the system-to-be-governed. The more recent and holistic perspectives aim to find alternatives to this hierarchical governance image and to promote more responsibility for the actors in the system-to-be-governed (Jentoft et al. 2012). They acknowledge that even if a governance system can still be said to consist of two sub-systems with governed objects and governing mechanisms, many forms of governance can exist, from a *local bottom-up self-governance* to a *hierarchical top-down type of governance*. Moreover, it is acknowledged that the success of governance varies and that successful experiences are difficult to copy (Jentoft et al. 1998; Johnsen et al.

2009a; Ostrom 1990). However, the holistic perspectives also miss the mark when it comes to what actually makes governance possible, because they still maintain the belief that governability is directly related to the properties of the system-to-be governed and the ability to produce feedback from it. The claim in this article is that governability is not something that follows how well a governance system is directly adapted to a system-to-be-governed, but a result of how both the governance system and the system-to-be-governed are configured together. Thus, the key to understanding governability is to switch focus from the system properties to the instruments that are used in order to reduce a system's complexity into governable objects and actions. In this respect, the instruments are not technical and fixed objects that are applied to the world. Even if an instrument has an essential property, a vessel quota is, for example, often a share of a Total Allowable Catch (TAC); the actual configuration and application of the instrument will depend on negotiations between the fishers and the governors about how the instrument will be implemented, in what form, and what it is supposed to do in the actual environmental, institutional and cultural situation. In turn, the instruments then not only become integrated parts of the organisational and technological process of change in the industry, but they co-develop in concert with the multiple natural and social objects that are governed. Instead of regarding the governing system and the objects that will be governed as bounded and distinct from each other, we see them as co-produced by the actors involved.

The analysis in this article focuses on how technologies of power and regulation are used in governance and the consequences of this use. The concept "technologies of power" is inspired by Foucault's "technologies of security" concept and denotes the techniques that governors can use in order to discipline and gain control over the governed (Foucault 2009:8-11). The approach contests the idea that governmental interactions take place in a direct relationship with the real world. Instead, fish, processes, people and practices are translated into constructed objects that can be handled indirectly through systems of representation for both nature and society (Holm 1996). However, as the co-management and the governability schools have taught us, it is difficult to govern fisheries without participation from fishers. Thus, from my point of view, fisheries governance is not about the application of technologies of power, but about getting the technologies to function. That may require shifts in power relations, for example by acknowledging users' right to participate in the decision-making or through adaptation of the instrument based on users' experience and knowledge.

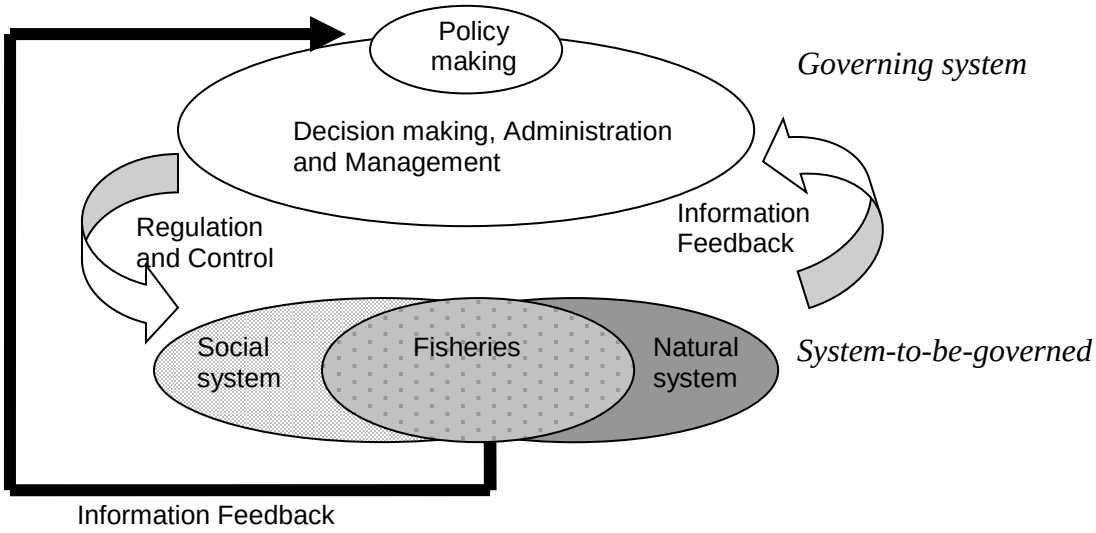

Figure 1. The Fisheries Governance Model (based on Johnsen et al.2009a)

Figure 1 is a conceptual model of governance that includes policymaking, decision-making, administrative actions and formal management, and the natural and social interactions within fisheries constituting the socio-ecological system-to-be-governed. The model depicts the components of a governance system and the logic of action in the system, where intervention has to follow after feedback, but not how the interactions are organised in relationship to each other. Thus, in practice the components can be organised in ways that make both self-governance and top-down governance possible. *Governance* is used here as having a broader meaning for governing, while *management*, in the figure, denotes the targeted formal actions that are undertaken to regulate fisheries. Two mechanisms for information feedback are depicted in the model. On the right side, there is a technical and scientific information system for monitoring the effects of fishing. In our case, Norway, this monitoring is carried out by the Institute of Marine Research and its affiliated scientific network, in particular the International Council for the Exploration of the Sea (ICES). The fisheries governance systems in the EU and other North Atlantic fisheries nations follow to a great extent the same model. Based on the monitoring, the effects on the system are modelled and fed back to the governance system. Thus, feedback comes in the form of scientifically modelled relationships and impacts, and not in the form of a direct response from the system-to-be-governed as both the conventional and the holistic approaches seem to assume. The information/feedback mechanism to the right translates the natural system into numeric models used to make estimates of the human impact on nature. Translation means here all the actions taken to create an order out of chaos, by limiting, defining and conceptualising processes and entities into objects that can be transported into specific frames of knowledge (Latour 2005). The scientifically constructed estimates that are produced

