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Title: Contextualizing Marine Resource Use: A Case from the Netherlands

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`What we need is a theoretical perspective that accounts for the shaping and constraining forces of ecological adaptation, but sees them as operating through systems of cultural meanings and social relationships; that sees internal conflict and contradiction within social systems, as well as adaptation to material circumstances, as dynamic forces'
(Roger M. Keesing 1981:171-172).

Introduction

In 1903, a number of English notable citizens enjoyed a Winchester banquet. Soon afterwards, several of them fell ill and some even died. An investigation into the cause was conducted. It was established that the victims had consumed oysters which were cultivated in waters contaminated with the sewage of a house inhabited by people suffering from typhoid. The message was immediately disseminated by the press, quickly giving rise to a public `oyster scare'. British oyster cultivators virtually lost their home market and dumped their stocks on the continental market at bottom prices. Dutch oyster farmers in the province of Zeeland faced the consequences; they, too, lost the British market and in addition prices fell sharply. But this was just the beginning of even worse problems. The British press began to speculate that the oysters which had caused the death of a few people hailed from Zeeland waters. Almost immediately, orders for Zeeland oysters from all over Europe were cancelled, causing financial disaster among scores of Zeeland oystermen. State agencies in the Netherlands ordered a close monitoring of the sanitary conditions in waters where shellfish were cultivated. (These measures still apply today.) However, this did not lead to re-establishing trust in eating oysters. Though based on unsubstantiated allegations and imagination, the oyster scare reigned unabated for several years. In this case, the Thomas theorem applied: `if people define situations as real, they are real in their consequences'.

This short case history reminds one of the principle Anglophone school children learn: `For want of a nail, a shoe was lost; for want of a shoe, a horse was lost; for want of a horse, a rider was lost; for want of a rider, a message was lost; for want of a message, a battle was lost; for want of a battle, a war was lost; for want of a war, a kingdom was lost - and all for want of a nail' (cf. Smith 1990:6). In less riddle-like terms: small causes can have huge consequences. Although this may seem self-evident, in modernist models of common pool resource management little attention is devoted to such factors impinging upon resource exploitation. Usually, management models focus on single species exploited by specific user groups. For the sake of such a model's applicability, complexity, diversity and dynamics are reduced or shunned altogether. As a consequence, users - in

the present case fishermen - will inexorably be blamed for overexploitation. However, it is becoming increasingly clear that merely focusing on the role of fishermen in marine resource exploitation is insufficient to understand the fisheries as an evolving socionatural regime. Therefore, we should devote ample attention to the wider context fishermen operate in, the unintended and unforeseen consequences of their and other people's behavior, the unintended and unforeseen consequences of fisheries management, and the feedback responses which give rise to new coping responses. Such coping mechanisms or adaptations refer to the modes of adjustment of humans to natural and social milieus, or the natural and social milieu to their lives, needs, wants and goals (cf. Bennett 1976:246).

This is the point of departure of the present paper. Based on ethnohistorical research in two distinct areas in the Netherlands (viz. the province of Zeeland and the Frisian Island of Texel), it attempts to delineate the ecological, economic and political factors impinging on oyster fishing and farming, the coping responses of the fishers and the transformations brought about by these intertwined processes. As will be shown in two extended case histories, remote contextual factors played an extremely important role in long-term developments in the oyster industry. In any kind of governance structure the fact that small causes can have huge consequences has to be taken into account. This means incorporating context in the models underlying such structures.

Here, `context' does not necessarily refer to factors within wholes like a predefined and bounded ecosystem, society or community. We have to look beyond such entities which we have devised for analytical purposes. Due attention to context in the elucidation of actions and consequences may mean dealing with loose, transient and contingent interactions and disarticulating processes from within and from without predetermined units. An insular view of ecosystems, societies or cultures does not allow for an understanding of the multiplicity of forces working upon such entities. Remote contextual factors are usually beyond the control of a user community (Edwards and Steins 1998). In a globalizing world, ecological, economic, social and political interdependencies have but reinforced the impact of external factors on socio-cultural entities defined as geographically bounded wholes. We should take into account that the blurring of boundaries is part of the problem we are dealing with.

A conceptual framework will be used to highlight some basic factors which make for uncertainty and impede governance structures. These include diversity, complexity and dynamics. Though often referred to as interfering with management objectives and desired outcomes, these broad factors are insufficiently theorized. This paper attempts to explicate these concepts. Its main goal is to arrive at a framework which includes the contextual factors and feedback loops that influence fisheries and fisheries management. The framework can be used as a sensitizing model, i.e. it focuses attention on important interferential factors which make for diversity, complexity and dynamics, and it tries to show how these factors are interrelated. Therefore, it is also a restatement of the old social science problem of how to relate micro- and macro-levels. Zooming in on contextual factors may provide precisely the locus where the micro-macro interface can be discerned and studied most advantageously.

