

Chapter 2

Growth and Management

Abstract This chapter seeks to reframe the reductionist historical narrative explaining problems of overfishing with a combination of human economic behavior, technological innovations, and lack of property rights. Instead, contemporary Danish commercial fisheries are seen as part of a more complex long-term development, with close attention paid to the actions of state, management, organizational politics, private companies, fishers, and their communities. The aim is to show the interplay of a broad range of factors, structures, and actors that influence fisheries management. Thus, the chapter seeks to avoid reducing the history of quota privatization to a simple and deterministic narrative of technological development and the tragedy of open access. The history of fishing is much more nuanced than this. This inquiry therefore looks more closely at, behind, and around the axioms of fisheries management narratives.

Keywords Fisheries management • Technological development • Share organization • Individual transferable quotas • Overcapacity

Long Past, Short History

It often appears as if fishing has a long past but a short history. While fishing is one of the oldest occupations in the world, it has undergone immense development in the last 100 years or so. Traces of its past go back many thousands of years to the times before human societies were changed by agriculture and urbanization. However, when the histories of today's issues in fisheries management are written, it is not this long past that is depicted. Rather, what we encounter not only in the media but often also increasingly in academia is a much shorter history, a story of growth in fishing capacity and decline of fish stocks, a story of constant innovations in technology and open access tragedies. When writing about the history of the modern fishing fleet, and in particular the problems of present-day fishing, the narrative tends to begin at around the end of the nineteenth century. Since that time, technological inventions such as motorization, decked boats, new nylon-based materials, advanced navigation, and fish finding equipment have changed the fishing sector many times over and created the modern efficient fleet (Fig. 2.1). Throughout the



Fig. 2.1 The immense growth in tonnage, new technologies, and lack of proper management are the central tenets in the common narrative. In this deterministic explanation, the resource depletion in the twentieth century is caused by individualistic human behavior, technological innovations, and lack of property rights. Steel trawlers like these, here anchored to massive concrete harbors, are on the other side perceived as the natural response to increased global competition. (Photo: Jeppe Høst)

twentieth century, the Western fishing fleet has experienced an unceasing technological development and growth in size, fishing effort, and capacity. According to the dominant historical narrative, during this period the combination of open access to fisheries, technological growth, and human rational behavior led to an unavoidable resource collapse. Today, this has fostered widespread international concern about the health of ocean ecosystems. In the last decade, several studies have been published showing that a majority of the world's fish stocks are fully exploited or overexploited (Zeller and Pauly 2007). These go hand in hand with media and newspaper headlines such as “Last fish to be caught in 2048” (a 2006 article in *Science*) and “Just 100 cod left in North Sea” (in *The Telegraph*, 16th September 2012). This narrative of “boom and bust” fisheries is deeply entrenched in academia and across the media, among NGOs and in the public sphere. Indeed, there may be a self-perpetuating synergy in the relationship between the dramatized historical narrative and the media, NGOs, science, funding organizations, and governments. But if the history of present-day fishing can be told as a narrative of rapid technological growth in the twentieth century and the tragedy of open access, then the theme of this book, market-based fisheries management, is introduced as the logical solution to this historical development. In this dominant narrative the introduction of individual property rights to our limited maritime resources has become the inescapable solution to the persistent growth in fishing capacity and to the open access nature of wild capture fisheries.