with the help of the models form the foundation for the policy formation and the other interactions in the system. The left side in the conceptual model depicts the control and regulatory instruments that have been created to regulate human activity in relation to the estimated effects and impacts. On this side, we find the technologies of power, like laws, reporting requirements, control requirements and Total Allowable Catch (TAC). In short, all the arrangements are deployed to structure and regulate human action. Additionally, a governance system can have public information channels that go directly from the system-to-be-governed, or representatives of this system, to the governing system (represented by the black arrow on the left side). This channel can contain both the formal collaboration between the governing system and stakeholders like, for example, the Norwegian Fishermen's Association in Norway or the Regional Advisory Committees in the EU; it can include formal and legally established hearing procedures, as well as more informal contact and information exchange between the governing system and the system-to-be-governed. This formal and informal feedback loop captures and conveys experienced problems, difficulties and also discrepancies between representations and the observable reality. Through this channel, the problems and discrepancies are translated into information that can be used for amending the system. In this way, the dynamic and complex character of natural and social systems becomes reduced to specific tangible governable objects. In addition, the political and ideological part of the system ensures that governance is not only a technical process. For example, this is seen when we define fish as crucial for communities, people's well-being and livelihood (Johnsen et al. 2009a).

The approach applied in this article is inspired by what is known as actor-network theory (ANT) (Latour 2005). In this perspective, the key to understanding governance and governability resides in analysing the instruments and methods that constitute the feedback and control mechanisms that are central in governance. The approach does not reject reality, but instead sees governance as something that has to be exercised on constructed objects without a fixed and stable ontology. These constructed objects may change character and properties when new or alternative knowledge or techniques are applied to construct them, or when new networks of knowledge and power become able to modify them (Latour 2004; Mol 1999). As an example, the fish that is managed is not the fish in the sea, but a model stock that is assumed to represent this fish. First, several techniques and methods are used to create the model stocks, and the stocks can have different properties depending on the chosen model (Jennings et al. 2001). Second, the calculation of estimated effects on this model stock can be based on input both in the form of catch data and independent scientific survey data, and these calculated effects are the foundation for the interventions. Third, the interventions structure and discipline human conduct in specific

ways. Hence, the scientific modelling creates representations that become reality through practical actions that combine natural, technological, political, cultural and symbolic elements in a complicated techno-social network that produces observable and measurable effects. Governance is about stabilising these networks into discernible objects that can be governed (Callon 1986; Holm 2001; Johnsen 2004; Johnsen 2005; Johnsen et al. 2009a; Latour 2005; Mol 2002).

In the case of the fisheries, this means that a fisher and the targeted fish both get their properties in a relationship that is constituted between the two of them as well as from the knowledge that is used to define the fish stocks and the intervention mechanisms used to regulate them. This would also include the measurable effects that fishing has according to the scientific model on the fish stocks, the policies defining the fishers, the fishers' rights and social statuses, the status of the resource, the market that makes the fish a commodity, and from numerous unknown factors related to system dynamics and complexity (Hilborn et al. 2003; Johnsen 2005; Nielsen and Holm 2007; Nielsen 2008). For example, a period with weak recruitment to the stock can have an impact on the fish biomass, but not necessarily on the fishers' behaviour in the short term if this reduction is not observed properly. On the other hand, an estimated reduction in the biomass will trigger a management action regardless of whether or not the reduction is real. Thus, as a result, uncertainty occurs. The only way of coping with this uncertainty is for the governance system to respond in a prescribed way to uncertainty and change through the introduction of devices that stabilise the chaos in the real world. How successful governance is does not depend on how well the devices fit into the real world, as the holistic approaches assume, but on how well these devices lock the actors into the system. Inspired by Foucault (Foucault 2008; Foucault 2009), this article asserts that governance development processes should be analysed as deployments of specific arrangements and devices that are used to govern. To put it more simply, governability is in the instruments used to govern.

Methodology, methods and data

Through the use of ANT methodology and a case study approach (Blaikie 2000; Yin 2009), this article seeks to achieve a qualitative understanding of how the processes of change have influenced governability and how devices and instruments contribute to create stable governable

objects. The instruments and devices are studied as parts of organisational networks that have an impact on what kind of actions can take place and by whom (Johnsen et al. 2009a; Latour 1987; Latour 2005; Latour and Woolgar 1986; Law 2004). The article's assertions use a substantial amount of material, such as interviews, research literature, official documents, materials from newspapers, technical journals, company history books, catalogues, brochures, information on the Internet about fishing technology, photo collections and film material, in order to draw their conclusions. Additionally, the author has documented observations, photos and videos from work on fishing vessels. Included in this are interviews with fishers, boat owners and other people affiliated with the fishing industry in very different settings. Altogether, this represents a substantial personal database of both systematically collected material and anecdotal material that is valuable in an abductive research strategy. An abductive strategy implies that there is interplay between an inductive description based on a rich empirical account and theoretical concepts and findings in research literature (Blaikie 2000).

