

Farming the Edge of the Sea

The Sustainable Development of Dutch Mussel Fishery¹

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ABSTRACT Throughout the world, there are myriad examples of abuse, overexploitation, or even depletion of living marine resources. Instances of successful fisheries management and sustainable use are rare. One such example is the Dutch mussel fishing and farming industry. During well defined periods in spring and autumn, the mussel fishers are allowed to catch young mussels, which they plant on plots rented from the state. This system has been in operation since the 1860s. The present paper explores the history of the mussel industry, points out the ecological, economic and social consequences of privatization of the marine commons, describes successive types of management regimes and discusses some of the merits and demerits of privatization.

Introduction

There are numerous examples of "tragedies of the commons" (Hardin 1968) which menace fish stocks and fishing industries in many parts of the world. Marine biologists and economists widely accept that resource abuse is inevitable under a system of common property tenure. They point out that fishers who enjoy unrestricted access to fishing grounds seek to maximize their profits in the short run. Fishing, they argue, is a zero-sum game in which one man's gain is another's loss (cf., e.g., Anderson 1976; Gordon 1954; Pontecorvo 1967; Scott 1955). The pessimistic message of the theorem is that "[r]uin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons" (Hardin 1968:1244).

In recent years, the assumptions underlying this proposition have been criticized (cf., e.g., McCay and Acheson 1987; Berkes 1989; van Ginkel 1989a). The gist of the critique concerns the implicit understanding that commons are inherently open access, inevitably lead to maximization of short-term self-interests and, hence, to abuse. These assumptions often do not hold true. Anthropologists and ecologists, for instance, have presented case studies which show that there are many past and present instances of viable common property regimes characterized by communal management and sustainable use (cf., e.g., Ruddle and Akimichi 1984; Ruddle and Johannes 1985; McCay and Acheson 1987). Nonetheless, it is generally understood that tragedies of the commons are likely to occur when access to fishing grounds is entirely open to all and when marine resource exploitation is not managed in some way or other by the users, by external authorities, or by a combination of both.

In response to current crises in the exploitation of the commons, there is a growing awareness that we need to develop modes of sustainable resource use.

In attempting to do so, we do not have to start from scratch: there are many common property management practices that contribute to the continuing sustained use of living resources. A careful analysis of the knowledge and social arrangements upon which they are based can yield valuable information which may pave the way for the development of sustainable resource use on a larger scale.

This paper describes a successful common property management regime: the Dutch mussel fishing and farming industry. It focuses on how it evolved from a capture fishery into culture fishery, or how "plunderers" became "planters." It explores the history of the mussel industry, the way it was and is managed by state officials and participants, and the successes and setbacks it has encountered. In addition, the merits and demerits of this resource management system are discussed. Most of the data relate to the province of Zeeland, and to the town of Yerseke in particular. Yerseke is the country's foremost centre of shellfish cultivation and trade.

The Setting

Zeeland is a province in the south-west of the Netherlands. Several inlets and estuaries indent its coastline and divide its territory into islands and peninsulas. Nowadays, the major local fishing grounds can be found in the Eastern Scheldt. The mouth of the sea-arm is protected by a storm-surge barrier, which can be closed during severe gales, but which under normal weather conditions maintains the tidal regime. The inlet penetrates approximately 48 kilometers inland from the North Sea. Its tidal range averages 3.2 meters. The large intertidal zones and intersecting deeper channels provide rich econiches, where many species of fish and shellfish abound. The firm seabed of the shallow flats, the constant water salinity, the moderate velocity, and an abundant food supply of phytoplankton form excellent conditions for the spawning and growth of the common blue mussel (*Mytilus edulis*). Similar ecological conditions can be found in the western part of the Wadden Sea, situated between the mainland and the Frisian Islands of Texel, Vlieland and Terschelling, some 200 kilometers to the north of the Eastern Scheldt. Since the 1950s, this area has also become an important mussel fishing and farming location for Zeeland shellfish planters.

Over 70 per cent of the national mussel harvest, which exceeds a hundred million kilograms per year, is exported to such countries as France, Belgium, and Germany. The Dutch mussel industry contributes more than 30 per cent of European production, which makes the Netherlands the largest mussel producing country in Europe. All important shellfishing communities are situated in Zeeland. They are Bruinisse, Tholen, Zierikzee and Yerseke.²

Yerseke is an affluent community, located on the south bank of the Eastern Scheldt. The town's favourable position near urban markets and a good communication network with the hinterland have contributed to its rise as a nucleus of maritime enterprise. The town has a population of approximately 5900. Its economy is dominated by mussel and oyster culture and trade. There are 80 mussel firms and companies in the Netherlands, 36 are based in Yerseke. The process-

ing and marketing of the bivalves is almost entirely concentrated in this town. There are six mussel canneries and twenty-odd shellfish processing and packing plants. A dozen of these companies are vertically integrated, i.e. combine farming, processing and shipping. Other maritime pursuits, like shrimping, lobstering and cockle fishing, also provide an important source of local employment. Yerseke harbours the country's second largest fishing fleet. It consists of a 112 diesel-powered boats, ranging from 17 to 40 meters in length. Each mussel vessel is equipped with two or four dredges and manned by two to four crewmen. A large percentage of Yerseke's occupational population depends directly or indirectly on the fishing industry for its livelihood. In 1980, for example, it provided employment for nearly 700 men and women.

Mussel Fishing and Farming Methods

Mussel farming is practised on rectangular parcels of seabottom, which vary from 2 to 12 meters in depth during high tide. The corners of these plots are marked by stakes. Each firm rents a number of such plots in the Eastern Scheldt and the Wadden Sea from the Crown Land Office (*Domeinen*). Access rights are exclusive. The average size of plots in the Wadden Sea is 25 acres, and in the Eastern Scheldt 11 acres. An area of 6000 hectares is available for mussel cultivation in the Wadden Sea, in addition to 1400 hectares in Zeeland waters.