Complexity, Diversity and Dynamics

Fisheries are economically, socially and culturally complex, diverse and dynamic systems of interactions between humans and the natural environment (cf. Hamilton *et al.* 1998). Often enough, however, fisheries management deals with single fisheries, reducing the complexity factor, while ignoring the factors of variability and dynamics. These factors are often regarded as `nasty' complications. As Estellie Smith cogently argues, scientists often depart from the assumption that fish stocks are `ordered, balanced and in dynamic equilibrium' (1990:5). Dealing with ecological,

economic and socio-political situations and developments `as if' they were simple, homogeneous and static provides for easier management tools. However, simple policy is not necessarily good policy, as many administrators who follow the KISS-principle (Keep It Simple Stupid) seem to believe. When forgetting that in fact one has simplified, serious complications may be the end result of resource management regimes. For this reason, it is appropriate to dwell a little longer on the concepts of complexity, diversity and dynamics in order to fully comprehend and appreciate their scope and importance. As Marcus and Fischer write: `The ethnographic task lies ahead of reshaping our dominant macroframeworks for the understanding of historic political economy ... so that they can represent the actual diversity and complexity of local situations for which they try to account in general terms' (1986:88).

Fishing is an `evolving socio-ecological regime', a historical, economic and political process embedded in historical, social and cultural systems (Durrenberger and Pálsson 1985:120). Fishing must be understood `in terms of its wider social, political, and economic context, the actions of other segments of the population, near or distant, that affect any aspect of the fishing industry, fishermen, the waters they fish, or the fish in them' (Durrenberger 1988:196). Therefore, we need to take a diachronic perspective, explicitly devoting attention to endogenous and exogenous forces impinging on the socionatural system or subsystem. As I have shown elsewhere, there can be intricate patterns of relationships between forms of resource exploitation and the socio-cultural composition of communities, making for quite diverse ways of humans interacting with the biophysical environment (van Ginkel 1993, 1994, 1995). In this connection, the homogenizing view of people's behavior inherent in `tragedy of the commons' scenarios grossly underestimates the importance of socio-cultural diversity. The use of communal natural resources in complex, diverse and dynamic socio-ecological systems cannot be explained by such simplistic and deterministic models like the `tragedy of the commons' model. It should be interpreted in a much broader contextual framework.

Though this will certainly complicate things for the researcher or manager of the commons, it would be unwise to simplify for the sake of a model's elegance. Besides being an oversimplification, the social consequences of departing from such a model may be enormous and perhaps irreversible.[1] It is well-known that human behavior, including conscious behavioral strategies, often have far-reaching unforeseen and unintended consequences. The same goes for fisheries management. Therefore, it is pertinent that we devote ample attention to the wider context of the fisheries and make sure that we incorporate as many contextual factors as possible in the frameworks or models underlying fisheries governance structures. However, it is still important to allow for flexibility, lest rigidity will hinder short-term responses to management failures. Enabling adaptive performance is a key issue here.

Adaptive strategies and processes result from cybernetics or positive and negative feedback loops. Adaptive strategies involve conscious decision-making. Adaptive processes are feedback loops operating outside of cognitive awareness. Adaptive dynamics are the total of strategies *and* processes (cf. Bennett 1976). There are individual and collective adaptive strategies, sometimes crosscutting one another and giving rise to tensions that may develop into conflicts. As the heterogeneity of a group of resource users increases, and if resource constraints grow, access and use rules may become more difficult to maintain (cf. Runge 1986:630). An irreversible transformation of the mode of resource utilization may occur. Such endogenous changes are often brought about by exogenous contextual factors which have an impact on resource use; remote and local factors are interrelated and may reinforce one another.

Before presenting the case material, some additional theoretical remarks are in order. Ecosystems - including the humans operating within them - are often approached as clearly bounded systems. But such `entities' should not be perceived as clearly defined, embedded and demarcated wholes. A widening of contextual scope is necessary to include factors impinging on

such porous units, while ideally the impact of such systems on the encompassing world should also be taken into account. Thus, `context' does not necessarily refer to a broad, holistic `entity' like an ecosystem, a culture or another predefined whole: `Due attention to context in the elucidation of actions and consequences may often mean having to deal with precisely the kind of factors and processes often scanted or denied by holistic approaches: the loose, transient, and contingent interactions, the disarticulating processes, and the movements of people, resources, and ideas across whatever boundaries that ecosystems, societies, and cultures are thought to have' (Vayda 1986:310). A cultural-ecological approach rejects the assumption of ecological and sociocultural homogeneity. Instead, it focuses on diversity and it looks at how different individuals and groups operate in and adapt to their *total* environments through a variety of behaviors, technologies, organizations, structures and beliefs (cf. Poggie 1992:51).