The Dynamic and Complex Fisheries

Organic Organisation and Self-Regulation of the Fisheries

Traditionally, the Norwegian open fishery system consisted of fishers who were mostly related to each other by affective or emotional relationships through kinship or neighbourhood associations (Johnsen et al. 2009b; Sinclair et al. 2009). Every Norwegian citizen still has the right, under certain conditions, to register at any time and work as a self-employed commercial fisher. Fish have been seen as a common resource, to which all fishers have had the same right. Both the affective relationships and the common rights are reflected in the still existing remuneration system for fishers in what is known as the *"lott" (share) system*, which divides the yield between the crew, boat and gear (Norwegian Fishermen's Association 2005). During the institutional restructuring of the Norwegian fishing industry that took place in the interwar period, the idea of fish as a common property became the ideological basis for the overall organisation of the fishing industry in Norway (Holm 1995). Due to this ideal, the social organisation of the fisheries was founded on self-ownership and on cooperative models (Johnsen 2004; Profitability Committee 1937).

Consequently, the fishing industry was characterised as one that exhibited mutual cooperation, interdependence, affective relationships, and to some extent, self-governance (Jentoft and Wadel 1984). Self-governance took place through *implicit social control* using social norms and power and authority relationships that were embedded within the local structure

(Jentoft 2000; Pálsson 1991; Pascual-Fernández et al. 2005; Sønvisen et al. 2011). Practical fishing activities, access to the best fishing grounds, behaviour at sea and personal relationships between skippers and crews were regulated through close social relationships. The open commons regime was marked by an absence of formal and explicit mechanisms for information gathering, decision-making and regulation of the fishing activity. The ability to levy sanctions and administer a hierarchal form of governance was unattainable. This is consistent with the author's own experience in open-access fisheries in the early 1980s on the west coast of Norway, where the fishers, only to a limited degree, followed explicit formulated formal rules for how, where and what could be fished. Also, the creation of knowledge, information and regulation took place through incremental learning processes inside the local fisheries system (Ostrom 1990). The social organisation had developed incrementally from inside the local culture through what we can call organic processes within the local community. The types of organisation related to fishing were therefore of a kind that Johnsen, Murray and Neis, inspired by Burns and Stalker, have called *organic associations* (Burns and Stalker 1994 [1961]; Johnsen et al. 2009a; Johnsen et al. 2009b).

However, even if there was a substantial amount of local-level governability in relation to fishing, this did not prevent overfishing. In the Norwegian herring fisheries, until the 1960s, the participants related to nature, fish and the environment in a way similar to Hardin's description in the "Tragedy of the Commons" (Hardin 1968). The open-access system had few means to control the increase in fishing effort and catch capacity that followed ever-growing technological advancements for finding and harvesting more fish. This development, probably in combination with natural conditions, not only brought the herring stock to near extinction (Nakken 2008), but was the start of a more radical change in the fisheries. At the end of the 1960s, it became clear that the sea's resources were not inexhaustible.

The Technological Revolution in Fishing

Footage from the documentary film *Ut mot havet* shows a group of purse boats at sea in the Norwegian herring fisheries (Sunnmøre Fishermen's Association 1955). Each pair of purse boats was controlled by a seine boss from the smaller seine boss skiffs that sounded for herring. The situation seemed to be pretty chaotic with pairs of purse boats and several seine boss skiffs heading in different directions, but suddenly we see order in the chaos when one of the bosses signalled the setting, and the two purse boats he controlled separated and surrounded the herring shoal with the seine. The seine boss, who led and coordinated the operation, remained in the middle of the seine until the pursing was finished. In the Norwegian herring fishery, the seine

bosses were regarded as persons with personal skills, knowledge and a sense of the herring's behaviour in the sea (Barth 1966). After pursing, the mother vessel, around 60-80 feet long, boards alongside the cork line opposite the purse boats. The purse boat crews of 10-15 men pull up the seine manually to allow the skipper, and eventually the few remaining crewmembers, on the mother ship, to load up the vessel with herring. Herring fishing in the 1950s was a labour-intensive operation. In addition to the purse boat crews, additional hands from the so-called *helpers* were often required to save the catch. The helpers were vessels without a seine, but with a single purse boat and crew that helped for a share of the catch. The helpers were recruited most often through their personal, family or community relationship to the seiner skipper or seine boss. When the vessels were fully loaded, they headed for land to report the catch to the Norwegian herring fishermen's mandated sales organisation, Norges Sildesalslag (NSL), which took care of the sales. In the 1950s, the herring industry, human labour, direct relationships between people and direct visual or oral communication were the most important aspects of fishing organisations (Flem and Skarbøvik 1959; Løken 1984). The fishing was largely carried out by enterprises that had developed from *organic* processes and relationships in coastal communities, characterised by close personal and affective relationships (Johnsen et al. 2009b).

A documentary on Norwegian television (Norwegian Broadcasting Corporation, NRK) almost 30 years later shows the skipper operating a 94-metre purse seiner called the *Libas*. *Libas* is one of Norway's most modern and technologically advanced purse seiners. It is the product of over 40 years of technological development in vessel design, fish capture technology and work organisation, reaching a maximum speed of 20 knots and accommodating 19 crewmembers. However, unlike the 1950s, Norwegian waters are no longer an open-access fishery, and *Libas* is one of a limited number of licensed vessels for large-scale purse-seining in Norway today.

