

Contextualizing Marine Resource Use: A Case from The Netherlands

ROB VAN GINKEL*

Department of Anthropology, University of Amsterdam, O.Z. Achterburgwal 185, 1012 DK, Amsterdam, The Netherlands

ABSTRACT The exploitation of renewable marine resources is fraught with problems. Several academics claim that the behaviour of fishermen is causing a tragedy of the commons. However, it is becoming increasingly clear that focusing exclusively on fishermen's actions is insufficient to understand the fisheries as an evolving system. Therefore, we should devote ample attention to the wider context in which fishermen operate, the unintended and unforeseen consequences of their behaviour, and that of fisheries policy and management, and the feedback dynamics which give rise to new coping responses. This paper uses developments in oyster fishing and farming in the Dutch province of Zeeland to illustrate these points. It also deals with the implications of the contextualist position for theory, policy and management. Copyright © 1999 John Wiley & Sons, Ltd.

Key words: marine resource use; fisheries policy and management; feedback dynamics

Introduction

In 1903, a number of notable English 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 that were cultivated in waters contaminated with the sewage of a house inhabited by people suffering from typhoid. Immediately, the message was disseminated by the press, rapidly giving rise to a public 'oyster scare'. British oyster cultivators virtually lost their home market and dumped their stocks on the continental market at rock-bottom prices. Dutch oyster farmers, in the province of Zeeland, also faced the consequences; they, too, lost the British market and, in addition, prices fell sharply. However, this was just the beginning of even worse problems. The British press began to speculate that the oysters that had caused death and disease 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 promulgated 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 consuming oysters. Although based on unsubstantiated allegations and imagination, the oyster scare reigned unabated for several years. In this case, the Thomas theorem applies: 'if people define situations as real, they are real in their consequences'.

This chain of events reminds one of the principles English 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' (Smith, 1990, p. 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 external factors impinging upon resource exploitation. Usually, policy and management models focus on single species exploited by specific user

* Correspondence to: Department of Anthropology, University of Amsterdam, O.Z. Achterburgwal 185, 1012 DK Amsterdam, Netherlands. Tel.: +31 20 5254811; fax: +31 20 5253010; e-mail: vanginkel@pscw.uva.nl

groups, as if they were autonomous systems, instead of being embedded in, and influenced by, wider ecological and socio-economic structures and processes. For the sake of such a model's applicability, contextual factors are reduced, or ignored altogether. As a consequence, users of the commons—in the present case fishermen—are inexorably blamed for over-exploitation.

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 socio-natural 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 behaviour, and that of fisheries policy and management, and the feedback responses which give rise to new coping responses. Such coping mechanisms or adaptations refer to the adjustments people make to their natural and social milieu (Bennett, 1976, p. 246).

This is the point of departure of the present paper. Based on ethnohistorical research in the Dutch province of Zeeland, it attempts to delineate the ecological, economic and political factors impinging on oyster fishing and farming, the coping responses of the cultivators and the transformations brought about by these intertwined processes. As will be shown in this case history, remote contextual factors played an 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. A conceptual framework will be used to highlight some basic factors that make for uncertainty, and impede governance structures. These include diversity, complexity and dynamics. Although often referred to as interfering with policy objectives and desired outcomes, these factors are insufficiently dealt with in theoretical models. The main goal of this paper is to show how these remote and local interference factors influence fisheries and fisheries management, and how they cause, or reinforce resource management problems. Because this procedure involves fo-

cus on the external–internal interface, 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. In the final section, some implications of the contextualist position for theory and policy will be discussed. First, however, I will make some preliminary remarks on the importance of context.

Context and cultural ecology

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 'closed' entities that we have devised for analytical purposes. Appropriate 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 without predetermined units. The same goes for 'the movements of people, resources, and ideas across whatever boundaries that ecosystems, societies, and cultures are thought to have' (Vayda, 1986, p. 310). An insular view of ecosystems, societies or cultures does not allow for an understanding of the multiplicity of shaping and constraining forces working upon such entities. Remote contextual factors are usually beyond the control of user communities (Edwards & Steins, 1998b). In a globalized 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. This applies to fishing in particular, as it cannot be understood in terms of boats or communities, 'it 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, p. 196).

