The Abundant Sea and Her Fates: Texelian Oystermen and the Marine Commons, 1700 to 1932

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Nature is seen by humans through a screen of beliefs, knowledge, and purposes, and it is in terms of their images of nature, rather than of the actual structure of nature, that they act. Yet, it is upon nature itself that they do act, and it is nature itself that acts upon them, nurturing or destroying them.

Rappaport (1979:97)

Many tragic stories can be told concerning the fisheries. Throughout the world, there are myriad examples of the abuse, overexploitation, or even depletion of living marine resources. The ethnohistory of the oyster fishery on the Dutch island of Texel provides an early instance of such a tragedy. Until the mid-1840s, the oysters (*Ostrea edulis*) were caught by the millions and provided a livelihood for scores of islanders. But various problems assailed the oysters and the oysterers, and eventually the banks were almost depleted. This article aims to uncover the processes and factors that brought about this decline. It seeks to contribute further to the debate about common property or common pool resources, defined as "a class of resources for which exclusion is difficult and joint use involves subtractibility" (Berkes *et al.* 1989:91).

In a well-known and oft-cited article, the biologist and ecologist, Garrett Hardin, postulates that each rational being exploiting common property resources seeks to maximize his gain in the shortest time possible. The individual user pockets nearly all the profits of his behavior while passing on almost all of the costs to the collectivity of users. Since all individual users act in this way, this behavior will in the long run inexorably lead to overexploitation: "Ruin 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. Freedom in a commons brings ruin to all" (Hardin 1968:1244). Hardin termed this dilemma of individual versus collective rationality "the tragedy of the commons." He also claims that this tragedy can only be avoided when some

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external authority (usually the state) intervenes or when the activity is placed in the private sector.

The simplicity and range of this proposition contributed to its popularity, not in the least among policy makers and state agencies regulating the fisheries. They perceive the sea and the fish in it as open access commons. Among them, it has become conventional wisdom that unlimited entry leads to over-fishing and that state intervention or privatization provides solutions to this problem. These views did not only develop from Hardin's theoretical model. More than a decade before Hardin presented his views, economists Gordon (1954) and Scott (1955) published similar propositions, specifically concerning the fisheries, which echoed even earlier statements.

From the mid-1980s, anthropologists and other scholars have criticized the tragedy of the commons theory on the basis of detailed case studies. Among many other things, their criticism concerns the fact that Hardin and his adherents equate common property resources and open access; suppose that individual persons behave as autonomous beings, are selfish, and act as if free of social norms and values; stress individualism and competitiveness above community spirit and co-operation; neglect institutional contexts; use a priori reasoning without empirical substantiation; and are ethnocentric because they view state intervention or privatization as the only solutions to the problem of the overexploitation of natural resources.[1]

There is overriding empirical evidence that those who use marine resources held as common property have in many cases developed rules and rights leading to sustainable use. Access to common pool resources is rarely free to all; many authors discern a variety of rights regimes, whether de jure or de facto (Berkes *et al.* 1989; Bromley 1992; McKean 1992; Schlager and Ostrom 1992; Matthews 1993:66–85). This is not to deny that "tragedies of the commons" exist. Under certain conditions, overexploitation does occur, but it is faulty to presume that it is necessarily caused by the behavior of selfish, rapacious, and unscrupulous fishermen. What is needed is a careful reconstruction of the factors bringing about resource abuse. Doing so requires a diachronical approach, in which the adaptive strategies and processes of fishermen over a relatively long span of time are taken into consideration. This ethnohistorical case study on developments in the oyster fishery on the island of Texel (the Netherlands) between the eighteenth and early twentieth centuries will throw light on the regimes of access and use of the marine domain, the motives and actions of fishermen, the intended and unintended consequences of their behavior, and the processes and conditions that eventually led to a tragedy of the marine commons.

[1] See McCay and Acheson (1987:7–34), McEvoy (1988), Acheson (1989), Berkes (1989:1–17), Berkes *et al.* (1989), Pinkerton (1989), van Ginkel (1989), McGoodwin (1990:77–96), Ostrom (1990), Brox (1990), Pálsson (1991:15*ff.*), Bromley (1992), and McKean (1992).

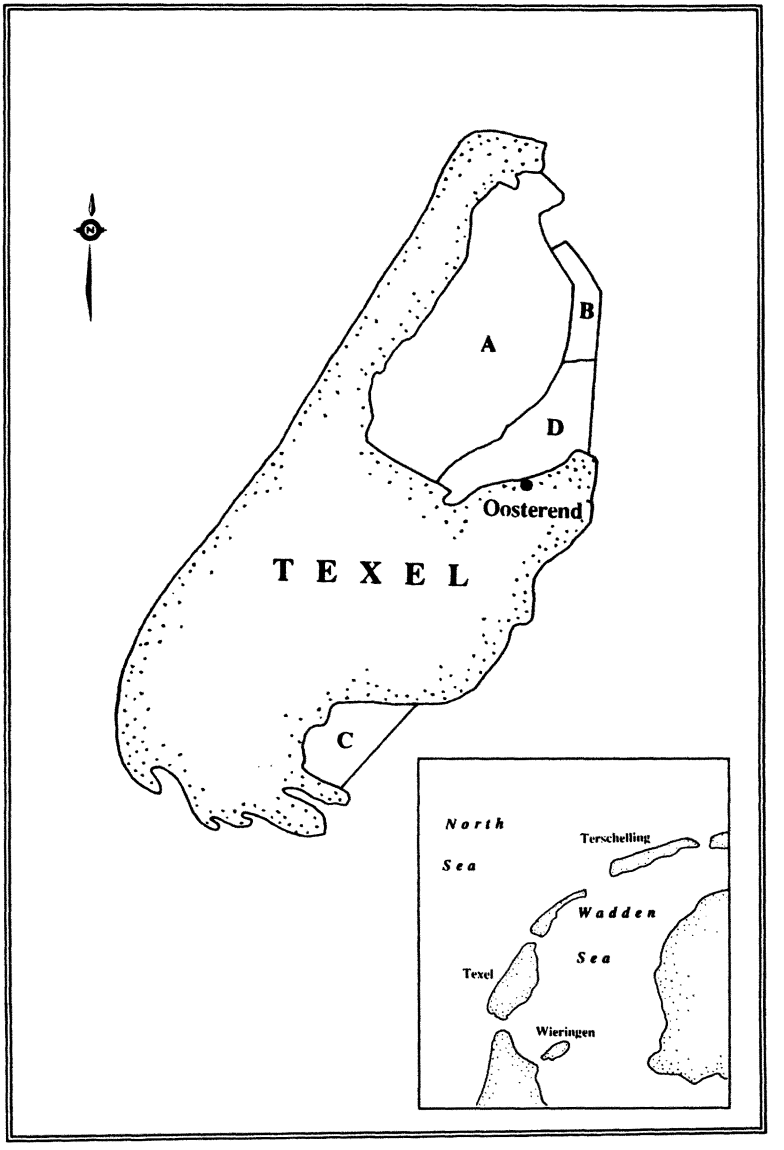

FIGURE 1. Map of the Dutch island of Texel. Insert shows the larger area, including the North and Wadden seas. The areas marked A, B, C, and D are nineteenth-century land reclamations.