Mussel farming in the Netherlands is a semi-culture. The reproduction of mussels is left entirely to nature. The seed fishery, carried out during a well-defined period of some weeks in spring and autumn, forms the basis of cultivation. The Ministry of Agriculture and Fisheries sets the opening and closing dates of this short season. During this period, the musselmen are allowed to dredge seed and young mussels on grounds assigned by the Ministry. The natural beds are productive enough to permit seed fishing from year to year. It is of paramount importance that the fishermen catch a sufficient amount of seed to stock their plots. As one skipper-owner stated: "It is a nerve-racking time. Everything has to be in perfect order: the vessel, the motor, the gear, and the crew, 'cause if I were to miss part of the seed fishery, the entire season would be lost. Sometimes I worry so much about it that I cannot sleep at night." The musselmen tremendously enjoy the competitiveness of what they consider to be a "truly free" fishery. If they have located a good spot, they will not share this information with colleagues in order to monopolize it as long as possible. Usually, however, other crews soon find out and make sure that they get their share. It is no exception that dredges and lines get entangled because several boats crowd a small, but rich niche, especially when seed mussels are scarce.

The musselmen usually plant the young bivalves on the shallowest plots they rent. There is a shortage of deep grounds. When winter sets in, the mussels are dredged up and deposited on deeper beds to stimulate growth and to prevent them from being washed away or covered by sand due to storms. The mussels mature within two years. They are dredged up again and brought to the mussel-auction in Yerseke. The mussel dealers and canneries who buy a ship's load plant

the molluscs on special plots with a firm peaty bottom for at least ten days so that they can dispose of sand and silt. This self-purification process is a crucial step before the bivalves are marketed. The only suitable underwater grounds for this procedure are located just off the shore near Yerseke. The dealers also lease these beds from the state.

Marine Commons and Maritime Commoners

Shellfishing in Zeeland is at least 7000 years old. Yerseke's history as a maritime community is, however, relatively recent. As late as the 1860s, its economic resource base was still mainly agricultural. The village was even landlocked until the 1530s, when floods washed away large areas of South-Béveland's territory, turning Yerseke and the hamlet of Yersekedam into coastal communities. The sea-change was, however, not solely destructive. It also provided new opportunities for the exploitation of marine resources. In 1784, official documents refer to the local shellfish fishery for the first time. The firm peaty seabed which had developed off Yerseke's coast provided an excellent base for the settlement and growth of oyster spat and mussel seed, which clustered into vast shellfish banks.

Fishermen from nearby villages started to exploit these banks. Even in the still predominantly agrarian village of Yerseke, some enterprising inhabitants began to switch between agriculture and fishing. They used flat-bottomed boats of types called *hoogaarzen* and *hengsten*. Such craft had two or three crew members, usually agnatic kinsmen. Others, especially male and female farm-hands, gathered oysters (*Ostrea edulis*), mussels, periwinkles and whelks when the receding tide left vast areas of tidal flats exposed. They walked out onto the banks and harvested shellfish to earn extra income during the winter months, when farm work was slack. However, the majority of villagers remained land-oriented.

Though all Zealanders and "foreign" fisher folk held equal access rights to the common property marine domain, *de facto* entry to its resources was often limited because local fishermen claimed customary rights over the shellfish beds near their residence. Sometimes they even used violence against outsiders who fished on "their" grounds (van Ginkel 1988, 1989b). This "culture of the commoners" (McCay 1987) notwithstanding, occasionally more than 200 vessels crowded the most productive niches. Hence, the menace of overexploitation, especially of oyster stocks, loomed large.³ A report described the state of affairs in the Zeeland fishing industry during the first quarter of the nineteenth century as follows:

In those times disorder prevailed. Each fisherman acted according to what his greed or rapacity dictated. It happened more than once that armed fishermen from one place set out to rob the beds over which those of another place claimed exclusive rights. Thus, the fishing grounds were often the scene of bloody meetings, which regularly necessitated the intervention of armed forces and eventually compelled [the authorities] to introduce regulations to counter the disturbances (Verslag 1863:22).

In 1825, the government assigned the management of local waters to the Board of Fisheries for the Zeeland Streams (*Bestuur der Visscherijen op de Zeeuwsche Stroomen*), in an attempt to change the situation for the better. The Board consisted of impartial notable citizens, who had no stake in the fishing industry. When it became clear that the natural shellfish beds faced gradual depletion if no measures were taken, the Board regulated fishing-gear and methods, seasons, minimum sizes of marketable shellfish, demanded a modest licensing fee and patrolled the waters to enforce these rules. This state intervention was supposed to stop overfishing, but poaching and fishing illegally became a widespread phenomenon. Sometimes this caused conflicts among fishermen. Crews fishing off-season, for example, were confronted by colleagues who tried to prevent "their" shellfish beds being plundered by non-locals before the season started. Thus, the new regulations could not prevent depletion of natural shellfish beds continuing.

