

## Chapter 2

# The Dynamics of Fisheries: A Sensitising Framework

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### Introduction

The utilisation of renewable marine resources is fraught with problems. Fishermen are often blamed for this state of affairs. Many environmentalists, biologists, economists, politicians and bureaucrats perceive fishers as rapacious maximisers seeking to extract the greatest share of the cake in the shortest time possible. Usually, modernist models of common pool resource management focus on a single species exploited by specific user groups. For the sake of the model's ease of application, factors making for complexity, diversity and non-linear dynamics are reduced or ignored altogether. Little attention is devoted to the question of how such factors affect marine resource exploitation. As a consequence, resource users – in the present case fishermen – will inevitably 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 a complex and evolving socio-ecological regime. There are many factors which interfere with or have an impact on fishing industries. It is beginning to dawn upon us that small causes can have huge consequences. In any kind of governance structure this fact has to be taken into account. Therefore, ample attention must be devoted to the wider context in which fishermen operate, the unintended and unforeseen consequences of their and other people's behaviour, the unintended and unforeseen consequences of fisheries management, and the feedback processes 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 milieus to their lives, needs, wants and goals (Bennett, 1976). The intertwined processes of remote influences on resources and resource exploitation – which are usually beyond the control of user groups – and the adaptations of users often lead to transformations in socio-ecological regimes. It is therefore pertinent that we devote attention to macro-social forces which operate beyond local communities of resource users but which can have a strong impact on them.

The main goal of this chapter is to arrive at a tentative framework which includes contextual factors and feedback loops that influence fisheries and fisheries management. The framework is intended as a sensitising model. That is, it focuses attention on important inferential factors making for diversity, complexity and dynamics, and it tries to show how these factors are interrelated. This implies incorporating context not as a mere background to research data, but focusing much more rigorously on contextuality. 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 have been devised for analytical

purposes. Due attention to context in the elucidation of human 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. In a globalising 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.

### **Some reflections on serious complications**

Fisheries are economically, socially and culturally complex, diverse and dynamic systems of interactions between humans and the natural environment (Hamilton *et al.*, 1998). Factors like diversity, complexity and dynamics make for uncertainty, interfere with management objectives and desired outcomes, and can therefore impede governance structures. Often enough, however, fisheries management deals with single fisheries and single issues, reducing the complexity factor, while ignoring the factors of variability and dynamics. These factors are often considered 'serious complications'. As Smith (1990) cogently argues, fishers see natural processes as dynamic, unpredictable, complicated, disordered, chaotic. In their linear view, scientists, on the other hand, usually depart from the assumption that without human intervention fish stocks are 'ordered, balanced and in dynamic equilibrium' (Smith, 1990: p. 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.

Complexity refers to phenomena which exhibit non-linear behaviour, that is, positive feedback in which endogenous or exogenous changes to a socio-cultural entity produce amplifying effects. Non-linear behaviour means that small changes in a system can have disproportionate consequences (Elliott & Kiel, 1997). Diversity relates to the variety of technological, economic, social and cultural coping responses that humans exhibit in exploiting natural resources. Dynamics refers to the processual or trial and error character of adaptation in which human-nature interactions give rise dynamically to emergent phenomena that can prove resilient in the face of environmental perturbations (Smith, 1997).

Fishing is an evolving socio-ecological regime, a historical, economic and political process embedded in encompassing political, economic and cultural systems. 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: p. 196). Therefore, we need to take a diachronic perspective, explicitly devoting attention to endogenous and exogenous forces impinging on the socio-ecological system or subsystem. As demonstrated

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, 1994, 1995). In this connection, the homogenising view of people's rationale and 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 like the 'tragedy of the commons'. It should be interpreted in a much broader contextual framework.

Although 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. It is well known that human conduct, including conscious behavioural strategies, often has far-reaching unanticipated, unintended and undesirable consequences. The same goes for the interplay between fishermen's behaviour and 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 fisheries 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.