THE SETTING

The Dutch island of Texel, to which the natives fondly refer as "The Golden Knoll" (*Het Gouden Boltje*), is the southwestern-most isle of the Frisian Islands (see Figure 1). This chain of islands stretches along the coasts of the

Netherlands, Germany, and Denmark's Wadden Sea. The other Dutch Frisian Islands include Schiermonnikoog and Terschelling, amongst others. Southeast of Texel lies the island of Wieringen. In the eighteenth and nineteenth centuries, the fishermen of these respective islands also pursued oysters, as did some of the inhabitants of Zoutkamp, a town situated on the Wadden Sea coast.

Of Texel's 163 square kilometers, nearly a third was reclaimed during the nineteenth century. The land ranges from between slightly below to fifteen meters above sea level. Dunes protect the island from the sea on its northwestern side, while dykes protect its southeastern flank. The island is approximately thirty-five kilometers long, ten kilometers wide, and is separated from the mainland by the Marsdiep strait.

Today, Texel has approximately 13,000 inhabitants. There are seven villages: Den Burg, Oosterend, Oudeschild, Den Hoorn, De Koog, De Waal, and De Cocksdorp. From the middle of the eighteenth century until 1930, the island population fluctuated from 4,500 to a little over 7,600. The population of Oosterend, the main fishing village, declined from 768 in 1830 to 698 in 1930. During the same period, the number of inhabitants of Oudeschild, the other important fishing village, decreased from 1,275 to 670. Fishing has always constituted an important pillar of the local economy. In 1895, at the peak of the fishing fleet's growth, some 500 crewmen sailed with approximately 175 sail-powered vessels. A century earlier, there were about 90 fishing boats, two-thirds of which were used in oyster fishing. This branch of fishing had already gained a prominent place in the island economy in the early part of the eighteenth century and was the preserve of fishermen hailing from Oosterend and the environs.

RISING, SHINING, AND SINKING

The oyster fishery in the northern part of the Zuyder Sea, harvested by approximately fifty vessels of the inhabitants of the Texelian village of Oosterend and its neighboring hamlets of Oost and Nieuweschild, began to flourish in the early decades of the eighteenth century. The oysters were caught in the waters south of the islands of Texel, Vlieland, and Terschelling, and around the isle of Wieringen—in an area presently known as the western Wadden Sea. The fishermen used various catching methods, gathering the bivalves with their hands or small rakes when the receding tides left the banks exposed and using dredge nets during high tide. The fishermen harvested considerable amounts of shellfish and marketed their catch in the nation's capital, Amsterdam, and the German port, Hamburg. Frequently, Texelians arrived in Amsterdam with "shiploads of oysters" (le Long 1727:581; see also Baasch 1910:71–73; van Benthem Jutting 1963).

The fishermen's revenues were so considerable that the Estates of Holland intended to levy a tax on the oystermen. In 1727, they held an inquiry, from which it appears that the oystermen thought that the oyster banks "sprouted

from nature through God's blessing and were not planted by man" (quoted in Dijt 1961:100).[2] They further stated that the oyster banks "are not owned by anyone, nor has anyone ever had a privilege to them. Whosoever, from East or West, wished to do so, has always been able to fish these banks freely and unhindred" (Dijt 1961:100). English and French sailors whose vessels were on Texel's roadstead indeed took the opportunity to catch oysters without having to pay any kind of tax or tribute (Dijt 1961:100). Thus, there was apparently open access to the oyster banks, a situation in which the bivalves on the sea bed were property to all and to none. It was only by catching or gathering them—in other words, by investing labor—that the fishermen could appropriate the oysters. Once harvested, the oysters were considered the property of the fishermen.

A detailed description of the Texelian oyster fishery (Paludanus 1776) makes it clear that the situation of *res nullius* had either changed or had never existed. In any case, the Texelian fishermen in 1754 sent a petition to the Estates of Holland, in which they asked to end the free right of foreigners to catch oysters (van der Vlis 1977:196). Apparently, the fishermen preferred the situation in which these foreigners could not fish in waters which the Texelians considered theirs. However, they had no formal means to stop the foreigners from doing so, since the Dutch government followed Hugo Grotius' plea of *mare liberum:* the right of free passage, trade, and fishery. Even if the foreign fishermen could be excluded from oyster fishing, the Texelians still had to compete with 60 vessels hailing from the island of Schiermonnikoog and 25 from the island of Terschelling (Paludanus 1776:234–5).

Yet, certain locations were considered communal grounds, the exclusive terrain of Texelians. The islanders, who in the meantime worked with sixty vessels, replanted the oysters they had gathered or caught on these plots, which were located in a shallow cove on the island's northeast side. Each oysterman had a parcel, demarcated with branches on the corners. They not only stocked these plots with mature and immature oysters on a temporary basis but deliberately gathered them up and transferred them to these plots in order to develop them further: "Each Texelian oysterman plants the oysters he has gathered on his own plot he has chosen and where he expects the best growth" (Paludanus 1776:252). The fishing and gathering of the bivalves was done in the public domain (*res publica*) throughout the year. These oysters were then replanted on the plots, where they were tended until they reached maturity and were marketable. Thus, part of the waters of the northern Zuyder Sea were considered *res communes,* and there was a quasi-form of oyster cultivation. Even when the fishery was free in a formal sense, informal

[2] Others thought differently: "Some say, that these oysters came from a ship loaded with English oysters, which stranded near Texel" (le Long 1727:582). I deem this a "myth of origin," a version of which was also told in the province of Zeeland a century earlier to explain why oysters were found there.

regulations existed in which the Texelians' access and usufruct of these plots were arranged, and agreements were made to exclude outsiders: Each plot was "habitually respected as someone's property."[3]

In addition, other practices and arrangements could prevent unbridled oyster fishing. For example, without some external authority forcing them, Schiermonnikoog fishermen limited their fishing season and the size of marketable oysters. They returned immature oysters to the sea. Although a striking example of self-management, the arrival of newcomers who did not abide by these informal agreements led to violations. Moreover, Texelian fishermen did not feel obliged by the arrangements of their Schiermonnikoog compatriots who, unlike Texelians, did not replant oysters. This implied that the fisher folk of these islands had conflicting interests, "and the interests of Schiermonnikoog fishermen compels them to also begin fishing earlier than was arranged" (Paludanus 1776:251).

Anthropologists point out that secrecy of fishermen with respect to rich fishing spots can have a "protective" effect (Acheson 1989:262*ff.*). This strategy was familiar to Texelian oystermen. Whenever they had localized a productive oyster bank, they attempted to monopolize this niche or only share their knowledge with relatives. For example, in 1772 a Texelian oysterman and his son found an extremely lucrative oyster bank, to which they returned time and again. However, eventually they told others, and during the next year ten or more crews cast their nets there with the result that bounty catches were short-lived (Paludanus 1776:134). Nonetheless, it is clear that access to the resources was not necessarily free to all and that exploitation of the banks was not necessarily rapacious. As Daniel Moerman observes: "Many tribal and peasant societies have customs and traditions which, in effect, control the freedom of the marine commons, and which, thereby, protect marine resources against excessive exploitation" (1984:52). Like fishermen elsewhere, Texelians claimed access and use of certain locations for themselves, trying to exclude outsiders.[4] The aim of this strategy was not to protect or to conserve natural resources, rather to obtain "privileged space" (Acheson 1981:281). However, the communal use and management of the nursery beds had the unintended consequence of advancing oyster reproduction. The cove where these beds were located measured forty-one square kilometers of shallow, relatively warm sea water with a sandy bottom, situated on the island's northeast side and thus protected from the predominantly strong westerly winds.