On the other hand, it can convincingly be argued that advanced, large-scale fishing has existed for centuries. The Basque distant-water cod fishing off the coast of Newfoundland in the sixteenth century and the large-scale Dutch herring fisheries in the North Sea in the fifteenth century are just two of the most prominent examples. Both of these fisheries were based on new discoveries in technology, and an advanced organization was necessary to carry out their complex, geographically diffuse activities. Tracing the beginning of the history of modern fishing to the late nineteenth century therefore excludes these and many other fisheries and technological developments. Worse, it also hides an ongoing and dynamic relationship between different types of fishing fleets that compete and collaborate with one another and employ a wide range of gear types and fishing methods in order to sustain livelihoods in an ever-changing social and natural environment. In the wider perspective, the history of fishing is a story of environmental and seasonal fluctuations leading to shifting possibilities and relative advantages between operators and regions. Rather than one “boom and bust” narrative, a closer historical examination reveals several cycles of boom and bust. The Danish fisheries are considered to have peaked in the 1500s and then to have declined before rising to prominence again in the late nineteenth century (Vaarning 1984). Fears about the health of fish populations due to declining catches were recorded in the 1600s and again in the late nineteenth century, when fish stocks were reported to have disappeared from near-shore waters (Mortensen 2004). In the largely enclosed fjord Limfjorden, the familiar story of growth and resource decline was played out, but the action took place at least 100–200 years earlier than our dominant narrative of twentieth century growth. In the Limfjorden the human consequences of the crisis in fish stocks led to debates at the state level about effective resource management, disputes over property and specific types of fishing gear, and methods being accused of doing damage to the natural environment, all topics familiar today (Rasmussen 1968; Stoklund 2000; Østergaard 1984). In 1741, the first of several commissions was appointed to undertake a study of the wellbeing of juvenile fish in *Limfjorden*. The commission pointed to the negative effects of purse seine nets and created closed areas that remained in place until around 1900. The exploitation of fisheries in Denmark thus has a long history, and there is vast historical evidence of growth and management preceding the twentieth century. It is only by closely examining this historical process that we can fully understand the full range of developments that led to the introduction of a market-based fisheries management system at the beginning of the twenty-first century.

The Vessel Quota Share (VQS) system has, in many ways, shed new light on the history of Danish commercial fishing by highlighting the need to study the role of management (and in particular quota management) as an active determinant of fishing practices. Former sociological and anthropological studies of Danish fisheries have largely focused on a specific fishing community, on the role of technology or the local consequences of the resource crisis and its management.¹ Rarely does

¹ Most of the community studies into Danish fisheries were conducted in the 1970s and 1980s before output and quota management were introduced. The management and regulation of fishing is seldom mentioned. The study of technological developments often illustrates the important role of

fishery management have a central position in the research, and rarely is it treated as much more than an external and necessary condition for fishers and fishing communities. But as quota shares are now transferable commodities, and as they have fundamentally changed the nature of access to fish resources, the specific history of fishing rights and their role in the management system have become central to social-scientific understanding of fisheries. To understand the creation of the VQS system, one unavoidably also has to understand environmental regulations, fishing-effort management, and the internal dynamics of the fleet. The VQS system thus allows new perspectives on that history. To reframe and understand the growth and management of Danish fisheries in its complexity is therefore the aim of this chapter. Finally, this chapter is also a chance to write about the history of the Danish commercial fishery for an English speaking audience. This contributes to wider international debates about the history of modern commercial fisheries, which serve to illuminate and question the historical terms through which market-based fisheries management is often promoted. The VQS system has radically altered the premise upon which the modern development of commercial fishing in Denmark is based, and quota shares, quota markets, and quota leasing will take up a natural and perhaps more prominent part in any future descriptions of contemporary Danish commercial fisheries.²

Sharing

Share organization is a characteristic of Danish fisheries that reaches back into the distant past. The share principle is still used today to such a degree that it has been mainstreamed in Denmark as the legal structure of fishing labor organizations. The share principle means that the crew members onboard a vessel are paid in shares (a certain percentage) of the income earned on each fishing trip. With the uncertainties of nature and the shifting of the seasons, sharing is a suitable way to organize fishing activities, and its use is in no way limited to Denmark (Højrup 2002; Löfgren 1977; McCay and Acheson 1987). The notion of sharing has historically been central to Danish fishing operations. Not only as the sharing of the catch or income but also as the sharing of all aspects of production. In 1880 a public authority pub-

state loans and subsidies but not the management aspect (Hjorth Rasmussen 1984). One exception is the PhD thesis of Morten Karnøe Søndergaard, which includes a study of technology within a management, organizational, and political contextualization (Søndergaard 2004, 2008).