There is yet another important remark to be made. Usually, the point of departure of modern-day ecologists is to analyse ecosystems as if a fundamental dichotomy between nature and society exists. Although many would add that these spheres are dialectically interlinked, they still compare them as relatively autonomous systems (cf. Pálsson 1996). In my view, human agency is *in* nature; humans act upon nature, while nature acts upon them: `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). We have to take into consideration `a complex whole system involving an interaction between the physical resources, animal species, and the human activities' (Bennett 1990:449). Such a viewpoint would be able to overcome Cartesian dualism and to avoid a `natural model' of fishing `which depicts the individual producer as an autonomous isolate, engaged in the technical act of catching fish' (Pálsson 1991:23). However, modes of production in fishing, as in any other extractive activity, are inevitably embedded in social relations. People confront nature through social interactions and relations and the mental universe produced, reproduced and transformed in these relations. The mental universe is the fragmentary, contradictory and ambivalent realm of knowledge, ideas, values, norms, beliefs, expectations and so forth. This approach enables the researcher to contextualize the attitudes, actions and conceptions of people using common pool resources. Contextualization is lacking in formalist propositions concerning the behavior of people in situations of common pool resource use in which the cumulative consequences of individual actions are a core theme. These propositions obstruct taking into account the interplay of numerous factors and the multiplicity of motives which influence people'_ behavior. At the same time, however, they point to the fundamental problem of unforeseen and unintended consequences of human behavior.

Exogenous Contextual Factors: Case Material

Detailed case histories covering a fairly long span of time can throw light on the ways in which people understand their natural and social environments and how they relate and adapt to them. They can also show the diversity and complexity of adaptive dynamics in maritime settings. Here, two extended case histories are presented to throw light on the impact of exogenous forces on oyster fishing and farming in the Netherlands. The cases are based on anthropological research in the Zeeland community of Yerseke, the country's foremost shellfish fishing and farming community, and in the fishing communities of Texel, one of the Frisian Islands.

Case 1: Texel Oystering

From the late 18th century until the mid-1840s, Texel fishers caught oysters (*Ostrea edulis*) in the Zuyder and Wadden Seas by the millions, providing a livelihood for scores of islanders. The fishers believed that the oyster banks `sprouted from nature through God's blessing and were not planted by man'. The oyster banks, they claimed, `are not owned by anyone, nor has anyone ever had a privilege to them' (cf. van Ginkel 1996:222). The fishing and gathering of the bivalves was done in the public domain. However, some areas were considered communal property. Oysters were replanted, tended and cared for in a shallow cove on the island's north-eastside. This cove provided excellent conditions for oyster reproduction and growth. This system of quasi-cultivation worked quite well. Given the facts that the number of oysterers did not increase much during this period, that the harvesting technology was rather simple, that the oysterers often could not or would not sail and that the radius of action of their vessels was but small, resource use was sustainable. Nonetheless, catches and proceeds fluctuated rather sharply. Ecological and climatological changes - *inter alia* harsh winters, ice-drift, cold summers, changing currents - had an impact on recruitment. Moreover, economic and political changes influenced the oyster industry. Fluctuations in demand - partly due to changing taxes and purchasing power - and supply brought about fluctuations in prices, and trade barriers sometimes impeded shipments abroad. Usually, however, such changes were temporary not structural.

But various problems assailed the oysterers and in the 1840s, the oyster banks were close to being exhausted. Government officials attributed this tragedy to the fishermen's behavior. They stated that the number of fishers had risen and that 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' (cf. ibid.:225). Was there indeed an unbridled `pursuit of gain' motivating the fishers to fish recklessly? And did their number and catching efforts grow?