[3] *Verslag van de Staat der Nederlandsche Zeevisscherijen* [Annual Report of the State of Dutch Sea Fisheries, [henceforth, *Report Sea Fisheries*] (1860:36).

[4] On territoriality and its ecological effects, see for example Acheson (1975, 1987), Levine (1984) and Levine and Levine (1987). The fact that fishermen claimed exclusive use rights of certain fishing grounds does, of course, not mean that they could enforce these claims. In many places, territoriality has led to conflicts and clashes between fishermen (see van Ginkel 1991:25*ff.*). This was, for instance, the case in Zeeland, where oyster fishermen from various villages claimed certain territories: "It was the denial of this usufruct which caused most quarrels" (*Report Sea Fisheries* 1861:16).

This location provided good conditions for oyster reproduction and growth. We should also keep in mind that the technological means available to fishermen were rather simple: Gear efficiency was concomitantly low; the oysterers often could not sail due to storms and ice drift; they did not market oysters between April and October; and they refrained from sailing on Sundays. Moreover, the radius of action of the vessels was small. These factors make it difficult to imagine that the problem of excessive fishing could occur in those days.

Until the early 1840s, excessive fishing did not occur. From Paludanus' writings it appears that each vessel had to harvest approximately 100,000 oysters each year to provide a living for all its crew members (1776:257). Since 60 oyster boats sailed from Texel, it is safe to assume that the local fishermen caught and shipped a total of approximately 6 million oysters per year. In the fall, they began to ship the bivalves to the markets, Hamburg being one of the most important markets for the Texelian oystermen. However, both catches and proceeds fluctuated sharply. For instance, between 1794 and 1798, the Texelians sold between 1.4 and 2.4 million oysters to Amsterdam merchants, but these amounts declined during a number of consecutive years to a low in 1805 of only 137,000 oysters. (There are no data on oyster shipments to Hamburg and other markets during these years.) Ecological and climatological changes had an impact on the oyster stocks: Fluctuations in demand and supply brought about fluctuations in prices, and trade barriers during the Batavian and the French Era (1795–1813) impeded oyster shipments. Ecological and climatological factors included harsh winters and ice drift that could inflict serious damage on the oyster stocks, cold winters that hampered oyster reproduction, and changing currents that possibly also affected the oyster crops. Political factors included the introduction of permits for oystermen, which resulted in declining oyster shipments after 1799, and the French blockade of the British merchant fleet—Napoleon's Continental System—which made any kind of trade from the Netherlands to other countries extremely difficult.

When the French were expelled from the island and the Netherlands, the Texelian oyster fishermen found themselves in dire straits. The 1814 annual report of Texel municipality states that they were

> in an unpleasant situation as a consequence of market prices which had fallen compared with previous years, the troublesome times and the heavy taxes in Amsterdam where they used to land most of their oysters. In addition, shipments to Hamburg (which used to be their goldmine) have all but come to a standstill. Moreover, last year's severe winter caused a huge morbidity of the oyster stocks on the beds, annihilating the oystermen's labor. The oyster fisherman has bought on tick from the baker and the shopkeeper, but is incapable of paying his debt, so that the baker and the shopkeeper also suffer because they lose their credit.[5]

[5] Texel archives, no. K–410.

Oyster sales in Amsterdam, which had become poverty-stricken under the French occupation, diminished as a result of the decreasing purchasing power of the citizens and a tax levied by the city government on fish and shellfish. However, the Texelian oystermen's ordeal was short-lived. Within a few years after 1813 until the early 1840s, their business thrived. During this period, they shipped from one to eight million oysters annually (Texelsche 1852:363).

However, dark clouds appeared on the horizon. In the mid-1840s, catches declined year after year:

> For the last eight or ten years, the oyster fishery has been in a deplorable state. The oyster banks seem nearly exhausted, and to keep the Texelian oyster trade going, it has become necessary to import oysters from France and England to replant them on the Texelian oyster beds. Moreover, Texelian oystermen have to fish oysters in Zeeland waters, to which end they sail to these waters in September and October. These oysters are also replanted on the beds near Texel and marketed later on or the next year. Previously, several million oysters were caught by the Texelian fishermen, but nowadays the catch only amounts to a few hundred thousand (Allan 1856:21).

Oyster banks in the vicinity of the island became less and less productive and were all but exhausted in the course of the following years. This was not a strictly local phenomenon, for sharply declining yields also afflicted oystermen elsewhere in Europe and the United States: "By the middle of the 19th Century the natural banks were close to [being] exhausted . . . in most . . . places where there had been any commercial exploitation of the oyster," writes Eleanor Clark (1959:43; see also Cove 1982; Winstanley 1978). Oysters are particularly prone to overexploitation because they are an immobile species and thrive in shallow waters, where they can be harvested fairly easily. In addition, the supply of oysters initially seemed inexhaustible, an image that faded rapidly when the oyster crisis persisted (compare Taylor 1983:86).

NATURE'S NEMESIS?

What caused the dramatic decline? On the face of it, the exhaustion of the parks appears to be a typical example of a tragedy of the commons. This view resonates in a late-nineteenth-century report on the state of the Dutch fisheries in the first half of the century:

> Previously, oysters were abundant in several areas in the northern part of the Zuyder Sea. . . . Numerous fishermen earned a living by gathering or dredging these shellfish. In the course of time, their numbers rose, and along with this development their pursuit of gain and the efforts employed to harvest a fair amount of oysters also increased. The government, which supposed wisdom where it was in fact lacking, left the care for the prosperity of this fishery in the hands of the fishermen. The disastrous consequences of this policy were imminent. It is easy to fish in most gullies, and thus fishing could be continued until the oysters were completely, or almost completely, extinct. Of course, it is not impossible that circumstances independent of man's control, such as changes in currents and cold winters, accelerated this process of extinction. However, there can be no doubt that unlimited fishing on the oyster banks in the Zuyder Sea by itself would have led to the destruction of these banks.[6]

[6] *Report Sea Fisheries* (1893:114–115).

Was there indeed an unbridled pursuit of gain motivating fishermen to fish recklessly? And did their number and catching efforts grow?