² Earlier studies often focused on a specific community, and unfortunately the management and regulations of access were often absent or left somewhat untouched. Some publications give a national and historical overview, but they often concentrate on the technological and quantitative developments. Recently a group of museums in coastal regions have published documentation on the development of the fisheries in a number of communities (Holm 1994, Byskov 2010). Compared to other nations, such as for instance Norway or Iceland where fishing represents a larger part of the economy and national identity, Denmark has little coherent literature on the development of the fishing sector and the management dimension in particular.



Fig. 2.2 Map showing Danish fishing towns and the fishing areas around Denmark

lished a report on the organization of fisheries in the remote community of Vorupør in Western Jutland (see Fig. 2.2; Hjorth Rasmussen 2000). There were no decked boats, only 14 open boats, each with six crew members. When fishing, each of these men had to meet in the morning with four sets of baited hooks. Each set consisted of a longline with 60 snoods and hooks. These hooks were set close to the coast and outwards. At the end of the fishing trip the catch was shared equally and distributed individually, often by the fishers' wives or children.

The principle of sharing is easily identifiable here. Not only did the six men share a boat but they also shared the burden of baiting and preparing fishing gear. At the end of the trip, they even shared the catch and the tasks of distributing and selling it. Both in relation to the baiting process and the distribution of the catch, the wider family was an integral part of production. The boat was shared as the production unit, as was the reproduction process of maintaining and preparing gear. By adopting the share organization, fishers also shared the risk of an unsuccessful fishing trip as well as the potential benefits of a successful fishing season and good sales. It is from share organizations like this that present-day share-based fisheries have inherited their organizational model. Even though the large investments in technology and developments in gear have led to changes in the traditional form of share organization, the sharing principle is still identifiable. The economic and material burdens of the vessel, fishing gear, and bait are shared, as well as the outcome of a fishing trip, whether successful or not.

Technology at Sea

In the short history of fishing, motorization plays a key role as the initiator and basis of intensive growth of the industry. In Denmark the motorization of the fishing fleet occurred around 1900. Within a few years, from 1900 to 1905, the total catch in Denmark was doubled to 70,000 t (Holm 2002). Motorization brought many advances for fishers after centuries of moving by sail power and rowing. Fishing grounds could be reached faster and the catch could be landed quicker, resulting in a better price. The motor also increased safety and the ability to navigate in difficult weather conditions. The result was higher mobility and a greater operational range. However, if we look more closely at motorization (or mechanization, as it can also be termed), the first engines installed onboard fishing boats in Denmark were not actually used for transportation purposes but in order to haul in fishing gear. This was particularly the case in the development of the Danish seine fisheries,³ where the seine had to be hauled in with the catch inside the net (Hjorth Rasmussen 1984). This hauling motor helped lift the weight of the catch, and it was only later linked to an outboard propeller through a “cycle-chain” system. Based on experiences with this setup, sternpost propellers (with a connection through the ship to an onboard engine) were installed on fishing vessels. These early motors were steam powered, later replaced by petroleum, before diesel proved to be the most reliable fuel. In 1889, for example, a group of fishers applied for a state subsidy to fund a motor for their new boat. According to the fishers, they needed a powerful engine to drag in their Danish seine, as the competition forced them to reorganize their fishery from close coastal operation into a longer-range seagoing fishery (Hjorth Rasmussen 1984). Working with larger gear at greater depth meant a heavier workload. What we can learn from this example is that already in 1889 growth, competition and state subsidies played a part in the development of fisheries—even before engines became commonplace on board fishing boats. In fact, since the 1860s the larger and more expensive deck boats had been developed with state subsidies and sometimes even state ownership (Hjorth Rasmussen 1984).