The documentary also shows us the skipper judging the size of a school of mackerel on the sonar screen. He delays setting the seine until the school on the screen appears to be big enough for him to make his quota in one cast (NRK 2007). The purse boats and the seine boss skiffs are long gone at this moment, as the enormous purse seine on board is ready for setting. The function and responsibility of the skipper and the seine boss are now executed by the skipper from his steering position behind the screens in the wheelhouse. In the meantime, the seine boss, and his knowledge, is more or less replaced by the sophisticated sonar screen. *Knut*, an old seine boss who was interviewed in one of our research projects in 1997, said that "his gut feeling now actually was replaced by buttons on the sonar". However, the skipper's ability to interpret the sonar picture is crucial; the technology cannot decide it for him, only help him make the decision. When the image on the screen looks favourable for a catch, the school of mackerel is

surrounded and the seine is pursed and handled with the use of cranes, powerful winches and power blocks. The fish are then pumped into the hold. The crew size for this kind of vessel is reduced compared to the 1950s, and to a large extent replaced by technology. Human labour now works in synergy with the on-board technology and much of the hard physical work is replaced by cooperation between man and machine. The catch is then reported by modern communication means to the sales organisation, NSL, which sells the catch through Internet auctions (see: https://www.sildelaget.no/en accessed December 14 2012).

The catch capacity of fishing vessels has increased tremendously since the 1950s (Hannesson 2008) and the purse seine fleet's fishing is now regulated through vessel licensing and a quota system. From July1 2010, an electronic Vessel Monitoring System (VMS) is mandatory for vessels over 15 metres in the Norwegian fishing fleet. Electronic catch reporting is from January 1 2011, and mandatory for vessels over 15 metres (source: Ministry of fisheries and Coastal Affairs). Whether fishing can continue or not depends on whether the vessel has met its quota according to what has been agreed to as the allowable catch for different types of vessel groups. The national TAC is set by the Norwegian government on the basis of recommendations from the advisory committee under the scientific body of the ICES. The work undertaken by the ICES and the legal framework based on the United Nations Convention on the Law of the Sea (UNCLOS), which divides resources between the different coastal states, symbolise that fish resources today are modelled and measured in ways that make it possible to share them. The end result of this research and advisory process is the establishment of a national vessel quota system that distributes the national TAC among groups of fishing vessels. The international and national distribution process is a scientific, but also political and symbolic, process in which negotiations take place between states at the international level and authorities and investors at the domestic level (Nakken 2008; Nielsen and Holm 2007; Nielsen 2008; Rozwadowski 2002). Therefore, it is not only the technical ability of the fishing industry to catch fish that is essential, but the extent to which all of these relevant parties are willing and able to come together and forge a consensus. Altogether, the institutional and technological development that has taken place in this field has resulted in a radical change in how the Norwegian fishing industry has been organised and maintained.

The Evolution of the Cybernetic Fishing Organisations

Most people don't realise the complicated network that is activated when a purse seiner is put to work. There are few people directly involved in the actual catching of the fish. Technology has made it easy to find fish, but fishers nowadays face increasing challenges in having to handle both larger amounts of information and ecological, financial and political risks. Even small technical devices must work perfectly; if not, the entire operation is at stake. While the social interactive relationships between people were more important in the 1950s, interactions with machinery, management, information and feedback mechanisms are held at a higher premium today, both at the micro level aboard the vessel and at the macro level where it becomes a part of the overall governance system. Considerations nowadays for the construction of a vessel are dependent on global trade practices and networks, boat owner preferences, financial institutions, naval architects, consultants, technology manufacturers and shipyard recommendations in Norway and abroad. The whole network collaborates in constructing a vessel that is adapted to national legal management requirements, and international rules and regulations according to UNCLOS as well as to EU and the World Trade Organisation (WTO). Through these relationships, the fishing industry became disengaged from the former local setting, but at the same time became more integrated into a more globalised harvest sector, where globally based trade relations, global knowledge development and exchange and industrial and financial interests have a significant impact on the organisation of the Norwegian fishing industry, even on a micro level (Johnsen 2005; Johnsen et al. 2009a; Johnsen et al. 2009b; Murray et al. 2006). The closing of the herring fishery in the 1970s and introduction of licences and quotas became the turning point for hierarchical resource governance in Norway, which was to impact on the still open coastal fishery for arctic and coastal cod (*Gadus morhua*, Gadidae) and haddock (*Melanogrammus aeglefinus*, Gadidae) in the 1980s. As described in Johnsen et al. (2009a) and Johnsen et al. (2009b), from the end of the Second World War until the end of the millennium the relations between the industry and the government became gradually more and more organised as a type that Burns and Stalker (1994 [1961]) define as *mechanistic* and to some extent in line with the market organisation, where the state intervened through a formal organisational set-up. The attempt was to configure a strong leviathan for more panoptic fisheries governance in Norway (Jentoft et al. 1998; Johnsen et al. 2009a). The establishment of the Exclusive Economic Zone in 1977 expanded the Norwegian state's responsibilities and power. In contrast to the former situation, all fishing activity inside 200 nautical miles could be controlled and managed. Resource management now became an option. In 1983, the Norwegian government pointed out in a white paper to the parliament that the state responsibility in the fisheries was now comprehensive (White Paper nr 93 1982-83). With the change towards the