The Texel fleet exanded from some 60 vessels in 1836 to 80 in 1846. Although total catches increased in this decade, per boat catches declined - a fair indication of overharvesting. The catching technology also changed. More efficient dredge nets were introduced. Although the Texelians were still practicing a kind of quasi-cultivation of oysters, the exploitation of public waters with a growing number of vessels and more efficient gear possibly undermined the carrying capacity of the oyster banks. Moreover, it is surmisable that the fishermen extended their efforts to harvest the bivalves in view of the increased possibilities to market them. Following the invention of steam power, the shellfish could be transported to markets further afield. Previously, catches were attuned to the demand in markets that could be reached by sailing vessels within a few days. But the coming of steam-powered vessels and railways implied an enormous expansion of the distribution network. As an anonymous author noted in 1855: `the period of peace, the improved communication, and the growing wealth of European peoples brought about an enormous expansion of oystering. ... Today, it rarely happens that the Texelian fishermen can meet the demand for their bivalves' (Texelsche 1852:359). Incentives to overharvest were high. When oyster stocks were abundant, prices declined so that the fishers had to land more oysters to make up for lower incomes. When oysters were in short supply, prices increased and the fishers were in for windfall profits.

Other factors were also important. In the 1830s, oyster harvests in the southwestern province of Zeeland were low. Zeelanders bought shiploads of immature oysters from Texelians to replant in Zeeland waters. Soon, the Texelians themselves had to import young oysters from Zeeland, France and England to keep their trade going. Still, they did not worry since they were used to natural fluctuations in stock abundance. But this transito trade led to small profit margins and the risks were considerable; mortality rates of imported oysters were high. Though state

officials expressed concern with regard to the Texel oyster industry, they did not intervene. By 1850, the industry was in a deplorable situation.

It would seem that the decline of oystering is a classical example of a tragedy of the commons. Although the fishermen's behavior was damaging to themselves as a collective, it was rational for each individual to catch as many oysters as he could. The social costs were passed on to the collectivity of users. Hardin's (1968) proposition seems to apply, even though the fishermen's behavior can only be understood against the background of infrastructural, technological and socio-economic developments: the invention and dissemination of steam engines and the concomitant expansion of markets and distribution channels, 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.

However, the decline of the oyster fishery cannot be attributed to the fishermen's behavior in this wider context alone. Natural circumstances also contributed to it. Oysters are very sensitive to changes in the ecosystem. Even slight fluctuations in water temperature, salinity, bottom features and food supply (phytoplankton) can cause considerable mortality. The ecosystem changed due to several factors. Severe winters led to high oyster mortality, and cold summers had a negative impact on reproduction. Moreover, storms and changing currents also had consequences for the oyster staple. More importantly, land reclamation in 1835 implied that a large part of the Texel cove where oysters were planted was lost. This shallow, relatively warm and quiet cove had provided excellent conditions for the reproduction and growth of the shellfish. What remained of it silted up and was reclaimed in 1876. This ecological deterioration is important, since the increasing scarcity implied that the level of exploitation of the oyster staple rose relatively, because initially catching efforts did not decrease. As yet, the fishers had few alternatives; debts to shopkeepers and suppliers had to be discharged and the costs of living met. Moreover, to the Calvinistic Texel fishers the Protestant ethic of working hard and living economical applied. They perceived nature as a God-given entity which was there to be exploited by means of investing labor.

But the oysterers 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. Infrastructural and market developments made for a growing demand for fish and fish products. Species and gear switching became part and parcel of their adaptive strategies. Many Texelians began to fish species they had previously disregarded either because it was difficult to find market outlets, or because of the rapid deterioration of fish. With faster transport and new conservation methods (for example, the boiling and salting of shrimp and cockles), these problems were overcome. Decisions on fishery cycles and gear switching were largely made on the basis of resource availability and accessibility, fish prices, fishing know how and expertise, vessel size, personal preferences, and alternative employment and sources of income. Diversification had obvious merits as effective insurance against resource decline and market fluctuations. Simultaneously, the chains between the first producers and the last consumers grew. This left the fishermen in a position at the outer end of the producer-consumer chain, making them vulnerable to recessions and sharp price fluctuations. Fishers had little withholding power; they were price-takers not price-makers. They tried to cope with these uncertainties by pursuing new markets and making arrangements regarding production and minimum prices. The latter had the unintended consequence that exploitation of marine resources was restrained (cf. van Ginkel 1995).

Diversification alleviated the pressures on the oyster stocks. Fewer and fewer fishers pursued oysters. Yet, oyster fishing never regained its former prosperity even though state regulations (legal seasons, minimum sizes) were introduced in the 1880s. Several fishers specialized in other species or left the fishery altogether. Some businessmen from without attempted to introduce oyster farming, but these attempts failed time and again. Severe winters, storms and

deteriorated ecological conditions caused poor results even though millions of oysters were deposited on demarcated and guarded plots leased from the state.