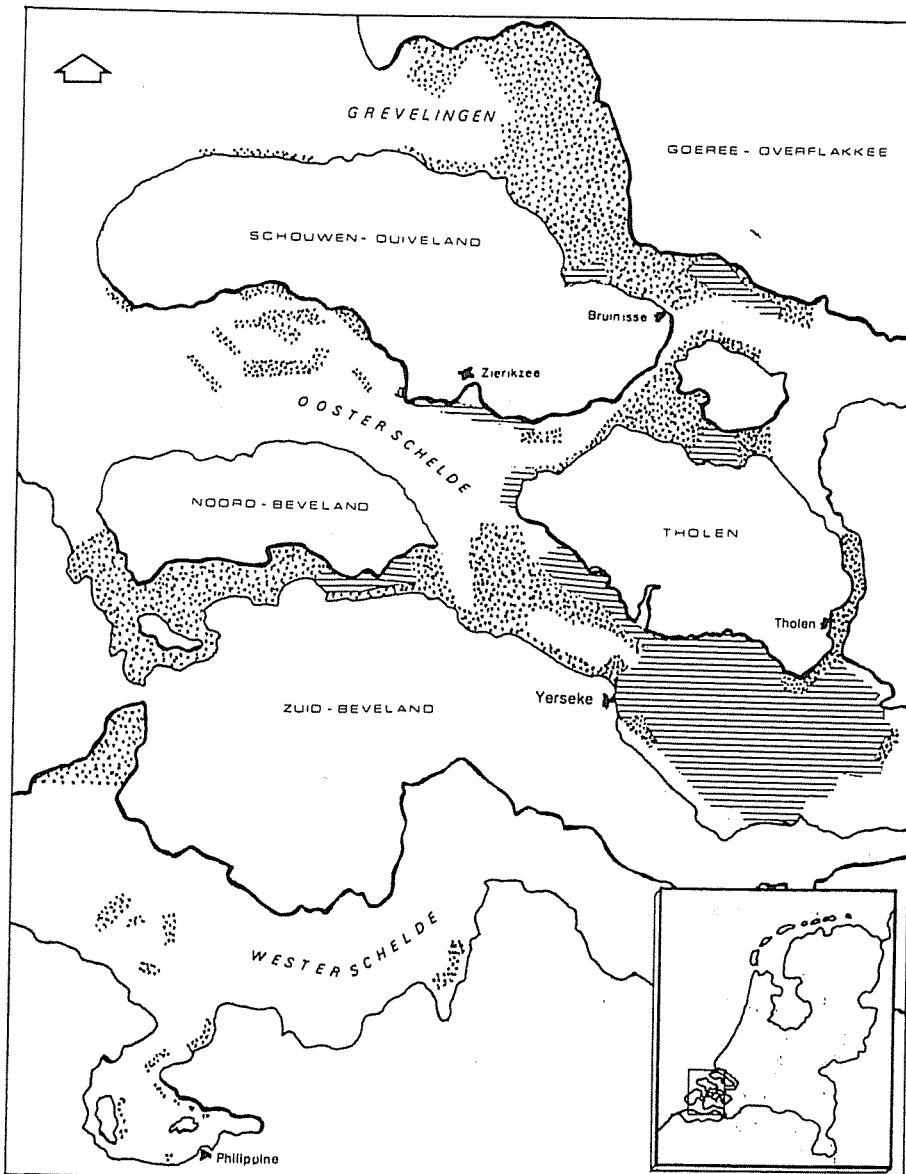
By the 1860s, hundreds of shellfish fishermen and gatherers exploited the Zeeland estuaries, providing a meagre subsistence to many households. Though the monetary rewards were small, the fishing industry expanded due to demographic growth in the province, which could not be absorbed by employment in agriculture. Yerseke's population, for example, increased from 560 in 1817 to nearly 1000 in 1867. Many took to fishing and during this same span of time the local fleet expanded from 10 to 24 boats. In addition to the crewmembers, the village had some forty boatless shellfish gatherers. In spite of the growth of its maritime sector, Yerseke was one of the poorest fishing communities in the country. Scores of villagers found themselves in dire straits and had to be assisted by poor-relief boards. The widespread poverty was closely linked to the undependability of the market, a shrinking supply of shellfish due to resource depletion, and vehement competition. However, Yerseke would soon become the scene of radical transformations spurred by the enclosure of large parts of the marine domain. The privatization of oyster beds, in particular, brought about sweeping changes, not only in the oyster trade, but in the mussel industry and in the larger community, as well. In the next section, I shall therefore also briefly refer to the far-reaching consequences of privatized tenure in oystering.

Enclosure of the Commons

In the 1860s, the Board of Fisheries privatized several mussel banks in the Eastern Scheldt and other Zeeland waters. The Board demarcated plots and allocated these for the duration of ten years to musselmen by the drawing of lots. It also provided for police patrols to prevent theft and poaching. Henceforth, mussel fishermen gained exclusive access rights in return for a modest rent of a few florins. The plots were reallocated ten-yearly. Capture fisheries gradually turned into culture fisheries, though there were still grounds where a free mussel fishery was permitted. The transition from fishery to semi-culture led to an increase in output, but did not cause dramatic changes in the social structure of the occupational community of musselmen and labour remained the most important factor of

production. A transition from free oyster fisheries to oyster farming did, however, have a tremendous impact upon the social relations of production.

In 1870, the state privatized several oyster banks in the Eastern Scheldt and



Map 1. *Mussel and Oyster Farming Locations in the Zeeland Streams, c. 1890 (Mussel Areas Are Indicated by Dots, Oyster Areas by Stripes)*

other Zeeland estuaries. Extensive underwater grounds were divided into five and ten hectare plots, which could be leased at public auctions. The highest bidders gained exclusive access rights. This measure attracted many wealthy urban capitalist entrepreneurs and this in turn brought about a rapid capitalization and industrialization of the oyster industry (van Ginkel 1988, 1989b, 1990). Shellfishing rapidly gave way to mariculture. By 1886, all banks suitable for mussel and oyster farming were privatized (see map 1).