closed-management regime that was to follow from the end of the 1980s, this responsibility increased with the evolvement of a complicated and detailed micro-management system that grew beyond panoptic control. During the 1990s, the leviathan became, according to Johnsen et al. (2009a), so entangled in a multiple web of politics, stakeholders, resistance and sciences that the governability of the system was reduced. As a consequence, after the millennium the processes found new and unexpected paths. To describe and understand this more recent change, we have to look into what the fishery industry is today, when the fishing vessels, as fishing industry organisations, are integrated into different value chains, both as producers of fish as a commodity and as customers for technology. Fishing vessels house crews, technology and licences and are nodes in a wide network of services. They can essentially be thought of as effective fish harvest organisations in their own right. Through the national governance system, the fish harvest organisations' conducts are indirectly structured, but not fully determined, by the scientifically modelled relationships between fish and fishers (Bavington 2009; Holm and Nielsen 2007). Moreover, in Norway they are increasingly becoming part of a large global industrial fish harvest machinery that supplies fish to the world's markets (Johnsen 2005). This integration of the micro and the macro in the fishing industry today is quite different from the former organic type of organisation that dominated in the open commons and from the mechanistic relationships that formed the fisheries leviathan. The technology today is more specialised, the vessel and its gear are much more tightly integrated into each other. Internal procedures for work performance and related internal control systems are also unlike before. Additionally, there is a more formalised system in place for vessel and gear maintenance, and accounting and payment of rents and wages (Johnsen et al. 2009a). As the skipper of *Libas* wrote in a letter to the editor in the fisheries newspaper *Fiskaren*, the skippers and crew nowadays need highly specialized knowledge to operate and manage a technologically sophisticated fishing vessel (Lie 2008). Most of these services and systems related to this harvest machinery are localised outside the boundaries of the community the fishers live in, but can still be seen as an integrated part of a national fisheries industry sector, because they are all acting inside a regulatory framework that serves to define and design their responsibilities in more detail. An example of the significant change in skippers' and crews' knowledge is the highly specialised knowledge required to operate these cybernetic fishing vessels, or "fish catch machines" as they are called by some Norwegian fishers. This knowledge and technology is not limited in to a certain social or ecological context, but can be applied in fishing operations in many places around the world. Murray et al. (2006) calls this knowledge *Globalised Harvesting Knowledge*,

which sharply contrasts with what is known as local or traditional knowledge, which is assumed to have been more prominent in the organic fisheries system.

Other participants, like the Norwegian fisher-owned mandated sales organisations, also get new roles in today's fisheries. The Raw Fish Act (1938) gave mandated sales organisations controlled by the fishers a monopoly on first-hand sales from fishers to processers. Similarly, in fish export, the Fish Export Law from 1955 limited the right to export fish to mandated export organisations (Holm 1995; Holm 1996). The rationale behind these market regulations was to mitigate the effects of market disturbances and to secure a reasonable share of the revenues for the fishers (Holm 1995). Together, the state and the market institutions formed a hierarchical apparatus for market control that protected the fishers' interests.

In the 1950s, these organisations were pure sales organisations (Holm 1995), while today they have responsibilities for quota control and surveillance of the landings (see: https://www.sildelaget.no/en accessed December 14 2012). Additionally, and partly because UNCLOS defines a duty to exploit resources in areas over which sovereignty is given, the ocean-going fishing vessels have traditionally played, and still do, an important role in the international game of gaining sovereignty of the seas. This is also true when obtaining its resources in places that are either defined as the high seas or in disputed areas, such as the Svalbard Fishery Protection Zone (Pedersen 2008). All these processes, elements, negotiations and agreements are built into the fisheries governance system in the form of regulatory mechanisms, such as catch and effort control (TAC, licences), the monitoring control and surveillance system based on catch logs, VMS, real-time closures, inspections at sea or on shore, and safety requirements and licence requirements for the boats and owners that shape conduct at sea. But due to the challenges with control down to the individual level, the responsibility for follow-up and response becomes delegated down to the vessel. Like the skipper of *Libas* in the before-mentioned documentary, the skippers are responsible for following up and responding correctly according to certain indicators, like their quota. Even if the sales organisations follow up on their landings, the responsibility at sea is on the skippers. When it comes to adapting to standards for ecosystem impact, like, for example, nitrogen oxide emissions (NOx), impact on non-commercial species or on other ecological processes in accordance with the ecosystem approach to fisheries management, there can be established incentives for changed conduct like the NOx Fund for investments in NOx-reducing technology (http://www.nho.no/nox accessed December 14, 2012) and the Seafood Research Fund (http://www.fhf.no accessed December 14, 2012), which has a focus on developing more energy-efficient and environmentally friendly fishing technology. When the technology is ready, standards can be defined and more responsibilities

can be delegated to the fishers. Both funds are financed through fees and the use of the funds is controlled by the users' interest organisations, but according to regulations approved by the state. Both funds are examples of shared responsibilities and that the cybernetic relations can facilitate delegation. Through the regulatory mechanisms, the fishing vessels, both at an aggregated level as a fleet and as individual vessels, become governable as interconnected, cybernetic systems (Mirowski 2002). We can label these as *cybernetic organisations*. Altogether, the overall process we have described can be called a *cyborgisation* of the fisheries (Johnsen et al. 2009a). Even though the development of the Norwegian purse seine fishery has been extreme in this respect, we see similar developments in other fisheries where technology, knowledge and relationships have developed into larger and more globalised networks (Murray et al. 2006; Standal 2009). For a full account of the differences between organic, mechanistic and cybernetic relationships, see Johnsen et al. (2009b). The result is an evolution of governability in the fishing industry that many have failed to see because it has happened as an invisible revolution.