In sum, various factors have to be taken into account to understand the causes of resource deterioration. However, it is difficult to weigh the relative importance of each of these factors though they probably reinforced each other. Although natural cuases 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 which provided a forceful incentive to expand exploitation; the sales of immature oysters to Zeeland fishermen; previous experiences with fluctuating catches; the Calvinistic attitude of the oystermen; and, last but not least, the perception that their economic existence was at stake when catches began to diminish alarmingly. The options they had were to curtail consumption, intensify extraction of the resource, and/or switch to other species. These options were not mutually exclusive, but when the first two failed, the Texelians choose the last. The unintended and unforeseen consequence of the fishermen's adaptive strategies was that the pressure on resources was dispersed. This alleviated pressure on a single species, though occasionally many fishers pursued certain species for a short period of time.

A fourth option was cultivation, since shellfish farming would seem to imply greater control of nature and increased production. But most Texelians opposed government measures aimed towards this end. More generally, they were ambivalent about state intervention. When they perceived advantages, they favored regulation, but as soon as they saw disadvantages, they vehemently opposed it. Besides, diverging interests of specific categories of fishers led to disagreements concerning regulatory regimes regarding seasons, gear, mesh and fish sizes. Nonetheless, since the 1860s several attempts to farm oysters on privatized plots were made, but they failed time and again and were eventually abandoned.[2] However, in the province of Zeeland, the transition from capture to culture fisheries was more successful.

Case 2: Zeeland Oystering

Sedentary marine resources such as oysters seem to offer excellent opportunities for the development of sustainable resource use under certain types of management regimes. These shellfish stocks can be assigned to specific owners and user groups, and cultivation or semi-cultivation is possible by collecting oyster spat and replanting these on plots which provide the best possible ecological conditions for growth and reproduction. In theory, the owners-cum-culturists will reap the benefits of good governance. Of course, a prerequisite is that ecological conditions allow for oyster farming. In the Wadden and Zuyder Seas, these conditions had deteriorated so much that it had become unfeasible to do so. But in Zeeland, ecological conditions were much better. An extensive area of shallow, relatively warm and quiet waters was available there. Oyster farming assumed enormous proportions after the privatization of a part of the Eastern Scheldt estuary in 1870. A lease system based on auctioning access and use rights to the highest bidders was introduced (cf. van Ginkel 1989).

Hitherto, Zeeland oystering had developed along similar lines as was the case in Texel. Open access to certain areas was combined with claims to certain territories and usufruct. Due to developments which were in some ways similar to the ones described for the Texel case, oyster catches diminished even though state regulations concerning seasons, gear and minimum sizes had been introduced as early as the 1820s. But, as said, ecological conditions in Zeeland waters were much better than in the Zuyder and Wadden Seas and the Zeeland oystermen never encountered problems of the proportions Texel fishers faced. Nonetheless, enclosure and oyster farming were introduced, terminating customary tenure. Several wealthy urban capitalists succeeded in renting

the majority of the plots. The state perceived the lease system as its `rational' economic interest, granting ample opportunity to the forces of capital to capture the commons. In an agrarian society like the Netherlands, the idea that the productivity of tenure-based oyster farming would by far exceed that of common pool resource exploitation easily gained acceptance by state representatives. Thus, initially, the benefits of oyster cultivation were not reaped by fishermen but mainly by newcomers who invested in the industry. Most oystermen were excluded from the best locations and had to find employment with one of the newly established oyster companies. Though they lacked the capital to work independently, they possessed the sailing and dredging skills needed by the newcomers. Those who cherished their independence exploited the still free grounds or turned to musseling, a far less capital and labor intensive enterprise than oyster farming.

The lease system contributed tremendously to the boom in production and to the industry's capitalization. Before 1870, the number of marketed oysters hardly ever exceeded one million specimens. By 1875 it was approximately 35 million. Still, supply could not keep up with demand, prices remained high and investors in the industry made considerable profits. Many were attracted to the oyster industry and at ensuing public auctions of plots the lease fees skyrocketed because prospective lessees began outbidding each other to gain access. Capital replaced labor as the most important factor of production. By 1886 nothing remained of the free oyster fishery. But the oyster planters had unreasonable expectations. In their competitive struggle for plots, they lost sight of potential risks. Many overinvested, especially companies which were financed by extralocal shareholders who hoped to make quick money. Due to the heavy lease burdens, considerable labor costs and increased bivalve production, the high profit margins began to shrink or even turned into losses. For each individual oyster farmer it was `rational' to increase production, leading to even greater overproduction. With a meanwhile saturated market, the industry was assailed by a prolonged depression. Lower prices created incentives for individuals to produce even more. The crisis was exacerbated by a deterioration of the oysters' quality which was caused by overproduction and severe winters. The oyster stocks exceeded those that could be sustained by the amount of phytoplankton in the Zeeland estuaries. Scores of large oyster planters went into bankruptcy or withdrew from the oyster industry. By 1900, the image of oyster farming as a lucrative occupation had vanished.