Fisheries are economically, socially and culturally complex; they are diverse and dynamic systems of interactions between humans and the natural environment (Hamilton *et al.*, 1998). Quite often, however, fisheries policy and management deal with single fisheries, reducing the complexity factor, while ignoring the factors of variability and dynamics. These factors are often regarded as 'nasty' complications. As Smith (1990) cogently argues, scientists often depart from the assumption that without human interference, fish stocks are 'ordered, balanced and in dynamic equilibrium' (p. 5). Consequently, any disturbance of this 'natural balance' must be anthropogenic. Scientists believe that fishermen and other users of the commons are driven by greed. Therefore, their behaviour should be controlled. As Hardin (1968) contends in his well-known paper on the 'tragedy of the commons': 'The social arrangements that produce responsibility are arrangements that create coercion, of some sort' (p. 1247). Dealing with ecological, economic and socio-political situations and developments 'as if' they were simple, homogeneous and static provides for easier policy and management tools. However, simple policy is not necessarily good policy. When forgetting that, in fact, one has simplified such factors, serious complications may be the end result of resource management regimes. Hardin (1968), for example, overlooks institutional arrangements, cultural factors and complex interactions (Feeny *et al.*, 1990; Ostrom, 1990). Yet the basic tenets of the tragedy scenario are still very much alive among policy-makers and politicians. Useful though they may be heuristically, such propositions are of limited use as statements about the *real* world. What we need is a careful examination of the ways in which fishermen perceive and relate to their natural and social environments, to each other, and to themselves. We must contextualize, lest we run the risk of creating mythologies or empty abstractions. 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.

Fishing is an 'evolving socio-ecological regime', an historical, economic and political process embedded in historical, social and cultural systems (Durrenberger & Pálsson, 1985, p. 120). Therefore, we need to take a diachronic perspective, explicitly devoting attention to endogenous and exogenous forces impinging on the socio-natural system or subsystem. As I have shown elsewhere (Van Ginkel, 1994, 1995, 1996), 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 human interaction with the biophysical environment. In this connection, the homogenizing view of people's behaviour 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. It should be interpreted in a much broader contextual framework. Although this will certainly complicate things for researchers, policy-makers and managers 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 broader contextual frameworks may be enormous and perhaps irreversible (see, for a tragic example, McGuire, 1991). It is well-known that human behaviour, including conscious behavioural strategies, often has far-reaching, unforeseen and unintended consequences. The same goes for fisheries policy and 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 their governance structures. However, it is still important to allow for flexibility, lest rigidity should hinder short-term responses to management failures. Enabling adaptive performance is a key issue here.

Endogenous changes in resource use systems 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. An understanding of these dynamics may be distorted by a particular perception of ecosystems. As previously mentioned, these are often approached as clearly bounded systems. However, such 'entities' should not be perceived as clearly demarcated and relatively autonomous wholes; they are only defined as such for analytical purposes, although in fact remote factors impinge and have an impact on them. In addition, many modern-day ecologists analyse ecosystems as if a fundamental dichotomy between nature and society exists. Although some would add that these spheres are dialectically interlinked, they still compare them as separate systems (Pálsson, 1996). Nonetheless, human agency is *in* nature, people and environment are mutually constitutive components of the same world; people confront nature through social interactions and relations, and the mental universe that is produced, reproduced and transformed in these relations (including their images of nature), while nature acts upon them (Rappaport, 1979; Bennett, 1990; Ingold, 1992). Thus, 'context' does not necessarily refer to a broad, holistic 'entity' like an ecosystem, a culture or another predefined whole; a cultural-ecological approach rejects the assumption of ecological and socio-cultural 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 behaviours, technologies, organizations, structures and beliefs (Poggie, 1992, p. 51). 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 behaviour 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 that influence people's behaviour. At the same time, however, they point to the fundamental problem of unintended consequences of human behaviour.