The Invisible Revolution – towards Fisheries Governance

The introduction of fisheries governance in Norway from the 1970s required that fish, fishers and governance and management instruments were defined and related in certain ways to each other.

First, this governance system relies on measurements of fish stocks from fishery scientists. Second, it consists of a decision-making and management system that can implement decisions on the basis of scientific recommendations as described in relation to Figure 1. Third, there needs to be an intervention and sanctioning system that can regulate the behaviour of the fishers and the fishing organisations in the fishery system. The need for regulation occurs when science provides the basis for defining a stock as vulnerable (Holm 2001). Then, the decision about regulation can be made and executed through a system of intervention. For example, licences can be issued and/or quota systems can be introduced. Additionally, mechanisms must be in place in order for information to flow from citizens to the fishing system and then back to decision-makers and managers so that adjustments and interventions can be made if necessary. In a democratic system, feedback flows through several channels, e.g. interest organisations, public engagements and the press. The Norwegian resource management instruments were, until recently, mainly oriented towards maximising the yield from their fisheries. However, since the turn of the millennium, there has been a rhetorical shift towards an ecosystem-based approach

for fisheries governance, but obtaining the Maximum Sustainable Yield (MSY) is still an important goal, and the central instruments like effort regulation, quotas, quota allocation mechanisms and control remain principally the same (Marine Resources Act 2008-06-06; White Paper (St. meld.) nr. 21 (2006-2007)).

In modern resource management, the formal structures for the creation of knowledge and decision-making based on this knowledge create formal relationships between the system-to-be-managed and the management system. Regulations are not generated through organic self-governance mechanisms, but rather through a more formal hierarchical and mechanistic structure of organisation that manages the relationship of the natural resource, the commercial fishers and the official bodies responsible for the governance. This new development also followed as a consequence of looser connections between the fishers and their fellow citizens in their communities due to the introduction of more exclusive fishing rights (Johnsen et al. 2009a; Johnsen et al. 2009b; Vik et al. 2011). Moreover, fisheries, like other activities in local communities, seem to become more and more disembedded from the local communities as their organising framework. A disintegration into separate sectors results because of these weaker connections, while networks within the sectors seem to grow stronger (Sønvisen et al. 2011). On the other hand, the growth of the welfare state also seems to have had a considerable impact on the fishing industry, since it reconstructed people's perceptions and expectations of a normal living. Thus, just as how a disintegration of our local communities into more separate sectors has occurred, the work and labour conditions inside these different sectors have become more alike (Johnsen and Vik *in press*).

In the former egalitarian, organic system, commercial fishers had no more of a right to fish than other citizens. Today, even if the right to become a fisher is maintained, not everybody holds the same right to an exclusive fish quota. On the other hand, the managers of the fish resources and the fishers with quota rights share a common interest in the health of the fish stocks. We can say in this case that the fishers who are enrolled in this administrative and regulatory system believe in it and subscribe to its goals so much that any distinction between them and their managers is much less distinguishable. The distinction between the governance system and the system-to-be-managed becomes more and more blurred (Johnsen et al. 2009a). The Norwegian Fishermen's Association (NFA) was established in 1926 and organises both boat owners and crew and is the biggest stakeholder organisation in the fishery industry. The NFA can today be considered an integral part of fishery management as opposed to just an outside interest group. This is reflected in the way that they have collaborated with the Ministry of Fisheries and Coastal Affairs about compromises on quota policy, fleet structure and

management issues. This is worth noting because quotas are not normally allocated on the basis of annual political decisions in Norway. Instead, shares of the Norwegian TAC in both the pelagic and demersal fisheries are allocated on more of a long-term basis to different groups of vessels that stem from politically approved allocation principles. The allocation principles are often a result of negotiations within the NFA. The organisation has significant influence in political matters and has contributed to form the system, but has also accepted that the individual fishers have got more responsibility for their own conduct. Hence, this collaboration between the interest organisations and the resource managers contributes to the development of the cybernetic fishery system in general (Johnsen 2005; Johnsen et al. 2009a; Johnsen et al. 2009b).

Changing Responsibilities in the Cybernetic Fishing Industry

Despite a decreasing number of people who are directly involved in the fishing industry, the organisational structure of the cybernetic fisheries is becoming more diverse and complex through an increasing number of new interest groups and relationships involved in the network. Technology producers and financial institutions are becoming increasingly more influential in the fishery industry, while relationships between crews, owners and customers are becoming more formalised than ever before with formalised work contracts and agreements. The fishers who own boats are, for example, capital managers and employers that must consider other aspects of the business such as quotas, management, processing and staffing. *Petter*, an informant in one of our projects, said that when individual vessel quotas (IVQs) were introduced into the coastal arctic cod fishing industry, they started to process the fish themselves to get a higher value added to their products (Johnsen 2004). Self-processing was just one of the strategies they could follow to secure a higher income. Another common practice was that skippers "buddied up to reduce the need for crew". "Buddying up" is when two skippers decide to work as crewmembers for each other to first take one quota on one skipper's boat and then take another quota on the other skipper's boat. In Norway and in Newfoundland, skippers reported this practice as a strategy to meet quota cuts and increasing costs. Others rigged their gear so they could undertake mixed fisheries after non-regulated species, and obtain their cod quota as bycatch instead of through direct fishing. In this way, the season could be extended and the total catch volume increased (Johnsen et al. 2009b). With the introduction of a system of rights and quotas, fishers started to think of their resources as scarce and it became important to plan how to exploit them. However, the value in this case was not only in the amount that they caught, but in the inherent economic value of a quota that on certain conditions could be sold.