The lease fees dropped. This enabled petty planters and family firms to obtain a greater share of the plots. Family labor provided a `shock absorbing capacity'. By curtailing consumption and/or expanding production, these planters succeeded in surviving bad times. For them, the rationale of capitalist production for the market did not imply that they quit as soon as their firms suffered losses; they would try to weather a depression as long as they could eke out a subsistence. In their world view, oystering was as much a way of life as a way of making a living. Still, they encountered the problems of being at one extreme end of the producer-consumer chain. As soon as landings rose, prices declined. The oystermen attempted to arrive at some form of market regulation. They realized that output had to be limited and in the 1910s and 1920s they established voluntary associations seeking collective agreements to do so. But time and again, these agreements were undermined by free riders who did not join organizations established with this aim and by those who did join, but evaded the organizations' rules and regulations. It became clear to most planters that self-regulation would only work if an external authority would enforce and supervise the rules. This happened in the 1930s, in the midst of the economic crisis that shook the capitalistic world. The state established a Fishery Marketing Board (*Visscherijcentrale*), and the planters and shippers had to join this state organization. Among many other measures, it set quality standards, quotas and regulated prices. There was an additional reason for the state to intervene. A serious outbreak of shell disease and the proliferation of the slipper limpet (*Crepidula fornicata*), a food competitor, caused huge problems and decimated the oyster population.

The oyster firms which had survived the economic crisis and other problems of the 1930s were faced with the consequences of war and occupation in the first half of the next decade. Many boats were confiscated, damaged or destroyed, fuel soon became scarce, oystering came to a near standstill, and export was impossible. The German occupiers demanded the greater part of the landings and they replaced the lease system by a fixed yearly rent, calculated in terms of the estimated value of the plots. It was further regulated that the entry rights could not be transferred to other oystermen, as was the practice heretofore, other than by the agreement of the Secretary General of the Department of Agriculture and Fisheries. Lastly, the allotment of plots became based on the need of individual oystermen and companies. These regulations were adopted by the Dutch government in the post-war era. It also reduced the rent of oyster plots to stimulate the shellfish industry's recovery. Gradually the industry did recover from the disruption of these years, although the position of small planters continued to be difficult. The organizations of planters and shippers gained a foothold in state-level fishery institutions so that they could defend their interests. Potential newcomers to the oyster industry could only gain entry if a firm relinquished its plots.

But new problems loomed large on the horizon. In 1953, a flood disaster struck Zeeland which was to have grave consequences for the oyster industry. Five years later, the government decided to dam off all inlets but one in the province, the so-called Delta Plan. This would render oyster cultivation impossible. The Eastern Scheldt was scheduled to be shut off from the North Sea in the 1970s. The state developed a compensation programme for the oystermen. They acquiesced in their fate, going about their work as usual, in an effort to make the best of the situation. But in 1962-63, an extremely harsh winter decimated the oyster stocks. Only an estimated five per cent survived. This dealt a death blow to the majority of oyster firms. The bivalve producers and dealers suffered great financial losses and on top of that the prospect was that the Eastern Scheldt would be closed in the near future. Most oystermen deemed it senseless to continue their occupation. The vast majority decided to quit and accept state indemnifications, amounting to approximately fifty per cent of the real damages. Some retired, while others set up new ventures. Only a small number continued to rent a few plots. Since the native bivalves were virtually wiped out, they imported large quantities of four-year old oysters, replanted them and marketed them one year later. Because supply was scarce and competition minimal, they could make a comfortable living.

The transito trade was, however, not without risks. The bivalves, mostly imported from France, did not adapt to the lower Zeeland water temperatures in winter and mortality rates were high. For this reason, the majority of those still renting plots began to refrain from using them. They consequently had to relinguish the parcels because a law passed shortly before forbade lessees to let underwater grounds lie fallow. Only ten planters persevered, and they cheaply rented the relinquished plots in addition to the ones they already leased. As a consequence, they gained access to extensive underwater grounds and accounted for 99 per cent of the oyster production. They intended to continue oystering as long as possible - that is, until the Eastern Scheldt dam would be completed. However, growing opposition by fishers and environmentalists led to a reconsideration of the government decision to dam off the Eastern Scheldt. In 1976, Parliament approved the construction of a storm-surge barrier which would maintain the tidal regime. This meant that oyster farming in the Eastern Scheldt would remain possible, leaving the ten planters in a comfortable position. They rented nearly all the oyster plots and as the sole representatives of the industry they had a strong bargaining position in negotiations with the state. Though some former planters (or their sons) attempted to regain entry to the plots, they were unsuccessful. Meanwhile, the state had adopted a policy of limiting access to the shellfish industry. The monopolists continued to play the game of import and export, seeking a quick turnover. But they had become careless. Against the advice of fishery biologists, they imported and replanted French oysters which turned out to be infected by a parasitic disease, later named *Bonamia ostreae*. In 1980, it was established that this disease had affected the oyster stocks in the Eastern Scheldt. Cultivation of European flat oysters