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. More or less 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 realisation of their goals may not be part of the notions on the basis of which they act. But 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 dynamics are infinite; people must continually adapt anew to their environments (Maxwell, 1983; Vayda, 1986; McEvoy, 1988). 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 cognitive awareness. Adaptive dynamics are the total of strategies and processes (Bennett, 1976). There are individual and collective adaptive strategies, sometimes cross-cutting 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 (Runge, 1986). An irreversible transformation of the mode of resource utilisation 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.

Ecosystems – including the humans operating within them – are often approached as clearly bounded systems. But such 'entities' are embedded in the surrounding world and should not be perceived as clearly defined and demarcated wholes. A widening of contextual scope is necessary to include factors impinging on such 'permeable' 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: p. 310)

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, organisations, structures, world views and beliefs (Poggie, 1992).

Usually, the point of departure for modern day ecologists is to analyse ecosystems as if a fundamental dichotomy exists between nature and society. Although many would add that these spheres are dialectically interlinked, they still compare them as relatively autonomous systems (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: p. 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: p. 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: p. 23). Modes of production in fishing, as in any other extractive or economic 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 contextualise the attitudes, actions, conceptions and interpretations of people using common pool resources. Contextualisation 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 our taking into account the interplay of numerous factors and the multiplicity of motives which influence people's behaviour. At the same time, however, they point to the fundamental problem of unforeseen and unintended consequences of human behaviour.

### **The Great Unknown 'E' and other riddles**

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-maximising automatons, consciously extracting common pool resources to the point of 'tragedy'. Most linear models which assume that a tragedy is inevitable unless government intervention or privatisation be introduced fail to incorporate contextual factors. Although this is frequently acknowledged, contextuality itself is poorly theorised. 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'. Such factors are usually relegated to the margins of figures representing feedback loops. However, understanding or managing complex and dynamic fisheries systems 'as a whole presents great challenges, and is rarely if ever attempted' (Hamilton *et al.*, 1998: p. 17).

As the historian McEvoy contends, 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 socio-economic context in which common pool resource users operate 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: p. 21). One can hardly argue with these observations, 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 short- and long-term processes including feedback responses. Choosing a synchronic approach may prevent the investigator from 'discovering' certain adaptive dynamics, that is long-term coping responses which are the end result of conscious strategies and adaptive processes operating outside 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 which Vayda (1983) dubs 'progressive contextualisation'. 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). 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 appropriate to distinguish several levels of exogenous contextual factors, each having their own particular impact while they can also mutually reinforce one another in the form of multiplier effects. As a minimal framework, attention should be devoted to ecological, demographic, infrastructural, technological, economic, political and administrative, legal, social and cultural factors impinging from the external world on localised 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. In what follows, a tentative framework is presented that is intended as a sensitising device for contextualised research into marine resource use. It is not claimed that this set of exogenous variables influencing fisheries is in any way complete. Rather, it is a preliminary exploration of some important inferential factors, but one which is of particular value in understanding Mediterranean fisheries.

## **Contextuality: towards a sensitising framework**

### *Ecology*

Natural fluctuations can be quite pronounced. Of course, this is stating the obvious. However, in bio-economic fisheries management models focusing on single species this is not always sufficiently taken into account. For example, fluctuating ocean temperatures and salinity, periodic changes in weather patterns, global warming and other environmental changes can have an impact on recruitment and mortality of fish stocks, while diseases can have devastating effects on certain species. Besides natural fluctuations, the dynamics of predator-prey interactions are not always accounted for. These dynamics may in turn be affected by fisheries. Migration patterns of certain fish species, such as herring and anchovy, can vary considerably from year to year. Fishermen cannot depend on past experience in this case. Nonetheless, in biological fish stock assessments fishers are sometimes blamed for overfishing such migratory species while in fact the fluctuations may be due to natural causes. Uncertainty and inaccuracy characterise most stock assessments (Sinclair, 1996). They can be overly optimistic or overly pessimistic. Nonetheless, scientific management models – such as the ones based on the Gordon-Schaefer theory – were and are ‘committed to a simplistic image of marine ecosystems, and a faith in the human capacity to predict and control them’ (Holm, 1996: p. 178). Of course, these remarks should not lead to a view that overfishing does not occur or that fishers are necessarily acting wisely from an ecological point of view. As Bennett (1990: p. 444) contends: ‘human populations have always displayed ... cyclical patterns of use and abuse; in some cases the degradation is irreversible; in others, regeneration is possible’. In this connection, a common adaptive pattern of fishers is important; they tend to switch away from declining resources (Townsend & Wilson, 1987). However, if quota restrictions apply to many commercially valuable species, the switching option may be effectively blocked.