Within decades Yerseke became the Dutch centre of oystering. Most of the newcomers to the industry established their firms and companies in Yerseke because in 1866 the town was connected to an international railway network, contrary to most of the other important Zeeland shellfishing communities, such as Bruinisse, Zierikzee, Tholen and Philippine. The town received a huge fillip from the spread of railways and the boost to consumption provided by the steadily improving standard of living at home and abroad. In the wake of this development the village turned into a relatively affluent town which attracted many migrants. By 1895, its population had more than quadrupled to 4338 and the local fleet had expanded to a 160 boats, including ten steam-powered vessels.

The new mode of production in the oyster industry initially resulted in a loss of independence of the existing oystermen. Most of them could not afford to pay the lease fees, which skyrocketed soon after the introduction of the auctions. They either became wage-labourers for one of the newly established companies



Photo 1. *Flat-Bottomed Boats Moored Near One of Yerseke's Shipyards, c. 1890*

or oyster barons, or turned to musseling (van Ginkel 1988). The gatherers, whose domain was drastically reduced, did not have the latter possibility. The majority had to get a job in the oyster industry. After an initial period of remarkable successes, the oyster trade suffered serious setbacks. The employees constituted a disposable labour force and many were sacked.

Compared to oyster culture, musseling was far less labour and capital intensive. The required means of production still consisted of a boat and relatively inexpensive gear. The fees for the rent of mussel plots remained modest. In contradistinction to the oyster trade, the mussel industry did not undergo a phase of rapid capitalization because the monetary rewards were smaller and plots were not up for public bidding but allocated by lot. Besides, a free mussel fishery was permitted in the Zuyder Sea and Wadden Sea.

Initially, however, the allocation of plots by the drawing of lots led to abuse. Anyone could take part in the draw. Thus, many non-fishermen tried to lease a plot with the sole objective to sublease it to a musselman for a profit. In the early 1900s, this abuse ended when the Board of Fisheries raised the lease fees and decided that only mussel planters could participate. Later, the lease contract was automatically renewed unless the culturists wished to end it.

Following the growth of the oyster industry, the number of musselmen also increased. Given the lower capital investments required, many former oyster fishermen, labourers and newcomers turned to musseling. Whereas the oyster industry became strongly stratified, the occupational community of musselmen remained fairly egalitarian. All mussel fishermen operated independently in family firms, possessed similar means of production, and had equal opportunities to rent plots by participation in the drawing of lots. Even though the profits were considerably smaller than those that could be obtained in oystering, those who possessed little money but valued their independence became musselmen. Since the vessels were still relatively small and cheap, it was feasible for every crew member, given reasonable luck, arduous labour, and a degree of thrift, to aspire to own his own boat. Turn of the century Yerseke counted approximately 90 musselmen, and several fishermen who also fished oysters, lobsters, crabs, periwinkles and whelks. Not only were they small commodity producers, many were fish mongers, too. They sailed to Belgian cities like Antwerp, Brussels, Ghent and Mechlin and sold their catch to merchants, market vendors and peddlers. Each year, they exported 20,000 to 30,000 tons of mussels this way.

In the early decades of the twentieth century, vehement competition for a share of the market resulted in continual overproduction. A similar process had also occurred in the oyster trade. Given the imbalance between supply and demand, prices dropped. As a result, most musselmen tried to increase production to maintain or improve their standard of living. This solution to the "peasant dilemma" (Wolf 1966:15) only exacerbated their situation, of course. Things became even worse when due to the motorization of the fleet the supply of mussel seed shipped home from the Wadden Sea increased. Many musselmen quickly adopted the new technology of mechanical power.

During the First World War, export became increasingly difficult. Though the

Dutch were neutral, the acts of war and restrictions imposed by the occupying German authorities in Belgium hampered free trade. A boom in the home industry of cooking, shelling, salting and bottling mussels, slightly alleviated the problems. By this time there were also two mussel canneries which processed considerable amounts of bivalves. After the war ended, a rise of the rent fees, unfavourable exchange rates, and declined purchasing power in Belgium and France created additional problems for the musselmen. A contemporary report mentions that "mussel fishery is in a bad state. Some fishermen blame the exchange rates, which is partly true, but the main cause is that mechanical power cannot sustain the fishery. Motors are installed in ever more boats because without them the fishermen are unable to compete" (Verslag 1921:106). Motorization and the introduction of mechanical dredges caused an increase in supply and a concomitant fall in prices. Early innovators were at an advantage over those who continued to use sailing boats. This was especially true for the seed fishery and the trade with Belgium. There was growing antagonism between those with and those without motorized craft. The latter requested a ban on the use of mechanical power in the seed fishery, to no avail, however. Some even feared that a few wealthy persons would monopolize the mussel trade and that they would oust the small planters from the fishery. Most petty fishermen, however, responded in time and also motorized their sailing craft. Thus, in 1932, a biologist could still observe that "mussel farming is exclusively a small-scale enterprise" (Havinga 1932:58).

On several occasions the mussel culturists tried to reverse the industry's im-



Photo 2. An Yerseke Skipper and His Two Sons Aboard Their Vessel (a hengst), Landing Mussels at a Quay in Brussels, c. 1925

pairment. They established co-operatives and unions which introduced quotas, quality standards and minimum prices. However, these measures failed time and again because there were always mussel farmers and shippers who did not join, or refused to live up to the voluntary regulations. In 1917 and 1927, for instance, unions of Zeeland mussel planters (both named *Bond van Zeeuwse Mosselkwekers*) were established on the initiative of Yerseke and Bruinisse musselmen. Both were liquidated within a few years. The problem was that several planters who did not join sold their mussels under the minimum prices set by the unions. Moreover, some members evaded the regulations by furtively selling more than their quota, while at the same time trying to benefit from the improvement in prices. These "free riders" favoured their own private interests above those of the mussel industry as a whole and, consequently, undermined any attempt at production and marketing management. Through the 1920s, overproduction, low exchange rates and low prices continued to weaken the industry. Though there were also some good years, a growing number of small planters had to ship the bivalves to Belgium themselves to earn extra money.