To answer the last question first: The scanty statistics available show that from the early eighteenth century until 1836, the Texelian oyster fishermen worked with approximately 60 vessels. But between 1836 and 1839, this number rose to 71, then to 80 by 1846.[7] Although total catches increased, the catch per boat declined. The technology of catching oysters also changed during this period. As before, the fishermen still gathered oysters by hand, rakes, and dredge nets, using the same type of vessels. However, the dredge nets, used more widely and more often, yielded better results than the other techniques. Although Texelians still practiced a kind of oyster cultivation, a growing number of vessels of fishermen—along with more efficient gear—exploited the oyster banks in public waters, possibly undermining their carrying capacity. Moreover, it is not unthinkable that the fishermen did indeed extend their efforts to harvest the bivalves. This is even quite realistic in view of the increase in the possible markets for them. Before steam power was invented, fishermen had to base the size of the catch on the demand in markets that could be reached by sailing vessels in a few days. After the steam era began with steam-powered vessels and railways, shellfish could be transported to markets further away, even though this required an enormous expansion of the distribution network. Correspondence in 1839 between the governor of North Holland and Texel's mayor clearly indicates this point, stating that the number of oyster runs to Hamburg, whence large numbers of the shellfish were sent to the hinterlands, increased from six to twelve shiploads annually between 1814 and 1827, to fourteen shiploads in 1828, then twenty in 1831, and even more in later years. This trade expansion coincided with the rise of steam navigation and the expansion of the Texelian fishing fleet was also—although indirectly—due to steam navigation: "Never before has it been possible to ship Texelian oysters with sufficient speed and certainty at such distances," the fishermen remarked.[8] The supply for the home market remained nearly stable in the early part of the century but rose in the 1830s. Initially, the oysters were predominantly marketed in Amsterdam, but dwindling prices caused the fishermen to look increasingly for other markets. They began to sail directly to such cities as Rotterdam, Leyden, Utrecht, Zwolle, Leeuwarden, and other places, to find ready buyers for their shellfish.

Between 1829 and 1837, from more than 1 million to over 2.6 million Texelian oysters were sent to Amsterdam (van Benthem Jutting 1963:231; de Bont 1874:68). Statistics pertaining to shipments to other Dutch cities are not

[7] The fleet of vessels from other locations that participated in the oyster fishery declined. In the third quarter of the eighteenth century, there were 60 oyster boats on the island of Schiermonnikoog and 25 in Zoutkamp. By about 1850, there were only 28 Zoutkamp vessels and a total of 5 from other places pursuing the oyster fishery (Paludanus 1776:234–5; Texelsche 1852:360).

[8] Petition of Oosterend oyster fishermen to the King, dated March 12, 1839 (State archives The Hague, RWS 2.04.07.02, no. 409–412).

available. Based on some scattered information, I estimate that exports of shellfish to Hamburg in this period must have amounted to from 1 to 2 million oysters and that, in 1838, the supply of Texelian oysters in markets at home and abroad was nearly 8 million, an increase of more than double the 3.2 million only six years earlier, in 1832. There are no statistics for the first half of the 1840s, but reports state that catches were extremely bad.

The development of the Texelian oyster fishery in the three decades after 1813 were noted by an anonymous author:

> The period of peace, improved communication, and growing wealth of European peoples brought about an enormous expansion of oystering. Increased competition did not diminish profits but, on the contrary, led to a thriving business. Fishermen searched for more oysters in the sea and found them, improving oyster dredging methods, replanting and spawning oysters. This resulted in higher yields and better quality. So much so, that in the Hamburg market—the staple market of entire northern Germany—the Texelian oysters are in the greatest demand, whereas previously other oysters were in greater demand. Today, Texelian fishermen are rarely able to meet the demand for their bivalves (Texelsche 1852:359).

Transportation time was reduced so much that the island's oysters were served at the tables of St. Petersburg elites within ten days of being shipped.

In the 1820s and 1830s, the oyster banks were, partly as a consequence of Texel's system of quasi-cultivation, very productive. Nonetheless, the increased catches did not result in a concomitant rise of income of the fishermen: "This exceptional abundance is far from advantageous to the oyster fishermen, since the oyster price has dwindled so much, that it is sometimes hardly worth selling them" (V. D. 1830:348). To keep their earnings at an acceptable level, the Texelians were forced to harvest more oysters. Moreover, the oyster harvests in the province of Zeeland were bad for a number of successive years. Thereupon, Zeeland oystermen bought shiploads of young oysters from their Texelian colleagues to replant them in Zeeland waters (de Bont 1874:68), quickly leading to disastrous consequences. In the early 1840s, the Texelians had to import oysters from Zeeland and abroad to keep their trade going. Initially, they did not worry seriously over declining catches. These had been encountered before, and the "experience of previous years has shown that adversity is not lasting but has always yielded to better times."[9] In addition, "even if, contrary to expectation, the catches would be lost for the greater part," the oyster fishermen wrote in 1842, they could "keep the trade going by buying French oysters, planting them on the Texelian beds, and shipping them to foreign markets afterwards."[10] However, only a few oystermen were able to operate in such a manner, and the gusto to keep doing

[9] "Beschrijving van de oestervisscherij zoo als die op het Eiland Texel wordt uitgeoefend" [Description of the Oyster Fishery as It Is Practiced on the Isle of Texel], Texel archives, no. K–853.

[10] Petition of Oosterend oyster fishermen to the municipal council of Texel, dated July 16, 1842 (Texel archives, no. K–853).

this was on the wane because the oystermen had to pay dearly for the imported shellfish, making their profit margins small. Moreover, the imported bivalves did not survive the considerably colder water temperatures of the Dutch winters. The island government concluded, "The financial outcome has been very unfavorable, so much so that the endeavor did not only not yield any profit but on the contrary has even led to losses which the participating oystermen have to bear."[11]

State officials began to worry and considered measures to protect the oyster banks. The governor of North Holland province asked Texel's mayor about the expediency of limiting the oyster fishery. However, the mayor thought that any limitation was "detrimental to both the society and the fishery itself."[12] Even though others also wondered whether the banks were "exploited too intensively" (Texelsche 1852:363), the state did not intervene at that time. In the early 1850s, the government established a committee to conduct research into the necessity of state measures regarding the fishery. That committee concluded that "for the time being, it appears to us that it is most efficient to not limit the fishery in the Zuyder Sea in any way because otherwise there is the possible danger that by regulating one fishery, the other will be destroyed or at least will be disadvantaged considerably. It is only after some time, when we have more experience with respect to the consequences of free fishery, that we can decide which measures are necessary to preserve the fishery in these waters" (Verslag 1854:147).

The Texelian oystermen themselves were opposed to any regulation because oyster prices, which had risen again due to the scarcity, kept the fishermen's income up to the desired level. It was precisely because of these high oyster prices that the fishermen marketed all oysters—both mature and immature—that they were able to harvest. The state fishery counsellor, P. P. C. Hoek, observed some decades later that "the dearth of oysters [has] led to a fishery which should be called devastation or plunder fishery. It resulted of course, in great scarcity" (Hoek 1878:390). Soon, the income of Texelian oystermen fell because higher prices could not make up for lower catches. In 1844, the provincial annual report stated:

> The reports concerning the fishery and trade of oysters are unfavourable. The decreased production, which was already noticed last year, has been sensed even stronger in 1844. The oyster fishermen and dealers saw themselves forced to sell and ship oysters which were in fact not of a marketable size. Therefore, the trade of oysters from Texel to Hamburg was slow. On top of that, the early winter did not only hinder

[11] 1843 Annual Report Municipality of Texel, Provincial archives of North-Holland, PB no. 2882.