We should also take into account that human activities unrelated to fisheries affect marine ecosystems. We can think of mineral exploration and exploitation, activities in the coastal zone, including housing, recreation, navigation, dredging, reclamation, waste-water disposal,

pollution, dumping of chemical, toxic and nuclear waste *inter alia*. For example, fishers in the Mediterranean area seem to agree that the fish stocks are in a crisis mainly due to pollution, whereas fishers in northern waters believe that management policies and stock fluctuations have brought about a fisheries crisis, while they deem pollution less influential (Vestergaard, 1997). Problems of natural degradation, pollution and overuse transgress national borders (Hanna & Jentoft, 1996: p. 48). Mariculture – for example, salmon farming – not only restricts space for capture fishers but can also cause pollution through the accumulation of waste matter and the use of pesticides, antibiotics and vaccines (Steins, 1998). Intensified use of the coastal zone can exacerbate resource problems. The great challenge is to incorporate the multitude of ecological factors into fisheries management models. Models focusing on single species stock size and fishing effort are inadequate simplifications, but the problem is that ‘the realism of multi-species model creates unmanageable complexities’ (Holm, 1996: p. 184). Devolved management systems allowing for flexible responses may be one solution.

### **Demography**

Global population growth leads to an increasing demand for food, including fish and shellfish. In the 1960s, some believed that the solution of feeding the world’s population was a Blue Revolution. To a large extent, this viewpoint was based on the false premise that the oceans contained inexhaustible fish stocks. But in many cases, extraction of renewable marine resources had already gone beyond the critical point of sustainability. One response was to encourage mariculture, but this brought about ecological problems of its own. Another response was the development of capital intensive high seas fishing. However, this hardly provides a way out. With an increasing human population, the world’s fisheries are likely to continue in a state of crisis for years to come.

Moving away from this macro-systemic level of demography, population dynamics on a national or regional level are also important. In Europe, the number of people involved in primary production has been decreasing for decades. Employment in fisheries has also declined. There is ‘a tendency for primary sector activities to move in search of cheaper labour costs’ (Suárez de Vivero *et al.*, 1996: p. 249). Recently this has affected the Andalusian fishing industry which has lost part of its position to the developing fishing sector of the Maghreb. In certain areas, alternative occupational options may be scarce. The problems are particularly acute in fishery dependent regions. Although governments sometimes adopted policies to retain the population in specific remote areas, as for example, in northern Norway and northern Scotland, these have not always been able to prevent mass unemployment and subsequent massive outmigration. In many places, young people are increasingly reluctant to follow in their fathers’ footsteps. As a consequence, skipper-owners may encounter problems in recruiting crew.

### **Infrastructure**

Nowadays, it is a commonplace to say that the world has become a ‘smaller’ place. The development of roads and railroads, harbours and airports and new means of transportation imply that fishermen can reach markets further afield, with the increasing demand this potentially entails. But petty fishers have usually not benefited as much as large fishers and

vertically integrated companies. And some remote areas encounter special problems in their links to the world without implying difficulties in marketing fish. If markets are distant, a disproportionate part of the value of fish landed is creamed off by the processing industry and by dealers.

There is increasing competition for coastal space in many European societies, not only from tourism but also from industrial development with all the accompanying infrastructure. For example, the development of tourism has led to the construction of roads and airports on many Greek islands. Immigration and development of coastal resorts and marinas can lead to pressures on the fishing industry. Fishermen are sometimes relegated to peripheral locations and may experience growing opposition to their quayside activities. At the same time, however, population growth and holiday making in coastal communities provide a local market for fish products. These developments can also create alternative employment opportunities.