This became relevant when transferable quotas were introduced as a catch capacity reduction measure in Norwegian fisheries. While low profitability and overcapacity before had triggered a state response in the form of decommissioning paid fully or partly by the state, the vessels' owners were now given a restricted option to buy out colleagues to increase profitability. From 2003, a market-based system with, on certain conditions, transferable, non-perpetual quotas, so-called structure quotas (SQ), as the instrument was introduced. The SQ system allowed an owner of a vessel with an IVQ to buy out vessels inside the same vessel group and keep their quotas for 20 years. Several SQs can be merged up to a certain limit on one vessel. After 20 years the SQs are reallocated to all the vessels in the group. The practice is strongly regulated and can only take place in some vessel groups and inside the county where the vessel is registered. The interesting thing, however, is that the state has delegated the right to respond to lower profitability to the fishers, and therefore this "structure quota arrangement" becomes a part of a cybernetic self-regulatory system. In short, cybernetically governed fisheries are characterised by a replacement of detailed explicit hierarchical governance with general frameworks on the central level and with more adapted arrangements, procedures, devices and mechanisms for feedback and response on board every single fishing vessel.

In this case, the quota system itself gives holders a much more formal and greater responsibility to manage themselves within these cybernetic fisheries. By starting to think about the quota as an economic value and fish as an economic and biological yield and how this could be maximally sustainable, the fishers adopt an economic and biologically based rationality with a need to adhere both to the economics of the business and to the science as well. They accept that a catch log has to be filled out before a vessel comes to port, possibly after every haul, and they acknowledge that there should be no more than a 10% discrepancy between a catch log and a landing ticket. As a result, the fishers have set up systems on board in order to estimate how much fish they can catch. For example, after gutting, the fish is laid into a washing bin before it is loaded into the hold. The skippers, in advance, have measured how many kilograms of fish that a full washing bin contains and they keep track of the amount they have caught through counting how many times the bin is emptied into the hold (Figure 2). Additionally, many boat holds have containers where the skippers know exactly how many kilos of fish can be contained in them. Therefore, the skippers have two distinctive ways by which they can control the amount of fish they have on board.

Figure 2. Governance devices: The washing and measuring bin (white arrow). Above the head of the two fishers to the left, is another cybernetic control device (black arrow), the net clearer. The net clearer has replaced the two men who hauled the nets to the stern, and thereby, structures and standardises the hauling operation. (Photo: Jahn Petter Johnsen)

When the bin to the right in Figure 2 (white arrow) is full, the fish are emptied into the hold. By counting the number of times the bin is filled, the skipper can fill out the mandatory catch log with exact figures. The direct, explicit governing of the fisheries through a formal set of rules for output control through quotas is in this way integrated into the normal fishing activity as two control and disciplining mechanisms: one routine procedure for registration (counting and recording) and one routine procedure for quota control (logbook update). Moreover, there are also requirements as to how the crew is used; at least 50% of the crew and the skipper have to reside on or live near the coast. For safety reasons there is a specific requirement about a common working language (normally English) on board if not all of the crewmembers can speak some Norwegian. Strict health and safety regulations must also be followed. Fishers need a safety certificate and must pass a medical test. While many of these requirements are not necessarily new, the way they are organised in relation to governance is. In general, the owner and skipper are responsible for following up on all of these requirements. The examples above are examples of how formal *self-regulation* of an individual vessel becomes enforced through the daily routine on board. This self-regulation does not occur through a series of local institutionalised norms and practice systems as was seen in the implicit social control mechanisms related to the open commons system. Rather, regulation in this system is performed through symbolic governing devices with standards focused on sustainability measures for economic value creation that imply new norms for what is considered moral and rational behaviour. These norms become tangible through, for example, biologically defined reference

points for fishing mortality and biomass. Other instruments can be technical standards related to the use of technology and the work practices on board, structural measures defined in the structural policy for reducing overcapacity and promoting economic efficiency, regulations for keeping and filling out catch logs, fish quality standards and health and safety requirements. In this way, governance becomes internal, without the influence of power directly exercised from outside in the form of a massive control system and with inspectors on board. In practice, in this ever-evolving system, even modest regulations tend to be followed (Gezelius 2002). Examples here are how Icelandic and Norwegian fishers are complying to a great extent with the discard regulation systems in Iceland and Norway (Johnsen and Eliasen 2011). As a consequence, the cybernetic system transforms the fishers bit by bit into resource managers, not through direct moral policing and power, but through arrangements and devices that discipline these fishers into new roles. *Roy*, another one of our informants, stated in 1997 that the requirement to be updated on the latest regulations had turned him into a lawyer (Johnsen 2004). The huge investment that is needed to obtain a fishing vessel and the requirements for economic performance also indicate that fishing is not only about the ability to catch, but also about how to most effectively achieve a sustainable profit (Norwegian Official Report 2002). The skipper and boat owner today is a business person as well as an administrator and manager who is acting through an increasingly complex and heterogeneous network. Thus, effective governance is not only about regulating the fishing effort alone, but about controlling all of the relevant aspects of a fisher's economic performance.