[12] Letter to the governor, dated June 24, 1841 (Texel archives, no. K–853). His colleagues on the isle of Terschelling and in the town of Zoutkamp thought differently. On the insistence of local oystermen, the mayors of Terschelling and Zoutkamp sent letters to their Texelian compatriot and to the provincial governor in which they urged them to take measures.

shipments but also brought about an increase of oyster mortality. All in all, this industry, which is so important for the inhabitants of Texel, is languishing.[13]

The winter of 1844–45 was particularly harsh and probably decimated the oyster stocks. In subsequent years, catches declined further. The Texelians could only harvest 200,000 to 300,000 oysters per year in this period. In 1851, the oyster fishery was reported to have fallen "into decline year after year and the moment approaches when the banks will be exhausted completely."[14] Theft of oysters from the spawning beds was becoming more common and to prevent it, the Texelian fishermen hired watchmen (usually some older colleagues) who guarded the plots, which were still claimed in usufruct.

It seems, therefore, that the decline of the oyster fishery is a typical example of a tragedy of a common property resource. Although the fishermen's behavior was damaging to themselves as a collective, it was perfectly rational for each individual to catch as many oysters as he could. The mechanism of subtractibility applies: Almost all of the gain would go to each individual fisherman, whereas the costs (over-fishing and ultimately exhaustion of the oyster banks) were passed on to the collectivity of users. The fishermen were also caught in a zero-sum game: If a fisherman threw immature oysters back into the sea, someone else would possibly catch and market them. In this respect, Hardin's proposition seems to apply, even though the fishermen's behavior was not innate and can only be understood against the background of infrastructural, technological, and socioeconomic developments, including the invention and dissemination of steam engines and the concomitant expansion of markets and distribution channels, as well as the introduction of more efficient fishing methods, the growing prosperity and demand for oysters in European cities, and the fact that the fishermen operated in a market economy. The validity of Hardin's generalization therefore depends on the incorporation of contextual factors (Vayda 1986:307). As James Acheson rightly observes: "Natural resources are more likely to be overexploited in technologically advanced societies, with large populations where resources are sold in large international markets" (1989:376).

ECOLOGY, BEHAVIOR, AND MENTALITY

The decline of the oyster fishery cannot be attributed to the fishermen's behavior in this wider context alone. Natural circumstances also contributed. Oysters are very sensitive to changes in the ecosystem. Even slight fluctua-

[13] *Verslag van den Gouverneur en de Gedeputeerde Staten der Provincie Noord-Holland aan de Provinciale Staten* [Report of the Governor and Aldermen of the Province of North-Holland to the Provincial Council] (1845:43).

[14] *Verslag van den toestand der provincie Noord-Holland, gedaan aan Provinciale Staten door de Gedeputeerde Staten* [Report of the State of the Province of North-Holland by the Aldermen to the Provincial Council] (1852:393).

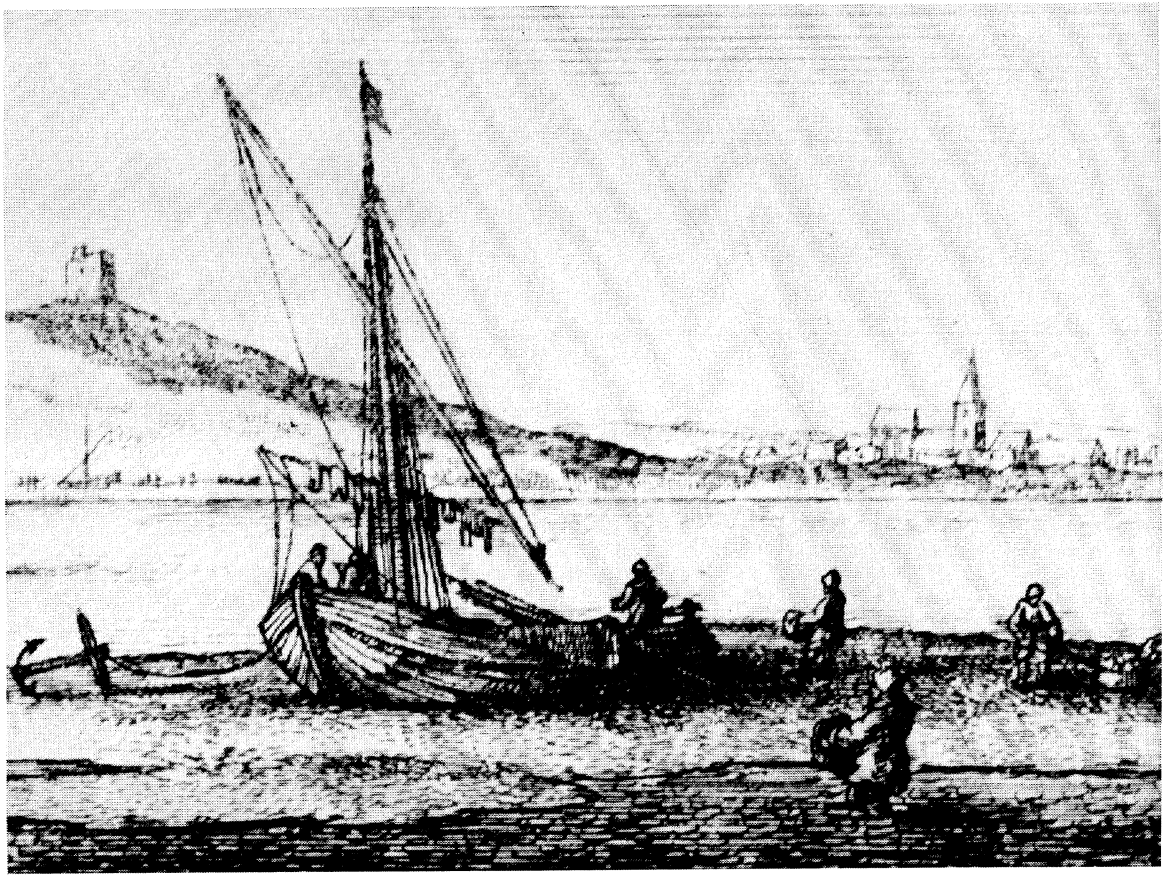

FIGURE 2. Texelian oystermen harvesting bivalves on an exposed tidal flat in the early eighteenth century. In the background is the island of Texel, with the village of Oudeschild to the right. Engraving by Wenceslaus Hollar. Used with the permission of the State Archives in North Holland, from the *Provincial Atlas*).

tions in water temperature, salinity, bottom features, and food supply (phytoplankton) can cause considerable mortality (see van Ginkel 1991:33–36). The ecosystem changed due to several factors. As mentioned, severe winters caused a marked oyster mortality, and cold summers had a negative impact on reproduction. Moreover, storms and changing currents also had consequences for the oyster staple. More important, a land reclamation in 1835 implied that a large area of the nursery location of Texelian oysters was lost. The reclaimed polder, an area of more than three-quarters of the cove situated on Texel's northeast side, concerned the territory where oysters lay in shallow, relatively warm and quiet waters; and these conditions were advantageous to the reproduction of the shellfish (see Figure 1). The fishermen from Oosterend and its environs could henceforth only deposit their oysters in what was left of the cove, which, to make things worse, had silted up. Thus, the natural milieu for the reproduction of oysters deteriorated (compare Dijt 1961:102; Ypma 1962:188; Moelker 1988:12).