One of the catalysts of the Danish expansion in the second half of the nineteenth century was the development of the Danish seine. This expansion has to be understood in the context of the absence of a proper Danish fishery in the North Sea. This created the impetus for the Danish state in granting subsidies for experimentation and new initiatives. As state investment in North Sea fisheries grew, fishers in other parts of the country—such as the fishers from the eastern region of Bornholm—were increasingly being declined in their applications for state grants. These were dedicated instead to developing the seagoing fishery that the ministry considered to be in the strategically important North Sea (Hjorth Rasmussen 1993). In the North Sea, British and German fishers were often seen close to Danish coasts, while the coast of Western Denmark (Jutland) was considered to be “undeveloped country” in regards to fishing (Meesenburg and Højrup 1984). During the nineteenth and

³ Danish seine, sometimes also called anchor seining, is a seine haul technique based on the beach seine. Its development in 1848 is credited to the Limfjord fisher Jens Væver.

twentieth centuries the fishing activities in the North Sea and Skagerrak, previously seen as too minor to be included in statistics, grew to become the economic backbone of the Danish fishery (Hjorth Rasmussen 1984). Landings from the North Sea increased from 10% of the total Danish landings in 1900 to 70% in the 1960s. This was paralleled by a continuous decline in catches from internal waters (Kattegat and the belts) and the stagnation of fishing activities in the Baltic Sea.

This shift would have been impossible without the early application of state subsidies. While fishing companies from both Germany and England had large operations fishing in the North Sea, often seen from the coast, Danish large-scale fishing operations were rare until later in the twentieth century. Some companies tried to attract greater capital to Danish fishing activities, one example being “Esbjerg Aktiefiskeriselskab,” a stock company that was established in Esbjerg in 1879. The company had three deck boats for line fishing and one steam powered trawler, but economically the company was a failure and was dissolved less than 4 years later (Hjorth Rasmussen 1984). Through the subsidies directed to smaller producers, the state therefore played a crucial role in the shaping and expansion of Danish fisheries, even before motorization. The Danish seine technology—developed at first single handed by the fisher Jens Væver—was an important step in this expansion of Danish fishing effort into the North Sea. Seine nets replaced the expensive, large and difficult trawl method with an inexpensive and lighter technology that was much easier to handle. Small share-based units could now take part in the fisheries that were previously limited only to companies with the capacity to invest in expensive trawling gear. What is peculiar is that this development was shaped through small loans and grants for the testing of new boats and motors, and not through large-scale funding of operators or scientific ventures. State subsidies were part of an organizational setup with local fishermen’s organizations and what we can call *captains of industry*—the inventive entrepreneurial people closely engaged in both the actual operation of fishing vessels and the development of inventive new fishing techniques (Veblen 1964).⁴ The introduction of the Danish seine gave fishing communities the possibility to increase their fishing and income and provided the basis for the development and use of deck boats,⁵ initiating growth and expansion that preceded that of motorization. The increases in catches connected to the mechaniza-

⁴ The captain of industry is in Thorstein Veblen’s account opposed to the absentee owner, where the managerial tasks take the “captain” away from the actual process of production. It should be noted that Veblen argues that this characterization is a myth and is actually based on far fewer people than the popularity of the characterization suggests. “In the beginning the captain was an adventurer in industrial enterprise—hence the name given to him; very much as the itinerant merchant of the days of petty trade had once been an adventurer in commerce. He was a person of insight—perhaps chiefly industrial insight—and of initiative and energy, who was able to see something of the industrial reach and drive of that new mechanical technology that was finding its way into the industries, and who went about to contrive ways and means of turning these technological resources to new uses and a larger efficiency; always with a view to his own gain from turning out a more serviceable product with greater expedition.” (Veblen 1964, p. 102).