The case of Zeeland oystering

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, a case history is presented, in order to throw light on the impact of exogenous forces on oyster (*Ostrea edulis*) fishing and farming in the Netherlands. It is based on ethnohistorical research in the town of Yerseke, presently the country's foremost shellfish fishing and farming community. Yerseke is located in the south-western province of Zeeland, where several estuaries and inlets indent the coastline, providing rich nursery grounds for fish and shellfish.

Archaeological excavations show that subsistence shellfish gathering and fishing in Zeeland dates back to the Mesolithic Age. By the late Middle Ages, population growth, the rise of cities and the establishment of trade networks had stimulated the evolution of commercial fisheries. Access to most Zeeland waters was officially unrestricted and many Zeelanders harvested oysters. Given the facts 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 small, resource use appears to have been sustainable. Nonetheless, catches and proceeds could fluctuate rather sharply as a result of natural circumstances (e.g. harsh winters or cold summers) and political-economic changes (e.g. boom and bust cycles, price fluctuations, trade barriers, taxes). Usually, however, such changes were temporary and not structural. Nonetheless, long-term developments had an adverse impact on sustainability. The fishing fleet expanded, fishing gear became more efficient, and the fishermen intensified their efforts to harvest oysters, as a consequence of market expansion. Oyster catches diminished structurally, and in the 1820s the state expropriated the Zeeland estuaries. It assigned the fishery management to the Board of Fisheries for the Zeeland Streams (*Bestuur der Visserijen op de Zeeuwse Stroom*). This

Board regulated fishing gear, methods, seasons and the size of marketable oysters (Van Ginkel, 1989).

The fact that entry remained unregulated does not mean that fishermen could harvest oysters wherever they liked. Zeeland oystermen from various villages claimed exclusive use rights for certain territories. However, they could not enforce these claims and territoriality often led to conflicts and, occasionally, even to violent clashes among fishermen as a result of the denial of usufruct rights. Neither customary tenure, nor the state measures introduced in the 1820s, could prevent overexploitation. The Board of Sea Fisheries stated that it deemed the oystermen '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' (Verslag, 1863, p. 24). It would seem, then, that the decline of oystering is a classic example of a tragedy of the commons. Although the fishermen's behaviour 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 oystermen's behaviour can only be understood against the background of infrastructural, technological and socio-economic developments, including the 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. In addition, natural circumstances also contributed to the decline. Several exceptionally severe winters led to high oyster mortality, and cold summers had a negative impact on reproduction. In total, various factors have to be taken into account in order to understand the causes of resource deterioration. However, it is difficult to weigh the relative importance of each of these factors, although they probably reinforced each other.

In the 1860s, the state considered far-reaching measures to counter the prevailing situation. One option to overcome problems of resource exploitation was shellfish farming.

Sedentary marine resources, such as oysters, 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 that provide the best possible ecological conditions for growth and reproduction, thus increasing control of nature and production. In theory, the owners-cum-culturists will reap the benefits of good governance, which reduces the likelihood of overexploitation. Of course, a prerequisite is that ecological conditions allow for oyster farming. In Zeeland, with its extensive area of shallow, relatively warm and quiet waters, that were stable in salinity and rich in phytoplankton, these conditions were available.

The first initiative to introduce oyster farming originated not from state agencies, but from a small number of entrepreneurs who had studied oyster cultivation methods in the Bay of Arcachon (France). They requested permission to rent part of the Eastern Scheldt estuary to begin oyster farming in Zeeland. In 1870, the state inaugurated a lease system, based on auctioning access and use rights to the highest bidders. 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. The enclosure of the marine commons terminated customary tenure. Several wealthy urban capitalists succeeded in renting the majority of the plots. Thus, initially, oyster farming benefits 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. Although 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 labour 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 1 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 labour as the most important factor of production. By 1886, nothing remained of the free oyster fishery. However, the oyster planters had unreasonable expectations. In their competitive struggle for plots, they lost sight of potential risks. Many overinvested, especially companies that were financed by extralocal shareholders who hoped to make quick money. As a result of the heavy lease burdens, considerable labour 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 that was caused by overproduction and severe winters. The oyster stocks could not 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.