This ecological deterioration is important, as the increasing scarcity implied that the level of the exploitation of the oyster staple rose relatively because catching efforts did not decrease initially. To eke out a living, the fishermen had to catch as great a share as possible from the declining stocks. This mode of behavior had little to do with an innate rapacious mentality but had everything with the fact that the fishermen's economic existence was endangered. Debts to shopkeepers and suppliers had to be discharged, and the costs of living met. The fishermen's short-term interests indeed prevailed, not because they were purblind and greedy per se but because other options were lacking as yet.

But the oyster fishermen did not continue their activities until they had caught the very last oyster. They were diligently looking for alternatives. They could no longer exist from the oyster fishery alone, and the Texelian fishermen shifted away from the pursuit of oysters to other fisheries. In the 1850s, many switched to exploiting eelgrass (*Zostera marina*) and harvesting shells and shellfish (such as periwinkles, whelks and mussels), shrimps, and fish. They still caught oysters but only during a short season, and then only as a marginal part of a varied seasonal cycle in which they switched between various fisheries. Thus, after a short period of intensification, the oysterers opted for diversification, a strategy that fishermen elsewhere also applied when the catches of species declined (McCay 1978:409*ff.*). Moreover, several fishermen used a third option to adapt to changing ecological conditions: They specialized in one type of fishery or permanently switched occupations. Some fishermen began to sail the North Sea to catch flatfish, some began to work as farmhands; others left the island and settled on the mainland. As a result, in the 1850s and 1860s only thirty to forty vessels were active in the oyster fishery for even a short period of the year. Probably as a result of these adaptive strategies, the oyster stocks recovered somewhat; and from 1858 till

1862 the annual catch of Texelian fishermen averaged approximately 2 million oysters. Due to this slight recovery, some fishermen were re-attracted to this fishery, again leading to declining catches; in 1864 the oyster banks were once more "fished dead."[15]

In the meantime, efforts were made to counter this situation. Following the example of French fishermen, attempts were begun to farm oysters on leased plots near the islands of Texel and Wieringen. This was first done in 1859 under the Board of Sea Fisheries (*Collegie der Zeevisscherijen*) and later by three private individuals from Amsterdam. This form of oyster farming differed from the Texelian system of quasi-cultivation in that the lessees tried to catch spat using "collectors" (usually shells) to which the spat could attach and grow, whereas previously the Texelians had only gathered or fished young bivalves and replanted them on parcels that they had staked out. However, the experiments with oyster farming failed for several reasons. Severe winters, storms, and deteriorated ecological conditions caused poor results; and on top of that oysters were frequently stolen from the plots because insufficient policing made it easy for fishermen to claim use rights to the commons. Oyster theft appears to have been a minor problem near Texel: "The experiments there could be made on a large scale, because near Texel—where the fishermen on their common account guard their oyster beds—there is less fear of theft than near Wieringen and elsewhere" (François *et al.* 1868:301). Private entrepreneurs did not want to bring an end to free fisheries: "They do not wish to withdraw from free trade; they do not want a monopoly for anybody, but ask for *restraint*, being convinced that everyone has the right to the fruits of his labor and has to be protected against the rapacity of others" (1868:306). However, these fishermen did not regard this form of privatization as an attractive alternative.

Over and over again, the ambivalent attitude of the fishermen towards territoriality was a problem. Although they claimed to have the exclusive use of certain fishing grounds, they rarely acknowledged the rights of others who claimed fishing grounds elsewhere. This phenomenon, widespread all across the globe, is known as the "tragedy of incursion" (McCay and Acheson 1987). In this respect, the fishermen did, indeed, consider the marine domain as a common property resource, which could be freely exploited. This attitude comes to the fore in a Texelian fisherman's autobiography:

> I live the way I live; the sea and the waves are my living / I fish whatever and wherever I can, even when it is deep down / Fishing is free to me; as it is to so many others / All that the sea provides us with; is for all of us in common (van der Vis n.d.:89).

The oysters were regarded as a gift from God, a gift that could be appropriated by investing labor. To the Calvinist fishermen of Oosterend, the Protestant ethic of working hard and living economically applied, or what Max Weber

[15] *"Gemeentelijk jaarverslag over 1864"* [Annual Report of the Municipality of Texel], Texel archives, no. K–412.

(1985 [1920]) has dubbed the *innerweltliche Askese* (worldly asceticism). In a myriad of petitions and letters, the Texelian oystermen depicted themselves as those belonging to the "humble, but industrious lower classes," as diligent folks who were always looking for ways to make a living. They perceived nature as an entity to be exploited by means of investing labor. Whosoever would be successful in his earthly work would also be rewarded for it in the hereafter. This disposition implied that the fishermen could hardly be considered stewards of the marine commons. However, this does not imply that they set out on a course of self-destruction. Instead, they used several adaptive strategies that prevented the complete exhaustion of one species (see also van Ginkel 1994). But they were still opposed to government intervention. When the Board of Sea Fisheries in 1859 asked the Texelian fishermen's opinion about oyster farming, they answered: "The Texelian oystermen are very satisfied with the destiny that nature affords them, and they also think that no one is powerful enough to lay down the law for nature in this respect."[16] Thus, God-given nature would regulate itself without government regulation.

In sum, various factors have to be taken into account to understand what caused the deterioration of the oyster yields. However, it is difficult to weigh the relative importance of each of these factors. Although natural causes are certainly significant, we should not underestimate the effects of human agency. In this respect we can point to the growth of the fishing fleet, the improvement of gear efficiency, developments in infrastructure and transportation and the concomitant market expansion, the growing demand and rising prices that provided a forceful incentive to expand exploitation, the sales of brood and immature oysters to Zeeland fishermen, previous experiences with fluctuating catches, the Calvinist attitude of the oystermen, and—last but not least—the perception that their economic existence was at stake when catches began to diminish alarmingly. Their options included curtailing consumption, intensifying extraction of the resource, or switching to other species. These options were not mutually exclusive; but, when the first two failed, the Texelians chose the last. A fourth option was cultivation, as shellfish farming would seem to imply greater control of nature and increased production. But, as we have seen, most Texelians opposed government measures aimed towards this end.

INTERVENTION AND PRIVATIZATION

Nonetheless, some Texelian oyster fishermen became convinced that farming oysters on privatized plots with the aid of collectors to catch spat could be successful. Apparently, they had reached a similar conclusion as the biologist, P. P. C. Hoek:

[16] Appendix to a letter, dated January 23, 1859, from the *Collegie voor de Zeevisscherijen* [Board of Sea Fisheries] to the Mayor and Councillors of Texel regarding the cultivation of oysters (Texel archives, no. K–853).