State Management of the Mussel Industry

In the 1930s, the state finally gave up its *laissez-faire* policy and intervened in the ailing industry to control the disrupting consequences of the general economic crisis. In 1934, it issued the Mussel Crisis Measure, (*Crisis Mosselbesluit*). This management regime finally introduced the measures which organizations of musselmen had also proposed, but were unable to enforce. All mussel fisherman and dealers had to join the Dutch Fishery Marketing Board (*Visserijcentrale*). The Board set minimum prices for mussels for export. The home market remained free, however. Soon Belgian dealers started to work with Dutch middlemen to evade the price regulations. To counter this situation, the Central Sales Bureau of Mussels (*Centraal Verkoopkantoor van Mosselen*) was established in 1935, partly at the insistence of the planters, who suffered most from the evasion of the price regulations. Henceforth, all transactions between planters and shippers had to be made via the Bureau. Subsequently, it set quality standards and introduced fixed prices, both for mussels the Bureau bought from the producers and for the bivalves it in turn sold to the dealers. Moreover, it regulated the admittance of newcomers in order to curb the expansion of the number of mussel culturists and introduced a licensing system for shippers, thus reducing the number of musselmen who were allowed to ship their own merchandise.

The management regime was still not quite successful; soon a new boom in output followed. In 1938, the Bureau responded by allocating production quotas, so-called standard capacity numbers (*standaardcapaciteitscijfers*), to all individual musselmen, based on their estimated production in earlier years. Alternately, each planter was allowed to supply a certain quota to the Bureau. This rigid regulation of the industry, aimed at balancing supply and demand, proved adequate and the position of the planters improved. It had a stabilizing influence, though it also brought about a fixation of the industry's structure and

limited the expansion of individual firms. The standard capacity numbers were fixed and non-negotiable. The only way to expand a firm was by buying another firm. The number of musselmen who kept sailing to Belgium started to diminish, not only due to restrictions imposed by the Bureau, but also because the transportation of bivalves was gradually taken over by trucking companies.

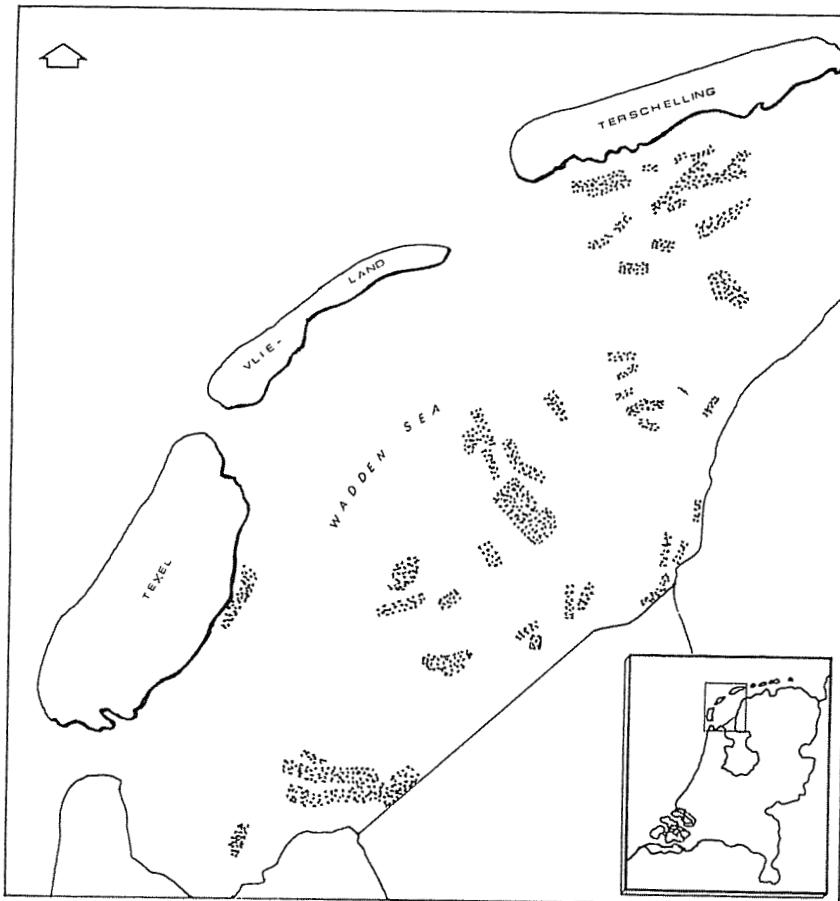
When the mussel industry had hardly recovered from the crisis of the 1930s, the Second World War broke out. Many boats were confiscated, damaged or destroyed, fuel was scarce, export made impossible and several Yerseke fishermen were forced to work as convicts on the German island of Wyk auf Föhr. Production came to a near standstill and the Germans demanded the best part of the landings.

After the war ended, the Dutch government reduced the rent of plots to stimulate the industry's recovery. Nonetheless, this was a difficult time, due to the damages inflicted upon the fleet. Following two good years, things appeared to get even worse. In 1950, a parasitic copepod, *Mytilicola intestinalis*, killed a large proportion of Zeeland mussels. Some musselmen lost over 80 per cent of their stock. The shippers were consequently unable to supply customers. The planters and dealers were powerless against this ecological disaster and feared that it presaged the end of musseling in Zeeland.