The introduction of modern governance means that how fishers think of the resource has changed dramatically during the last decades. While fish stocks were once considered living natural objects, they are now thought of and created through models, calculations and negotiations (Nielsen 2008). This symbolism is a part of the cybernetic system, and it is this "cyborg fish" concept that now affects the decisions on a fishing boat (Johnsen et al. 2009a; Johnsen et al. 2009b). Fishing "has become a paper mill" according to our informant *Arthur* (Johnsen 2004). Adaption to this paper mill requires new forms of knowledge – formal knowledge in addition to the practical *skills* needed in practical fishing. For example, a basic knowledge of the English language is needed in order to communicate with foreign crews and read complicated manuals. In this way, governing mechanisms affect both the formation and use of knowledge and skills needed in the fisheries (Murray et al. 2006; Murray et al. 2008).

This cyborgisation contributes to the development of an increasingly efficient and self-controlled, but more depopulated, fishing industry. The result is that the connection between Norwegian coastal communities and fishing becomes much weaker (Sønvisen et al. 2011). While

the crew and local communities become disconnected from this system, the rights that come with it also supply certain duties for the right holders. Boat owners are trapped in a system of fishing rights that provides them with exclusive opportunities, but where the opportunities also set requirements that restrict their freedom to fish. Petter Holm (2003) ironically states that the quota system has caused "the fish", as a symbolic right, to chase the right owner: the one who best performs biologically, economically and socially, as required by the cybernetic system. In other words, the free and unbound fishers in the commons are now transformed into holders of exclusive fishing rights, but also with new obligations and duties to the fish, the state and other fishing rights holders. On the other hand, those without quotas are turned into employees and will only get access to fish through those who hold fishing rights.

A Self-governed Fishing Industry for the Future?

As this article has described, the fisheries are both governable and governed, through a new form of governance. This form of governance evolves between the panoptic state of hierarchical governance and the more cooperative co-governance. These two forms of governance are not necessarily replaced, but become modified through the development of cybernetic mechanisms that discipline fishers into a more individualised self-regulatory form of governance. This system partially emerges as a result of the compromises that were made between the fishing authorities and the stakeholder organisations and partly as responses based on the fishers' continuous experiences and adaptation to environmental processes and to the experienced consequences of the instruments. The fishers' conducts are shaped both by the instruments and the environment, and the experiences are continuously used to amend or reform mechanisms as long as these amendments do not threaten the system itself. It is the total effect of these compromises and adaptations that contributes to a more cybernetically organised sector (Holm 2001; Holm and Nielsen 2007; Johnsen et al. 2009a; Nielsen and Holm 2007; Nielsen 2008). The example of the skipper who tries to catch as close as possible to his quota is an example of how the governance system has disciplined fishers to develop and exercise self-regulatory practices. Yes, it can be claimed that a fear of sanctions levied against them makes them follow the rules, but on the other hand they experience the privileges and the long-term economic benefit of the regulated system. Although it can be argued that these rules are sometimes broken when an external control is not present, a majority of fishers seem to accept more individual responsibility as a rationale for a system of governance. By adapting to and exercising these self-regulating practices, we can

actually say that a certain governmentality (Foucault 2008; Foucault 2009; Sennellart 2009) has developed. Governmentality conceptualises the citizens' willingness to be governed. While we have seen how external governance has been difficult to exercise, the actors in our case have accepted arranging their practices in a manner and pattern that turns them into self-governors. In the vocabulary of Interactive Governance, we may say that a new approach and mentality towards new images of themselves in relation to what is considered natural has been created as a result. These different arrangements represent delegated power, and the governing ideas, structures and the fishers' actions are the outcomes of an indirect control that is executed through small and modest governance instruments. The catch control system on board or symbolic requirements like the need for a "sound economic performance" (White Paper (St. meld.) nr. 21 (2006-2007)) are examples of this concept. Through the development of governmentality, the governance system and the system-to-be-governed are merged and form a new kind of governance, where those who govern and those who are governed agree upon what they have to do and about a division of responsibilities. As Lemke (Lemke 2001: 201) writes, even if the state becomes more invisible, it does not abdicate; it retains control through the control apparatus, but governs through indirect mechanisms and leaves more responsibility to the governed. The fishers have to govern themselves with strict guidelines and are responsible for staying within the limits of their catch and acting according to the rules. Thus, the limits of governability do not depend on how well a governance system corresponds to observable properties of the system-to-be-governed, but rather on the society's and the fishers' willingness to accept governance devices and organise activities according to them.

Although the process described here took place in a specific institutional and environmental context, this is what others can also learn from the Norwegian experience: the creation of governability requires that the actors are not only participants in a predefined system, but that they must be co-producers of the system. It is not only a question of how the fishers' conduct is shaped, but also about their possibilities to contribute to shaping the instruments. Furthermore, the governors and the governed have to share some images, visions and ideas, and the work with modifying the instruments to the fishers' own reality may contribute to the development of this common understanding. The clue is that governance creates governable fishers, and that governable fishers are the guarantee for governability. It should also be added that the described changes have not been without problems, and the transformation described is neither total, nor brought to an end. The question may therefore be not what the limits of governability are, but what they should be. How far will we and can we go in terms of introducing devices and arrangements to expand governability and governmentality?

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