It goes without saying, that an owner (even a temporary owner) will care more about the maintenance or even growth of the value of his oyster grounds than can be expected under a system of common exploitation. Under the latter, each fisherman will strive to catch as many oysters in as short a time as possible, being convinced that each oyster he will leave in the sea will not lead to his future prosperity but will only extend the profit of the one who will come next and catch it (1878:390–1).[17]

The few Texelians who in the 1870s obtained tenancy of plots in the Zuyder Sea to farm oysters have never been very successful. That they nonetheless thought that a privatized system could lead to good results is apparent from the fact that some of them left Texel and went to Zeeland, where ecological conditions were better and oyster farming had assumed enormous proportions. Most Texelian fishermen continued to fish oysters; but after the reclamation in 1876 of the cove where their oyster beds were located, they lost all of the underwater grounds where they used to deposit the seed and immature oysters. By the late 1870s, nothing was left of the vast area of more than forty-one square kilometers once used for the quasi-cultivation of the bivalves (see Figure 1). Henceforth, the fishermen were compelled to deliver their catch to the dealers immediately. They also did so in the summer—the period when oysters reproduced. The fishermen were aware that this behavior had harmful consequences but maintained that they were not in a position to act differently: "If we don't do it, someone else will." It was hard to earn money with other fisheries during the summer season, and not all fishermen could—or wanted to—be active in the eelgrass industry. Those cherishing their independence preferred to stay out of the eelgrass industry because its capitalist mode of production turned fishermen into de facto wageworkers. Most fishing families found themselves in dire straits. For this reason, "the poor fishermen, to eke out a living—a living that is getting increasingly meagre—neglect and destroy their future capital."[18] In the 1860s and 1870s, total annual catches rarely surmounted 500,000 oysters. If the impoverishment of the fishermen had not caused their rapacious attitude and the plundering of the marine common property resources, it had surely accelerated it. However, state officials deemed this situation intolerable: "To permit some to annihilate this industry, of which the prosperity is so important, to find a scanty means of subsistence is not in compliance with the well-understood interests and duties of the State" (Verslag 1854:142).

[17] From this passage it appears that the essence of the tragedy of the commons proposition and related economic theories such as Gordon's (1954) and Scott's (1955) was proposed fairly early. Also compare this passage from a mid-nineteenth-century report, which concerns the care of the richness of the sea in a way which leaves the "capital" intact but uses the "interest." "Without government intervention, achieving this goal appears to be impossible, because there is a natural conflict between the general interest and the specific interests of the fishermen: the fishermen demand as much as possible for themselves and hardly care about the possibility that they take a part of the capital with the interest" (Verslag 1854:134–5).

[18] *Report Sea Fisheries* (1880:67).

For this reason, members of the Board of Sea Fisheries insisted on government intervention, to wit, regulations concerning seasons and methods of fishing and the enforcement of these measures. They found policing necessary "because due to practices existing since time immemorial, the Zuyder Sea fisherman has become used to the idea that everything he finds in the sea is his property. Therefore, it will demand an extreme effort to dissuade him from this view, and this task will surely be accomplished only slowly."[19] The members of the Board overlooked the fact that these practices did not exist "since time immemorial" and that a complex of factors had contributed to the decline of the oyster stocks: In the Netherlands, the stereotype of the selfish fisherman who passes on the costs of his behavior to the collectivity of users and the natural resources was conventional wisdom early on.

It gradually dawned upon the fishermen, who began to complain louder and louder about the deterioration of the oyster stocks, that the government should regulate the fishery. However, their attitude towards state intervention was still ambivalent, as was the attitude of their colleagues from other Zuyder Sea fishing villages:

> Those who complain are far from unanimous as to the measures that should be taken to improve future yields. Each fisherman wants to maintain complete freedom for himself as long as possible. Nonetheless, one gets the impression that many of those concerned—both fishermen and dealers—have reached the conclusion that measures are necessary. In general, they prefer some regulation to unmitigated liberty (Hoek 1911:14).

A legal season for harvesting oysters was introduced in 1884, in which oyster fishing was prohibited between April 1 and October 1. The ambivalent attitude of the Texelian fishermen is reflected by the fact that they sometimes urged the state to open this season earlier, while at other times they wanted tighter surveillance to maintain it.

The state demanded greater control over marine common property resources. As a result of the successes in the Zeeland oyster industry, the state wanted to begin auctioning the oyster fishing and farming rights for certain Zuyder Sea areas in order to stimulate oyster cultivation. Most Texelian fishermen were opposed to this measure because they feared that the lease system "would throw them partly out of employment" (*'t Vliegend Blaadje,* August 24, 1887). Hence, they demanded "free labor" (*'t Vliegend Blaadje,* August 24, 1887). They were supported, in part at least, by the Board of Sea Fisheries. The Board was not so much opposed to the lease system but to the system of auctioning the rights to the highest bidders. The Board preferred a system in which the fishermen themselves would gain control over the plots as

[19] *Report Sea Fisheries* (1880:67). The members of the Board of Sea Fisheries gave a similar opinion with respect to Zeeland oystermen: They deemed them "not in the least the persons who are able to act with judgement in the exploitation of the fisheries; their short-sightedness, their greed, and also their lack of funds, make them care only for the moment and not for the future" (*Report Sea Fisheries* 1863:24).

lessees without having to pay huge rents. The Board deemed it unacceptable that only some wealthy leaseholders would gain access and that the less well-off fishermen would be excluded from entry. It also feared opposition from the fisher folk. The Secretary of the Treasury, who had jurisdiction over the public waters, did not heed the Board's advice because the system it proposed would not generate state income. He wanted to line his coffers and in 1884 decided to introduce the lease system.

Since 1870, this lease system, based on auctioning access and use rights to the highest bidders, was used in Zeeland, where it had led to an enormous increase of production but also at the same time to the rise of a fishermen's proletariat (van Ginkel 1989, 1991) Nearly all the lessees of the plots in the northern part of the Zuyder Sea were successful and financially strong Zeeland oyster farmers. They were able and willing to pay dearly. During the sale of the very first public lease, seventeen lessees paid an annual lease sum of DFL 51,711 for sixty-one parcels to obtain exclusive access and use rights. Texelian and other fishermen saw themselves excluded from this area and could only continue their activities in public waters. But the leaseholders were not successful. They did not give sufficient care to the plots; their supervision and policing were inadequate; ecological conditions were poorer than in Zeeland and the severe winter of 1890–91 dealt a death-blow to oyster cultivation (Hoek 1911; Havinga 1932). Thus, contrary to what Hardin, Scott, and Gordon maintain, (temporary) ownership does not necessarily provide a solution to a tragedy involving common property resources (see also van Ginkel 1989). As early as 1886, many leaseholders had given up their attempts to farm oysters in the Zuyder Sea. The sums of money offered for the lease of a plot fell dramatically, and in 1895 oyster farming was abandoned altogether. The government decided to return the plots to the public domain.

The return was done under the fisher folk's mounting pressure. Texelian fishermen, amongst others, urged the government to return to free fishery. In response to growing state regulation, they had organized in associations to increase their bargaining power. In 1893, for example, they sent a petition to the government in which they stated that the lease "is very damaging to the free pursuit of various fisheries, and does not appear to be profitable to the lessees" (*Texelsche Courant,* March 26, 1893). The government conceded their demand, and so allowed several fishermen to earn a meagre living for a limited time of a few weeks after the oyster season opened. In 1905, two Texelian fishermen began to farm oysters again on a very small plot over which they had gained private control; while some others replanted the oysters they caught on underwater grounds they claimed. However, the scale of their operations was small, indeed; and the oyster industry never regained its prosperity of the first half of the nineteenth century. Fewer and fewer fishermen specialized in oyster fishing, and the bivalves were more and more caught only incidentally by whelk fishermen. After the Enclosure Dike (*Afsluitdijk*)

which separated Zuyder Sea and Wadden Sea, was built in 1932, ecological conditions worsened. What was once Zuyder Sea became Lake Yssel, a fresh water lake in which the oysters could not live. But the oysters disappeared altogether even in the saline Wadden Sea.