was banned in most Zeeland waters and up until the present day, the oystermen are confronted with the *Bonamia* disease. In the first half of the 1990s, total landings of flat oysters averaged 0.8 million oysters per year. After a political battle, new claimants won their case. Since 1990, the state rents plots to a total of 27 firms. But today, it is impossible to have a cost-effective business by merely farming flat oysters. The oystermen combine their oyster fishing and farming with other fishing or shellfish farming activities.

This case history shows that privatization by auctioning access and use rights to the highest bidders does not necessarily lead to sustainable utilization. Increased competition eventually brought about overproduction and ecological deterioration, excacerbated by severe winters. Even when the auctions were replaced by a system of fixed rents, exogenous factors - the vicissitudes of a market economy, diseases, the war, a flood, the building of dams, harsh winters - led to problems the oystermen had to cope with. Even with a small number of stakeholders, sustainability was not ensured. The oystermen still face the consequences of importing diseased flat oysters.

Theoretical Implications of Contextuality

Contrary to what functionalist ecological anthropologists have often claimed, there are no homeostatic situations in resource exploitation, automatically restoring equilibrium. This view has to be dismissed as teleology (McCay 1978). By its very nature, resource utilization is dynamic and adaptations may be either functional or dysfunctional. John Bennett maintains that `human systems are not unitary, but are dynamic and proliferational: when needs cannot be satisfied by one system, a subsystem is likely to form through the adaptive actions of individuals; or, the individual may switch his behaviour from one system or subsystem to another, seeking out more congenial alternatives' (1976:255). Adaptive responses to resource and market fluctuations and social constraints often include diversification, intensification or specialization. Diversification refers to a spreading of risks and increasing alternative modes of exploitation; intensification refers to a growing commitment to invest in one or another mode of resource utilization (cf. McCay 1978:410). Historian McEvoy comes up with a rudimentary `interactive theory of nature and culture': `First, people adapt to the world around them, which consists not only of a nonhuman environment, evolving partly on its own and partly in response to what people do to it, but also of other people as well. Second, what distinguishes humanity as a species is its capacity to produce, to alter its environment, more or less deliberately, so as to ensure its survival and propagation. Finally, people organize their behavior according to particular worldviews, whether expressed or implicit. As people act on the basis of one or another understanding of how the world works and their place in it, finally, what they do inevitably changes their social and natural environments, to which they then must adapt anew' (1988:229).[3] How such adaptations operate in practice can only be fully comprehended by taking into account contextual factors in a diachronic perspective and by devoting attention to the economic, social and cultural embeddedness of human behavior.

Fisheries `are ecologically volatile and vulnerable to any number of external influences, whether generated by humans or as impersonally as a change in the weather' (McEvoy 1988:215). One can hardly argue against this observation, but the point is that in common pool resource management models, scant attention is devoted to this broader context. This raises the important question of how deep and how wide researchers must cast their nets. In dealing with contextuality, the time-space axis is of considerable importance. A diachronic approach would enable the researcher to map and analyse long-term processes including feedback responses. Choosing a synchronic or short-term approach may prevent the investigator from `discovering' certain adaptive *dynamics* (i.e., long-term coping responses which are the end result of conscious strategies and adaptive processes operating outside of cognitive awareness). What we can learn from

retrospective analysis is to discern the variety of coping mechanisms to certain types of change in remote contextual factors. Focusing on a particular level of analysis can also have important implications. If, for example, `we focus on the impact of state or national forces on local communities, we may find that these wider forces shape the life of local communities in relatively similar ways. However, if we focus on the community, we see "individuals responding actively to actually subvert or alter these external forces, not passively accepting them'" (Moran 1990:283). Ideally, we should look at the problem from both angles. Perhaps, however, it is more feasible to use a mode of analysis Andrew Vayda dubs `progressive contextualization'. It involves a procedure that focuses `on significant human activities or people-environment interactions by placing them within progressively wider or denser contexts' (1983:265). The researcher can depart from studying specific activities, performed by specific people in specific locales at specific times, then trace the causes and effects of these activities outwards including the factors impinging on them without defining the boundaries of a system *a priori*.