### ***Technology***

Fishing technology is growing increasingly efficient, effective, mobile, versatile and capital intensive. There is a pressure to invest in new technologies, and many governments have aided modernisation of vessels through the provision of credit, loans and subsidies. Those lagging behind run the risk of being ousted from the fishing industry. The number of petty fishermen is declining. Labour is becoming less important, while capital is becoming more important, implying a shift away from petty fishers' control of the means of production. Although there is still an excess fishing capacity and catching effort in the EU Member States, the fishing industry in some countries has experienced a period of rapid decline in number of vessels and fishers. The introduction of new capital intensive fishing technology still puts pressure on the resources and usually leads to the marginalisation of petty inshore fishers. Technology is not the only relevant factor here. Drummond and Symes point out that:

'As the viability of a particular socio-economic formation becomes threatened, strategies designed to preserve the value of capital and the viability of extant patterns of social relations are devised and promoted. Contradictions which emerge in a particular place at a particular time are either deferred through the provision of credit or subsidies or exported through protectionism and the exploitation of new resources and markets. The "successful" strategies are determined by the mode of social regulation which selectively legitimates and empowers some whilst invalidating others. This process of selection is currently biased in ways which make unsustainable events the norm.'

(Drummond & Symes, 1996: p. 156)

The penetration of capital also threatens to undermine the traditional social organisation of fishing, which was – and still is – predominantly based on small-scale production units comprising household enterprises and kin-based crews. For example, in the 1970s Pi-Sunyer (1977) observed that in the Catalan fishing community of Cap Lloc larger boats were increasingly owned by non-fishermen as a consequence of technological development and the concomitant heavy capitalisation.

The predominant viewpoint of modernist fisheries economists and managers is that there is a need to encourage economies of scale and to reduce inefficiencies. This puts a premium on those units that can capitalise on investments while marginalising small-scale units which cannot afford the growing costs of new harvesting technologies. These latter production units



are precisely the ones which contribute least to the problem of overfishing. Yet, they are the ones that usually suffer most from new technologies and new regulatory regimes. Fishers with the highest levels of capital, education, knowledge and skill are in the best positions to adjust to and adopt technological innovation.

### ***Economy***

Fisheries in market economies operate under different modes of production than fisheries in subsistence economies. Overexploitation is more likely in the former than in the latter. With the emergence of capitalistic fishing, productive targets become indefinite. As Acheson (1989a: p. 376) puts it: 'Natural resources are more likely to be overexploited in technologically advanced societies, with large populations where resources are sold in large international markets'. This may seem obvious, but it usually goes unacknowledged. The situation is commonly countered by the introduction of fishing restrictions, including effort controls and quota systems which impose a ceiling on production. Such measures will often lead to a consolidation of vested interests, thwart social mobility and prevent newcomers from entering the fishing industry.

External factors such as the availability and prices of food other than fish have an impact on the revenues of fishermen. Interdependencies and integration into more complex social formations and institutions are increasing, linking fish production with local, regional, state and international markets, economies and organisations (Andersen, 1979a). The globalisation of the market economy leads to a loss of control over shares and prices in specific local and regional markets. This affects fishers in particular: since they are at the end of the producer-consumer chain they are price-takers not price-makers. This presents a potential threat to self- or co-management regimes aimed at reducing fishing effort and production. Since market controls are difficult to maintain, there is an incentive to land more fish unless quota restrictions apply. At the same time, enforced modernisation can lead to the breakdown of local and regional markets through competition from low-priced imported fish products, as Collet (1998) argues in respect of France. There may also be a narrowing of links between the processing industry and retail outlets, thus constraining fishermen's access to centres of negotiation and decision making in markets as has happened in Brittany (Delbos & Prémel, 1996).