Subsequently, the lease fees dropped. This enabled petty planters and family firms to obtain a greater share of the plots. By curtailing consumption and/or expanding production, they 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. Nonetheless, 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. However, time and again these agreements were undermined by free riders who did not join any organization established with this aim, and by those who did join, but evaded the organization's 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 capitalist world. The state established a Fishery Marketing Board (*Visscherijcentrale*), which both the planters and the shippers had to join. 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 so 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 needs of individual oystermen and companies.

The Dutch government adopted these regulations in the post-war era. It also reduced the rent of oyster plots to stimulate the shellfish industry's recovery. Gradually, the industry recovered 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. However, new problems loomed large on the horizon. In 1953, a flood disaster struck Zeeland that 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. Yet, in 1962–1963, an extremely harsh winter decimated the oyster stocks. Only an estimated 5% 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 decided to quit and accept state indemnifications, amounting to approximately 50% of the real damages. Some retired, while others set up new ventures. Only a small number continued to rent a few plots. Because the native bivalves were virtually wiped out, they imported large quantities of 4-year-old oysters, replanted them and marketed them 1 year later. Because supply was scarce and competition minimal, they could make a comfortable living.

The 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 relinquish them, because it was not allowed to let underwater grounds lie fallow. Only ten planters persevered, and they leased the relinquished plots at a reasonable rate, in addition to the ones they already held. Consequently, they gained access to extensive underwater grounds and accounted for 99% of Dutch 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 estuary. In 1976, Parliament approved the construction of a storm-surge barrier that 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. Although 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.

However, they had become careless. Against the advice of fishery biologists, they imported and replanted French oysters that turned out to be infected by *Bonamia ostreae*, a parasitic disease. In 1980, it was established that this disease had affected the Eastern Scheldt oyster stocks. Henceforth, the state banned the cultivation of the European flat oyster in the inlet. It was only in another inlet, the Grevelingen—which had been dammed off earlier but was conserved as a salt water lake—that the cultivation of *Ostrea edulis* could be continued. In the second half of the 1980s, an annual yield of approximately 10 million oysters was harvested there. New claimants demanded entry to the oyster industry, and after a political battle they won their case. Since 1990, the state has been renting plots to a total of 27 firms and has admitted no new tenants. However, in 1989 it was established that *Bonamia ostreae* had spread to the Grevelingen and in that year, harvests declined from approximately 10 to 0.5 million European flat oysters. This miserable situation continues to exist up to the present day. It is impossible to have a cost-effective business by merely farming flat oysters. The oystermen must combine their oyster fishing and farming with other fishing or shellfish farming activities.

This case history shows that privatizing the commons, 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, exacerbated 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, land reclamations, 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. A maritime activity which has often been compared with the Klondyke goldrush is now in a deplorable state; the 'gold from the water' seems to have disappeared. This chain of events illustrates the point that 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, p. 215). The idea of a 'natural balance' of fish stocks should, therefore, be dismissed.

Contextuality: implications for theory and policy

There are no homeostatic situations in resource exploitation, automatically restoring equilibrium. By its very nature, resource utilization is in perpetual flux because of internal and external changes, and people's adaptations may be either functional or dysfunctional. People adapt to the world that surrounds them and of which they themselves are part. The non-human environment evolves partly on its own and partly in response to what people do to it. Deliberate human adaptations are based on people's particular views of the world and their place in it, even though the effects of people's behaviour upon the natural environment, and the constraints which the physical world imposes upon the realization of their goals, may not be part of the notions on the basis of which they act. However, the way in which humans act upon the world around them alters the natural and social environments and the change influences the way people behave and think. These dy-

namics are infinite; people must continually adapt anew to their environments (Vayda, 1986, p. 297; McEvoy, 1988, p. 229). 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 behaviour.

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, p. 283). Ideally, we should look at the problem from both angles. Perhaps, however, it is more feasible to use a mode of analysis Vayda (1983) dubbed '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' (Vayda, 1983, p. 265). As a point of departure, the researcher can study 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*. It is

here that both micro and macro forces intersect and interact, and 'by focusing on the choice sets available to individual users of the resource, the different decision-making arrangements possible and different action strategies; and tracing back the derivation of these choice sets to contextual factors, the researcher will have a greater appreciation of the often complex origin of the selection of different strategies' (Edwards & Steins, 1998a, p. 367).