For analytical purposes, it is wise to distinguish several levels of exogenous contextual factors, each having their own particular impact while they can also mutually reinforce one another (multiplier effects). As a minimal framework, attention should be devoted to ecological, demographic, infrastructural, technological, economic, political, legal, social, cultural and religious factors impinging from the external world on localized systems of common pool resource use and the adaptive responses of the users. The main problem of arriving at a broad theoretical model is that these factors will vary from case to case. However, this is no reason to exclude them from the research agenda. Moreover, a number of propositions or hypotheses could be helpful in focusing research on specific contextual issues. For example, Jim Acheson contends that: `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). This may seem obvious, but it usually goes unacknowledged. The socio-economic context common pool resource users operate in also influences the modes of adaptation available to them and `there is the possibility that external changes may sweep rapidly over a group, giving them insufficient time to adjust their internal structures to avoid the suboptimal outcomes' (Ostrom 1990:21).

Conclusion

Multi-species fisheries are chaotic systems, it is sometimes argued, with simply too many uncertainties for any kind of long-term control. Still, one of the most pressing needs of social science investigations is to determine the ways people understand and relate to their natural and social environments and how they bring about and respond to ecological, economic, political and social change whether from within or from without a predefined entity. Humans are not necessarily narrow-minded profit-maximizing automatons, consciously extracting common pool resources to the point of `tragedy'. Most models which assume that a tragedy is inevitable unless government intervention or privatization be installed fail to incorporate contextual factors. Though this is frequently acknowledged, contextuality itself is poorly theoretized. We should avoid to merely pay lip-service to the incorporation of context in theoretical models. Many such models focus on a predefined system and present exogenous factors as the Great Unknown `E' (cf., e.g., Hamilton *et al*. 1998).

Therefore, it may be a reasonable strategy for management purposes to devote closer attention to fishermen's knowledge, `allowing for extreme fluctuations in the ecosystem, relaxing at the same time the modernist assumption of predictability associated with the ecological project of sustainability' (Pálsson 1996:75). This viewpoint is seconded by Alf Hornborg, who contends that: `The contextualist position is not mysticism but a sober recognition of the limitations of totalising

institutions and knowledge systems. It is an argument not for regression but for a *recontextualisation* of the production of knowledge. Because of the sheer complexity and specificity of ecosystemic interrelationships and fluctuations, it is not unreasonable to expect that optimal strategies for sustainable resource management are generally best defined by local practitioners with close and long-term experience of these specificities, and with special stakes in the outcome' (Hornborg 1996:54). I can only subscribe to this viewpoint. However, it seems to focus entirely on endogenous contextuality. Even local stakeholders cannot foresee exogenous factors impinging on their modes of resource exploitation. Though their empowerment may be one step on the road towards achieving legitimacy of and compliance to management measures of external authorities, flexibility should be provided for so as to enable optimal adaptive strategies. In large measure, this flexibility is needed precisely because of the huge consequences contingent and capricious exogenous factors can have. If management models do not take into account these external contextual factors, they may run the risk of setting out on an irreversible course. In the short run, socionatural regimes may seem to be adaptive, but in the long term they may turn out to be maladaptive or dysfunctional. Though frequently scholars advocate proactive instead of reactive management policies, these can only apply to clearly bounded entities. The great challenge is, then, to create ample room in such proactive models to still be able to cope with uncertainty due to exogenous factors impinging upon localized systems of common pool resource use.

Notes

1. For a tragic example, cf. McGuire (1991). Chris Finlayson surmises that: `If the dynamics of a fisheries ecosystem are predominantly nonlinear, then *all* fisheries management strategies based on linear cause-and-effect models, single-species assessments, predictions and quotas are profoundly flawed and unlikely to achieve their intended results' (1991:93). This view, influenced by chaos theory, has recently gained acceptance from several maritime anthropologists and some economists (cf., e.g., Acheson and Wilson 1996).

2. A dike, seperating Zuyder Sea and Wadden Sea, was built in 1932, turning the Zuyder Sea into a fresh water lake. Soon afterwards, oysters also disappeared from the Wadden Sea. The fact that previously oyster farming in the Zuyder and Wadden Seas failed seems to indicate that ecological conditions had deteriorated structurally.

3. Put even more simply: `we live in an environment, we adapt to it, the adaptation changes it, and the change influences the way we behave' (Maxwell 1983:viii).

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