⁵ Deck boats were known in other regions and countries, but the development of a deck boat suitable for landing and hauling onto the beach was conducted by a ship builder in Vorupør around 1889–1890 (Hjorth Rasmussen 1984).

tion and motorization of the fisheries in the period from 1880 to 1910 can be termed the first industrial revolution of the fisheries (Søndergaard 2004). A second revolution took place after the Second World War and involved immense developments in materials, fish finding equipment, and the use of hydraulic power. These will be touched upon later. The great plaice fisheries in the 1880s and onwards, which were based on the new use of Danish seine in Skagerrak and in the North Sea, renewed a debate about the need to construct new harbors on the windy and sandy west coast of Jutland. In this aspect, state subsidies and state decisions were also crucial in determining the shape of Danish commercial fisheries and regional economies.

Harbors and Land-Based Infrastructure

Motorization and mechanization, combined with the spread of the Danish seine technique, created the potential for growth in the Danish commercial fleet. However, if the fishing fleet was to develop into a proper seagoing fishery and take part in the highly productive fisheries of the North Sea and Skagerrak, then Northern and Western Jutland would need proper harbors (Rasmussen and Hjorth Rasmussen 1972). As long as the vessels were landed on beaches by human power, fishing activities would not be able to expand much beyond that of small deck boats. At the same time as new harbor building techniques made these developments possible, the expansion of the railways made it reasonable to construct harbors on the remote west coast. Increasing amounts of fish could not only be landed but also transported to the important urban markets in Denmark as well as in northern Germany. The patterns of these harbor constructions were shaped by political decisions and local lobbyism, and their development adhered to a range of constantly changing conditions in the whole maritime sector as well as to infrastructural improvements on land.

For example, at Hirtshals a breakwater pier structure was constructed in 1879 to give lee to approaching fishing vessels landing on the beach. It was lengthened shortly afterwards, and by 1900 it extended out 276 m. At that time, there was only one larger vessel fishing from Hirtshals, a 50 t boat owned by a merchant from neighboring Frederikshavn. The remaining fleet consisted of smaller boats of around 5 t (Vandsted 2004). A few years later, in 1908, local fishers called for a real harbor in order for the fishery to develop and be competitive (Vandsted 2004). This development of the fishery required larger vessels, and for that they needed a proper harbor. After political discussion the construction of a new harbor commenced in 1920 and lasted the remaining decade. However, the harbor had hardly been completed in 1930 before a resolution from the fishers demanded an even larger harbor (Vandsted 2004). The railroad connection in 1925 had improved the distribution channels and increased the price of fish at the auctions. Since then, the harbor has been expanded step-by-step, most notably in the 1960s. The sale of fish for domestic consumption still plays an important role in the harbor's activities, but this is now supplemented with offshore oil and gas industries, shipping and the industrial reduction fisheries, the latter which will be discussed at greater length below.

In the 1960s, Faroese and Icelandic purse seiners began landing huge amounts of herring and mackerel in Hirtshals, and the town consequently built up an industry increasingly dependent on foreign landings. This had a negative impact on prices for many local operators, but it benefitted the local fish processing industry and the many people working there. As vessels grew larger in order to remain competitive, there was a need for a larger and deeper harbor. In 1960, Hirtshals harbor was approximately 4.7 m deep. Today, the largest fishing vessels require 9 m of depth. The Hirtshals example shows the complex set of relations that go into the making of a harbor. Local needs merge with demand from international vessels and the dynamics set by a global market. Other examples, especially those from Western Jutland, show similar trends, all with their local peculiarities. Hanstholm, a harbor that now aims to be the “fishing port of Europe,” was recognized by law in 1917, but only in 1967 did a proper harbor replace the breakwater structure built in 1911. In the following decades the harbor was expanded incrementally (1977, 1987, 1997, and 2006), and the seafood, ferry and freight industries were established next to the first harbor basin. Esbjerg harbor came into legal being in 1868 as a replacement for the export harbor in Altona lost in the Second Schleswig War of 1864. Esbjerg harbor quickly grew into one of the largest fishing harbors in the world and had a major impact on local demographic shifts, attracting people from the inland and coastal areas north of Esbjerg. In 1900 more than half of the fishers in Esbjerg were from Holmslandklit and beyond (areas north of Esbjerg). This demographic trend continued until harbors were constructed in those areas suffering out-migration, most importantly in Hvide Sande in 1931 (but also Thorsminde in 1932 and Thyborøn in 1918).