For analytical purposes it is wise to distinguish several levels of exogenous contextual factors, each having their own particular impact while they can also have multiplied effects. As a minimal framework, attention should be devoted to ecological, demographic, infrastructural, technological, economic, political, legal and administrative, 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 (Van Ginkel, 1999). The main problem of arriving at a broad theoretical model is that these factors will vary from case to case. It is sometimes argued that fisheries are chaotic or non-linear systems, with simply too many uncertainties for any kind of long-term control. This has important implications for policy and management: 'If the dynamics of a fisheries ecosystem are predominantly non-linear, 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' (Finlayson, 1991, p. 93). This may apply to fisheries systems in particular, but it is also true of many other systems of resource utilization. Against this background, one of the most pressing needs of social science investigations is to determine the ways in which people understand and relate to their natural and social environments, and how they respond to ecological, economic, political and social change, whether from within or 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 that assume a tragedy is inevitable, unless government intervention or privatization be installed, fail to incorporate

contextual factors. Although this is frequently acknowledged, contextuality itself is poorly understood. We should avoid merely paying 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' (Hamilton *et al.*, 1998).

Fishermen typically perceive natural processes as dynamic, unpredictable, complicated, disordered, chaotic, and in perpetual flux. Therefore, it may be a reasonable strategy for policy and 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, p. 75). These knowledge systems need to be recontextualized in policy and management frameworks, and ideally resource users and other stakeholders should be involved in the process: '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, p. 54).

However, this viewpoint seems to focus entirely on endogenous contextuality where resource users would seem to be—at least potentially—in control of their socio-economic and political environments. Yet even local stakeholders cannot foresee or control exogenous factors impinging on their modes of resource exploitation. Although their empowerment may be one step on the road towards achieving legitimacy of, and compliance with, management measures of external authorities, flexibility should be provided for, in order to enable optimal adaptive performance. This flexibility is needed in large measures, precisely because of the huge consequences that contingent and fickle exogenous factors can have. If policy and 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, socio-natural regimes may

seem to be adaptive, but in the long-term they may turn out to be maladaptive or dysfunctional. The enclosure of the Zeeland marine commons, which was supposed to lead to increased and sustainable production, illustrates this point. The rigidity of the consecutive privatized management regimes contributed to the resource management problems (Van Ginkel, 1989, p. 102).

Although scholars frequently advocate proactive, instead of reactive management and policies, these can only apply to clearly bounded entities. Therefore, the great challenge is to create enough room in such proactive models to still be able to cope with uncertainty as a result of exogenous factors impinging upon localized systems of common pool resource use. We should bear in mind, however, that there is no single best management structure, 'all structures involve tradeoffs between stability and flexibility, authority and representation, social and individual' (Hanna, 1998), while the outcomes of governance systems themselves are hard to control and predict. Therefore, managing resources in a complex, diverse and dynamic context involves a process of continual learning on the part of policy-makers, managers, and resource users. One thing is certain: we must learn fast, lest there are fewer resources left to manage.