CONCLUSION

In the eyes of irate officials, the quote, "If the sea can be fished dead, let's at least have our share of the funeral meal" (Verslag 1854:143), characterized the Dutch fishermen's mode of thinking and behavior as early as the mid-nineteenth century. In the course of time, this tenacious stereotype has been supported by such economic theories and propositions as the "tragedy of the commons." The premise in these theoretical models seem to be that each fisherman using common property resources operates in an economic, social, and cultural vacuum and behaves as an archetypical *homo economicus*. However, anthropologists have presented many examples of sociocultural institutions and arrangements enabling the sustainable use and governance of fish and fishing grounds (see, for example, Ruddle and Akimichi 1984; Ruddle and Johannes 1985). Yet, there are numerous instances of over-fishing, even in places where, as on Texel, access to fishing grounds was not entirely free to all. However, as I have argued, the reasons for excessive exploitation cannot be explained merely by citing Hardin's model. Exogenous forces, ecological, and technological developments, and market fluctuations—understood in the context of a market economy—should also be taken into account. The Texelian example demonstrates that, in situations of ecological deterioration (not necessarily caused by human action), indebtedness, and impoverishment, fishermen can face dilemmas that, if they have few or no alternatives, may force them to opt for survival in the short run. This choice can lead to the overexploitation of fish stocks. For the individual, it is a reasonable choice to intensify exploitation; but what is adaptive for the individual can be maladaptive for the collectivity of users and the environment that they exploit (Bennett 1976:195). This is true in particular "if a relatively large number of individuals make high demands on a *single* CPR [common property resource]" (Ostrom 1992:297, emphasis added). However, usually the pressure on the resource is alleviated as a result of various adaptive strategies. Fishermen rarely exploit one single species or one single ecological niche. Moreover, as economists Townsend and Wilson maintain, there is a "normal tendency of fishermen to switch away from declining stocks" (1987:323).

Though some anthropologists and other scholars deem the tragedy of the commons and similar theoretical models useful heuristic and analytical devices (Prattis 1987; Brox 1990), many have expressed serious criticism, particularly concerning access and use rights. The proponents of the tragedy scenario maintain that entry to resources held in common is unrestricted, while their opponents show that this presumption is flawed and based on

conceptual confusion. For example, Ciriacy-Wantrup and Bishop (1975) argue that common property is not everybody's property and must be distinguished from free and open access.[20] This observation was one step ahead in the debate on the commons. Subsequently, several authors have presented more sophisticated taxonomies of common property rights regimes (McCay and Acheson 1987; Berkes 1989; Berkes *et al.* 1989; Bromley 1992; Schlager and Ostrom 1992; McKean 1992; Matthews 1993). Common property resources are resources to which individuals, communities, and states claim rights of access, use, and management. These bundles of rights often exist in various combinations; they can be de jure or de facto; overlap, complement, or contradict one another; and different sets of rights "affect the incentives individuals face, the types of actions they take, and the outcomes they achieve" (Schlager and Ostrom 1992:256).[21] However, under open access conditions, there are no property rights but only the opportunity to utilize resources, although the users face no incentives to conserve them. Therefore, if entry to natural resources is indeed open and unregulated, it is likely that abuse will occur: "All agree that *unowned* commons are doomed to tragedy" (McKean 1992:250).

But if free and unregulated exploitation of resources held in common is the problem, does putting those resources in the private sector prevent overexploitation? The answer is no. My case study indicates that leasing fishing grounds to individuals and corporations did not bring about an improvement for the oyster industry. This is also shown by detailed research into the lease system in the Zeeland oyster industry (see van Ginkel 1988, 1989, 1991). In the Dutch province discussed here, the marine commons were enclosed in 1870 and the oyster banks divided into plots to be leased by the highest bidder at public auctions. Contrary to what some economists claim (Anderson 1976; Pontecorvo 1967), this mode of privatizing access and use rights was no panacea that could prevent or surmount overexploitation.[22] Besides, these measures led to the exclusion of commoners, who lost their rights to the marine commons but tried to maintain them as "piscatorial pirates" (McCay 1984). Some of the consequences of privatizing the Zeeland oyster banks were overproduction, resource deterioration, overcapitalization, marginaliza-

[20] Gordon himself, referring to anthropological literature, concluded that many peoples claimed property rights "[to] prevent the resources of the community at large from being destroyed by excessive exploitation" (1954:134). Yet he equated commons with open access.

[21] According to Schlager and Ostrom's conceptual scheme, *owners* have the rights of access and withdrawal, management, exclusion and alienation; *proprietors* have all of these except the right of alienation; *claimants* have the rights of access and withdrawal and management; and *authorized users* only have the right of entry and withdrawal (1992:252). The incentives to invest in governance structures are strongest among owners and weakest among authorized users (1992:257).

[22] As another economist writes, corporate or private owners of property rights in natural resources "might actually prefer extermination to conservation, on the basis of maximization of profits" (Clark 1973:630), especially when they use high discount rates.

tion of the original fishermen, the creation of social divisions, and the maldistribution of incomes (van Ginkel 1989). On the other hand, privatization in the Zeeland mussel fishing and farming industry provides an example of successful fisheries management and sustainable use (van Ginkel 1990). Under certain conditions, certain forms of privatization may be viable resource management instruments, but not all forms of privatized management regimes are necessarily successful.

The tragedy is that there are no easy solutions leading to the sustainable use of marine (and other) common property resources: "Sustainable common-property resource management is not intrinsically associated with any particular property-rights regime" (Berkes *et al.* 1989:93; see also Schlager and Ostrom 1992:259). The use of communal natural resources in complex and dynamic socioecological systems cannot simply be explained by such simplistic and deterministic models as the tragedy of the commons but should, as I have shown, be interpreted in a broader contextual framework. Fishing practices are embedded within the historical, economic, social, and cultural context of communities. Hardin, however, assumes a direct and unmediated relationship between individual behavior and the ecosystem, thus obscuring a myriad of factors relevant to the use and management of natural resources by human beings. Their beliefs, social norms and values, relationships of cooperation and conflict, and the institutions that they have developed should be taken into account in order to understand the shaping and constraining forces of ecological adaptation because these adaptations operate through systems of cultural meanings and social relationships (Keesing 1981:171–2). However, the properties of people's relationships with nature and with one another "derive neither from their will nor their consciousness" (Godelier 1986:6). It is largely because of this fact that ecological problems do occur. As Michel Foucault once observed, "People know what they do; they frequently know why they do what they do; but what they don't know is that what they do does" (quoted in Dreyfus and Rabinow 1982:187). Therefore, it is necessary to go beyond the image of the rapacious, maximizing man-as-fisher and devote more attention to the wider context in which this entity operates, the unintended and unforeseen consequences of this behavior, and the feedback processes that give rise to new responses for coping.

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