Expansion and Co-Management

Paradoxically, however, this catastrophe preluded a phase of capitalization and expansion. Some enterprising planters gained permission to cultivate plots in the Wadden Sea, until then a location mainly used for seed fishing (cf. van Ginkel n.d.). Soon all Zeeland musselmen relocated parts of their production areas to the Wadden Sea (see map 2). Moreover, the mussel parasite vanished from the Zeeland inlets within a few years. Thus, there was an enormous expansion of the total available area of plots, which gradually increased from 4,000 to 10,000 hectares.⁴ Since the demand for mussels had also risen, the Bureau considerably extended the individual quotas.

In 1967, some of the most successful planters and dealers persuaded the Ministry of Agriculture and Fisheries to withdraw most of the protective measures which had been introduced in the 1930s. The quota system was abandoned and henceforth mussels were sold at a free auction in Yerseke. This did not imply that the industry returned to a *laissez-faire* situation. The state has retained formal jurisdiction over shellfish grounds, still polices the waters, monitors the sanitary condition of shellfish farming areas and finances a department of the Netherlands Institute for Fisheries Investigation in Yerseke, which carries out biological research and provides the shellfish farmers with information and advice. However, the involvement of the industry's participants has increased. The Industrial Board of Fisheries (*Produktschap voor Vis en Visprodukten*), an organization of the fishing industry as a whole, together with representatives of all branches of the mussel industry – planters, dealers and canneries, united in the Mussel Advisory Committee (*Mosseladviescommissie*) – now determine



Map 2. Mussel Plots in the Wadden Sea, c. 1960

quality standards and maintain minimum prices. A fund (*Mosselfonds*) was created to facilitate this. The planters deposit a small percentage of each sale with this fund. If their mussels do not meet with the quality standards, or cannot be sold for at least the bottom price, they are compensated by the fund. The mussels are bought by the fund, planted on plots and sold at a later date. Thus, this system is quite flexible. The Industrial Board and Advisory Committee also negotiate with the Ministry of Agriculture and Fisheries regarding the replacement of plots which have become unproductive, for example due to silting. In general, this co-management regime has been successful so far. Production has boomed, but supply could not keep up with demand and, concomitantly, prices have increased sharply (see figures 1 and 2).

However, there were also disadvantages. The expansion of mussel farming in the Wadden Sea was at the expense of shrimp fishermen in the north of the country, who saw their shrimping territory drastically reduced. Some fishermen from

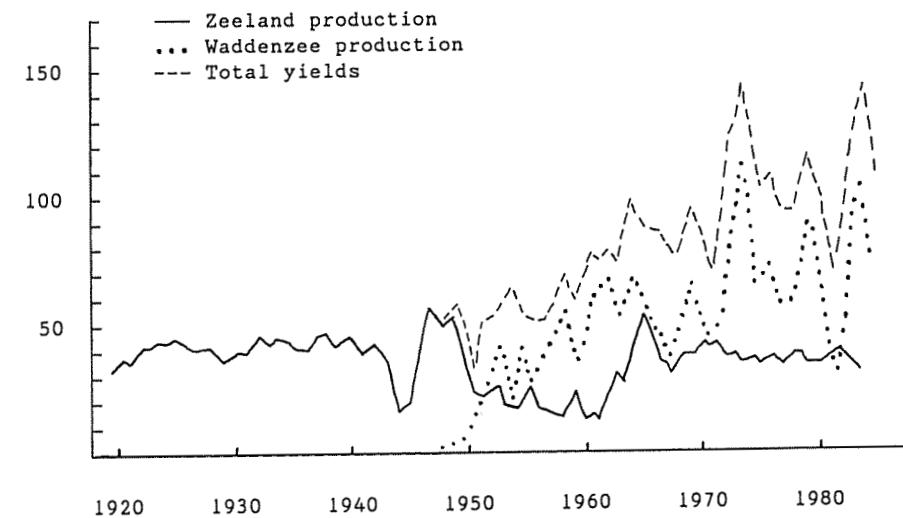


Figure 1. Yearly Yields of Marketable Mussels (in Millions of Kilograms)

the island of Texel, for example, tried to gain permission to rent plots in order to start mussel cultivation, too. Their efforts did not bear fruit. The Ministry of Agriculture and Fisheries refused to give them access to such plots because Zeeland mussel planters had to be compensated for a loss of mussel beds as a

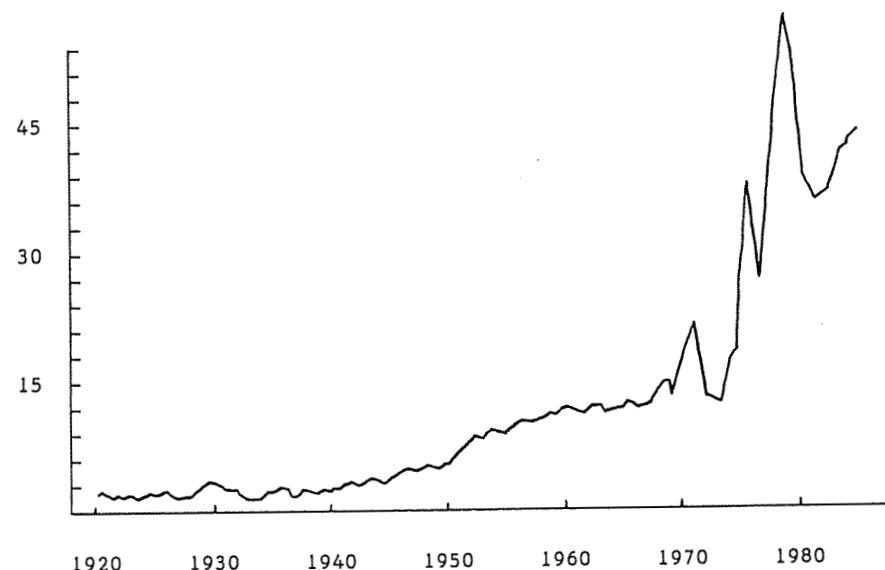


Figure 2. Average Price of Mussels per 100 Kilograms (in Dutch Guilders)