References

- Bennett JW. 1976. *The Ecological Transition: Cultural Anthropology and Human Adaptation*. Pergamon Press: New York.
- Bennett JW. 1990. Ecosystems, environmentalism, resource conservation, and anthropological research. In *The Ecosystem Approach in Anthropology*, Moran EF (ed.). The University of Michigan Press: Ann Arbor, MI; 435–451.
- Durrenberger EP. 1988. Shrimpers and turtles on the Gulf Coast. *Maritime Anthropological Studies* 1: 196–214.
- Durrenberger P, Pålsson G. 1985. Peasants, entrepreneurs and companies. *Ethnos* 50: 103–122.
- Edwards VM, Steins NA. 1998a. Developing an analytical framework for multiple-use commons. *Journal of Theoretical Politics* 10: 347–383.
- Edwards V, Steins N. 1998b. *The Role of Contextual Factors in Common Pool Resource Analysis*. Paper presented to 7th Conference of the International Association for the Study of Common Property, Vancouver, British Columbia, 10–14 June 1998.
- Feeny D, Berkes F, McCay BJ, Acheson JM. 1990. The tragedy of the commons: twenty-two years later. *Human Ecology* 18: 1–19.
- Finlayson C. 1991. Notes on chaos in fisheries management by Estellie Smith. *Maritime Anthropological Studies* 4: 91–95.
- Ginkel R van. 1989. 'Plunderers' into planters. In *Dutch Dilemmas: Anthropologists Look at the Netherlands*, Boissevain J, Verrips J (eds). Van Gorcum: Assen.
- Ginkel R van. 1994. Tacking between Scylla and Charybdis. *International Journal of Maritime History* 6: 215–229.
- Ginkel R van. 1995. Fishy resources and resourceful fishers: the marine commons and the adaptive strategies of Texel fishermen. *The Netherlands' Journal of Social Sciences* 31: 50–63.
- Ginkel R van. 1996. The abundant sea and her fates: texelian oystermen and the marine commons, 1700 to 1932. *Comparative Studies in Society and History* 38: 218–242.
- Ginkel R van. 1999. The dynamics of fisheries. In *Europe's Southern Waters: Management Issues and Practice*, Symes D (ed.). Blackwell Science: Oxford; 19–32.
- Hamilton LC, Duncan CM, Flanders NE. 1998. Management, adaptation and large-scale environmental change. In *Property Rights and Regulatory Systems in Fisheries*, Symes D (ed.). Blackwell Science: Oxford; 17–33.
- Hanna S. 1998. Parallel institutional pathologies in North Atlantic fishery management. In *Northern Waters: Management Issues and Practice*, Symes D (ed.). Blackwell Science: Oxford; 25–35.
- Hardin G. 1968. The tragedy of the commons. *Science* 162: 1243–1248.
- Hornborg A. 1996. Ecology as semiotics. In *Nature and Society: Anthropological Perspectives*, Descola P, Pålsson G (eds). Routledge: London; 45–62.
- Ingold T. 1992. Culture and the perception of the environment. In *Bush Base, Forest Farm: Culture, Environment and Development*, Croll E, Parkin D (eds). Routledge: London; 39–56.
- McEvoy AF. 1988. Toward an interactive theory of nature and culture. In *The Ends of the Earth: Perspectives on Modern Environmental History*, Worster D (ed.). Cambridge University Press: Cambridge; 211–229.
- McGuire TR. 1991. Science and the destruction of a shrimp fleet. *Maritime Anthropological Studies* 4: 32–55.
- Moran EF. 1990. Levels of analysis and analytical level shifting. In *The Ecosystem Approach in*

- Anthropology*, Moran EF (ed.). The University of Michigan Press: Ann Arbor, MI; 279–308.
- Ostrom E. 1990. *Governing the Commons*. Cambridge University Press: Cambridge.
- Pálsson G. 1996. Human–environmental relations. In *Nature and Society: Anthropological Perspectives*, Descola P, Pálsson G (eds). Routledge: London.
- Poggie JJ Jr. 1992. Intracultural and intrasocial variability as a tool for policy making in fisheries development and management. In *Anthropological Research: Process and Application*, Poggie JJ Jr, DeWalt BR, Dressler WW (eds). State University of New York Press: Albany, NY; 49–64.
- Rappaport RA. 1979. *Ecology, Meaning, and Religion*. North Atlantic Books: Berkeley, CA.
- Smith ME. 1990. Chaos in fisheries management. *Maritime Anthropological Studies* 3: 1–13.
- Vayda AP. 1983. Progressive contextualization: methods for research in human ecology. *Human Ecology* 11: 265–281.
- Vayda AP. 1986. Holism and individualism in ecological anthropology. *Reviews in Anthropology* 13 (4): 295–313.
- Verslag (1863) *Verslag van de staat der Nederlandsche zeevisscherijen over 1863*. Van Weelden en Mingelen: 's-Gravenhage.