With the new harbors and the expanding railroads and road system, many places grew from mere *places to fish from* into permanent settlements of established fisher communities (Moustgaard and Damgaard 1974). Harbors and fishing activities thus had an impact on everyday life in the remaining towns and uplands. The Danish seine fisheries transformed places like Frederikshavn, and fishers, previously among the poorest members of society, became an esteemed class (Hjorth Rasmussen 1984). The increased incomes from fishing were visible in better houses and clothing. This would not have been possible without the rising demand for fish in inland and urban areas in Denmark coupled with the introduction of the infrastructure necessary to bring this perishable product to consumers.

Markets, Demand, and Distribution

The technological progress in sea and land-based infrastructure would be of no economic use without consumers or demand for fish products. Preservation techniques and transportation networks played a crucial role in developing the demand side of fish markets. Railways are often considered a catalyst for local fisher communities in Denmark, providing access to much greater markets than existed locally. From the second half of the nineteenth century, railroads increasingly provided a link

between urban markets and what had previously been remote fishing communities. Growth in the fishing sector accordingly had its parallel—and precondition—in urbanization and in rising mass consumption (Wilcox 2006). Demand and distribution were central to fishing activities, since without a buyer the increasing volumes of fish caught would be of almost no monetary value. For many remote and isolated fishing communities, local demand had previously been an absolute limit on both fishing activities and income. These remote communities also experienced rise and falls in demand and prices, prior to the establishment of the railways. Before tar roads and railroads, it was often wives or children who went out on foot from farm to farm to sell the catch, which often meant that prices quickly fell in favor of the buyer (Hjorth Rasmussen 2000). Given the right conditions, the catch could be sent by ship, in so-called “well smacks,” to the nearest large town (Hjorth Rasmussen 1968). Another option was to transport the catch alive in a dam on board the fishing vessel. This was only practical for a limited number of species, most importantly the flatfish species like plaice, but also cod and eel. Seaborne transportation limited the distribution to the coastal markets with their own local suppliers, and this was precisely the obstacle that railroads could overcome. For example, fish loaded onto the train in Frederikshavn in the morning could reach the market in Hamburg the next day at noon. However, even with these new distribution options, fishers sometimes opted to collectively limit their landings in order to achieve a better price for all (Hjorth Rasmussen 1984; Vandsted 2004).

The new distribution opportunities also created new demand for different fish species. In Hvide Sande, for example, new access to German markets was the basis for a sole fishery (Moustgaard and Damgaard 1974). As railroads and road systems allowed products to reach more distant locales, new processing, packing, and preservation techniques also created new uses for the produce of fishers. A local fish meal factory could greatly increase demand in a local area, as could the invention or introduction of a new preservation technique, such as canning. The appropriate preservation of the catch would mean that even without railroads, fish could reach a much wider market. For example, prior to the finalization of the local railroad in 1900, the town of Kerteminde had several different distribution channels. In the 1840s, smoked mackerel was exported to Hamburg, and a new salting facility had improved prices and stability of demand. In 1862 a fish guano (fertilizer) factory was established, and in 1890 a cannery was built. Only in 1900 did the railway become a determining factor for distribution (Vaarning 1984).

For many fishers, the increased access to inland and urban markets meant more than just a larger turnover; it was the factor that enabled fishing to become a full-time occupation (Holm 2002; Tophøj 1976). Prior to the end of the nineteenth century the authorities in Kerteminde did not recognize fishing as a legitimate occupation, even though most of the town was somehow involved in it and fed by it (Vaarning 1984). With the urbanization of the nineteenth century, fishing as a profession was made possible, and with that also came the professionalization of fish processing. During this period, herring catches from Kerteminde were sold to places as far afield as the Caribbean islands (Vaarning 1984).

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