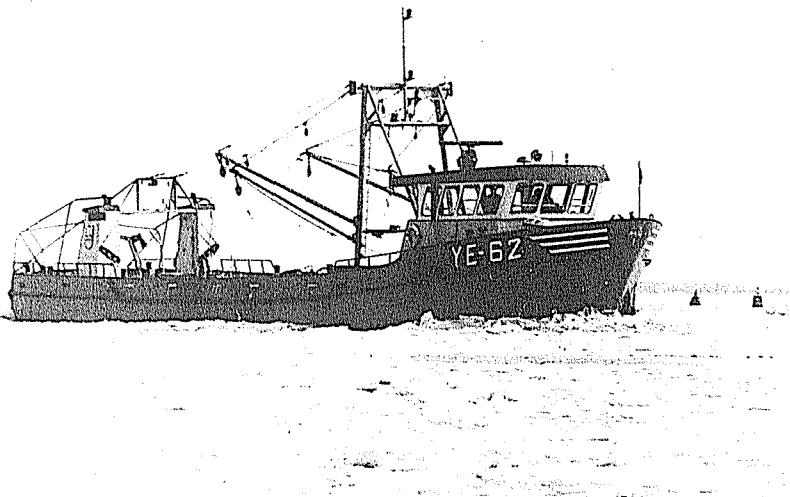


Photo 3. *Modern Mussel Cutter, 1986*

result of the damming off of the Zeeland delta (see note 4). Most shrimpers, who only received nominal indemnifications for the diminution of fishing grounds, bitterly resent the fact that Zeelanders plant mussels in what they consider to be "their" territory.⁵

There were also demerits for certain musselmen. The relocation of many production areas to the Wadden Sea meant that larger boats were needed. This changed the balance of forces of production from labour to capital. A period of rapid modernization, increases in scale and mechanization ensued. These changes worked to the advantage of the large mussel culturists and to the detriment of the petty planters, who were unable to keep pace with the process of growth because they lacked the funds to modernize. Many could no longer compete and especially those without successors had to sell their business to large-scale planters and dealers. The number of firms decreased from 143 in 1960 to 80 in 1985. This development was stimulated by the Ministry of Agriculture and Fisheries. It aimed at fewer, but more profitable enterprises. Today, the state follows a very restrictive policy with regard to the admittance of newcomers. Only those inheriting a family business or experienced employees who want to set up their own enterprise can get a license, provided that the total number of firms does not increase. Thus, the expansion of the mussel industry as a whole brought about the demise of small enterprises. Nonetheless, the industry's social organization is still predominantly based on family firms.

Discussion: Pros and Cons of Privatization

This case-history describes, among other things, several management regimes which have been in operation in the Dutch mussel industry. For ages, the mussel fishing grounds have been commons which local shellfish fishermen regarded as "theirs." However, they could claim but not enforce exclusive rights and often extralocal fisher folk incured on "their" territory, ultimately resulting in a tragedy of the commons. The introduction of exclusive property rights by the drawing of lots in the 1860s implied a change toward ecologically sustainable development. Capture fisheries turned into culture fisheries which resulted in increased production. This management system seemed equitable since all participants had equal opportunities to rent plots. Nonetheless, abuse occurred and was only countered in the 1900s, when the Board of Fisheries decided that only musselmen could participate in the draw. Moreover, one of the shady sides of this successful development was overproduction and, consequently, a fall in prices. Thus, privatization *per se* is not necessarily the answer to all resource management problems in fisheries. The musselmen themselves established unions in order to turn the situation for the better through the introduction of quality standards, minimum prices and production quotas. Such agreements were undercut by fishermen who evaded the rules or did not join the unions established to this end. In the 1930s, the state intervened and did exactly what fishermen had tried to do earlier. Unlike the fishers, however, the state was capable of enforcing production and market regulations. This rigid management regime bore fruit and was maintained into the late 1960s. Following the expansion of mussel farming to the Wadden Sea and the capitalization of the industry, the planters and dealers asked for a relaxation of the strict regulations. The Ministry of Agriculture and Fisheries withdrew its measures, though it maintained formal jurisdiction with regard to marine property and allocation of new grounds. All parties in the mussel industry participate in management through the Mussel Advisory Committee and the Industrial Board of Fisheries. So far, this co-management system has worked well, at least in ecological and economic respects. It has led to increased production at an ecologically sustainable level and higher incomes to musselmen.⁶

Can similar management systems work elsewhere? I think they can. When carefully planned and introduced, mariculture could perhaps provide a solution to *resource* management problems.⁷ This does not necessarily mean that the marine domain has to be privatized; state or communally managed shellfish resources, or a combination of management regimes, may be viable alternatives. Whatever the details of such a tenure system are, it seems a sound strategy to introduce some form of exclusive access to sedentary fish stocks in order to develop ecologically sustainable fisheries or mariculture. However, there are many problems involved and social costs have to be considered, as well.

Firstly, it will be difficult to introduce exclusive access rights to fishing grounds, because this will render multiple-use impossible. There are conflicting interests between mariculturists, on the one hand, and commercial and recrea-

tional fishermen, environmentalists, holiday-makers, energy (e.g., oil and nuclear) and other industries, and sewage works, on the other. The case of the Dutch mussel industry is telling in this respect: where mussels are farmed, all other forms of marine resource exploitation are prohibited. Since the 1950s, with the expansion of mussel cultivation to the Wadden Sea, the musselmen have taken up much space formerly mainly exploited by shrimpers.⁸ This has led to frictions and conflicts because the latter felt that the mussel farmers had encroached on "their" territory.

Secondly, there may also be different perceptions of property which can lead to poaching. Thus, McCay writes that in the U.S.A., the history of eastern seaboard oystering shows "the persistence of the sentiment or culture of the commons even in the context of a strong rationale for a privatized fishery" (1987:208). Her case history bears a family resemblance to what happened shortly after the enclosure of the Zeeland commons. It is not easy to turn fishermen into "farmers." Even when fishermen are in favour of a privatized fishery, poaching and theft can occur. For instance, Zeeland mussel farmers still claim that mussels are fished illegally from their plots and that there is fraudulent displacement of seamarks. Policing the waters is a dear necessity, even though it will never be entirely effective.

Thirdly, privatization often leads to marginalization of the commoners (cf. van Ginkel 1990; McCay 1987; Taylor 1983). It further protects the interests of participants once they have gained access and may create tremendous barriers for potential newcomers to the industry. Moreover, the example of the Dutch mussel industry illustrates that many small-scale planters were ousted from the business. These seem to be inherent inequities of an exclusive or limited entry rights system. One of the major management concerns should therefore be an equitable allocation of access rights to marine resources. However, tragic choices can hardly be avoided in finding solutions for resource management dilemmas (cf. McCay and Acheson 1987). Nonetheless, in trying to achieve ecologically sustainable development, the social problems of fishers should not be neglected. Management institutions or arrangements that fail to address this dilemma may perhaps solve the tragedy of the *commons*, but at the same time they will certainly contribute to the tragedy of the *commoners*.

Conclusion

The present paper shows that the introduction of exclusive entry rights can provide fishermen with incentives not only to maintain, but even to increase their harvest at an ecologically sustainable level. This conclusion is perhaps deceptive. It may create the impression that I subscribe unconditionally to at least parts of the tragedy of the commons proposition and similar theories (e.g., Gordon 1954; Scott 1955), in that exclusive access rights convey only benefits. I do not think that they do. I have already stated some of the negative aspects, but there is more. In previous articles, I pointed out that the allocation of exclusive use rights is not necessarily a panacea for resource management problems. I used

the history of the Dutch oyster industry to illustrate this point (cf. van Ginkel 1988, 1989b and note 6). Nevertheless, stationary marine resources, such as mussels and oysters, seem to offer excellent opportunities for the development of sustainable resource use under certain types of management systems. Such sedentary shellfish stocks can be assigned to specific owners or user groups (Townsend and Wilson 1987:318). The main problem is to devise equitable forms of access allocation to the resource. The introduction of individual property rights is certainly not the only possible management solution. Such resources can also be managed communally or in combination with external authorities. Sustainability, however, appears to be attainable, since the shellfish are planted on plots which provide better ecological conditions for growth and reproduction than under entirely natural circumstances and the shellfish culturists will reap the fruits of good stewardship. In the instance of the shellfisheries, "man the plunderer" can be turned into "man the planter." In this sense, shellfish farming is a viable option for the enhancement of ecologically sustainable use of renewable marine resources.

Notes

1. An earlier version of this paper was presented at the First Annual Meeting of the International Association for the Study of Common Property – "Designing Sustainability on the Commons" September 27-30, 1990, Duke University, Durham, North Carolina. I would like to thank Jojada Verrips for his comments.

2. Several other Zeeland villages and towns also had a small musseling fleet. They could not retain their position (cf. van Ginkel 1989c). Outside Zeeland, there are only two locales in the Netherlands where a small number of mussel farmers are active today: Harlingen and Wieringen.

3. Overfishing had been triggered by the steadily rising demand and prices for shellfish, which in turn were brought about by population growth in western Europe, infrastructural improvements and increased spending power of the urban middle and upper classes.

4. In 1953, a flood disaster struck Zeeland. Five years later, the government decided to dam off all inlets but one in the province. In 1971, the Grevelingen inlet (see map 1) – an important mussel farming location – was closed off by a dam, rendering mussel cultivation impossible. The Eastern Scheldt was scheduled to be shut off from the North Sea some years later. In anticipation of the damming off of the Zeeland delta, the relocation of mussel farming to the Wadden Sea was hastened. However, growing opposition by fisher folk and environmentalists led to a reconsideration of this government decision. In 1976, Parliament approved the construction of a storm-surge barrier which would maintain the tidal regime. This meant that mussel and oyster farming in the Eastern Scheldt would remain possible. Thus, the total available area for mussel cultivation increased, though the acreage of mussel beds in Zeeland decreased.

5. This has become clear to me while doing fieldwork on the island of Texel.

6. It is Acheson's hypothesis that "where property rights exist, there would be less likelihood of overexploitation of resources, larger catches, more efficient use of capital, and higher wages to fishermen" (1981:301). Though the present case history seems to corroborate this hypothesis, I do not think that it holds true in general. In another article, I have used the history of the Zeeland oyster industry to clarify this point. Some of the consequences of privatization of oyster banks were overproduction, resource deterioration, overcapitalization, marginalization of established fishermen, the creation of social divisions and maldistribution of incomes (cf. van Ginkel 1989b).

7. An obvious prerequisite is that ecologically suitable areas, a market and a communication network must exist or have to be created. Therefore, a careful analysis of local situations should be made before attempting to introduce forms of mariculture, such as mussel farming. It should at least include a study of the consequences for the ecosystem; the sanitary condition of local waters; the chance that diseases are introduced or spread (such as MSX in oyster culture); and culturally mediated food preferences and taboos in view of marketing possibilities.

8. This seems to confirm Tuomi-Nikula's hypothesis that "[i]n the competition between niches the more effective form of natural resource exploitation of greater economic significance supersedes that which is of lesser economic significance" (1985:162).

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