However, in capitalistic societies fishers have always had to acquire new markets as part of their coping responses to resource and price fluctuations. Moreover, they had to adjust to fluctuating exchange rates and overt and covert trade barriers. Their modes of adaptation often included diversification and switching behaviour due to trade cycles and the vicissitudes of a market economy. Usually, fishermen have short time horizons; due to high levels of uncertainty they prefer short-term planning. The incentives to adopt a new mode of production are inextricably intertwined with opportunities for change and perceived costs and benefits. However, new management regimes may cut across adaptive performance.

### ***Politics and administration***

At the macro-systemic level such as the European Union, there are trade-offs between the national interests of Member States. For example, claims to fish quotas may be weakened in favour of agricultural concerns. In such a case, fishers have to cope with the consequences.

Conversely, fishing interests may be protected in supranational negotiations without sufficiently taking into account potential threats to sustainable use. Quota systems protect vested interests and the fishing industry may be turned into a closed shop. If Euro-politicians demand organisational restructuring, some specific and successful forms of fishers' organisations, for instance the Spanish *cofradías* or the French *prud'homies*, might disappear (Frangouides, 1995; Alegret, 1996a, 1998; Collet, 1998).

Political decisions concerning access to and use of the marine domain, whether fisheries related or not, are bound to have unintended social and environmental consequences (Hamilton *et al.*, 1998). Marine resource management systems introduced by external authorities may undermine time-honoured tenure or usufruct systems and informal resource management arrangements. In fact, there are many examples where this has actually occurred. In Denmark, 'The introduction of quotas, relying on expected predictability, contradicted the fishermen's accumulated and present experience of the concrete stock situation. Quotas prevent the fishermen from freely using their usual strategies of action to cope with fluctuating stocks and prices' (Vestergaard, 1996: p. 88). This also had consequences for their perceived identities.

New regulations affect different categories of fishers in different ways. There will be political bargaining among competing interest groups and contracting for property rights: 'All things equal, those interest groups with greater wealth, size, and homogeneity will have more resources to influence politicians regarding the assignment of property rights' (Libecap, 1989: p. 17). Heterogeneity among fishermen will render collective action more difficult and exacerbate the problem of free riding. Stakeholders with more leverage are likely to win in the game of political bargaining. This may bring about multiple-use problems and conflicts. Within the fishing industry, well-organised, large-scale entrepreneurs are in a better position to give vent to their wishes and demands than their petty counterparts. Many states would seem to favour enclosure of the marine commons. They have a preference for fish and shellfish farming activities based on privatised access and use rights. Privatisation facilitates generating state revenues and reducing transaction costs. But it also renders multiple use of certain locations impossible.

A considerable body of knowledge concerning fishers' responses to the introduction of new regulatory regimes has already been accumulated by scholars. Less is known about the impact of the activities of new stakeholders. For instance, pressure groups of environmentalists influence policy decisions concerning non-extractive use of the marine environment. Fishermen are often in a poor position to gain political clout. The environmentalists seem more concerned to conserve the resource than to conserve the labour and capital employed in its exploitation, although in this respect the situation differs from country to country and from sector to sector.

### *Law*

In a globalising world, international and supranational agreements affect local populations to a greater extent than ever before. This also applies to fishing communities. In this connection, one could think of the geopolitics of extension of national jurisdictions with the concomitant expansion of exclusive economic zones not so far experienced in the Mediterranean but under active consideration in many countries. Where it has happened in the North Atlantic, for example, it has led to international conflicts such as the 'cod wars' between Great Britain and Iceland. The Law of the Sea has had a major impact on Spanish littoral fishermen in

connection with the fact that Morocco has limited and regulated access to its waters (Meltzoff & LiPuma, 1986). The Mediterranean fishers face particular problems in this respect, since it is so far impossible for the nation states to which they belong to claim more than an exclusive 12 n mile zone. International negotiations as to who has jurisdiction over which waters is often accompanied by trade-offs and the introduction of high entry fees. There is increasing control of supranational or international external authorities regarding decision making concerning marine resource use, as in the case of the Common Fisheries Policy. The implications of enactments directed at or influencing specific types of resource use are often far reaching. The introduction of new legislation and regulations can disrupt precariously balanced complex adaptive systems based on usufruct and informal distributive rights of entry and use. Existing space and resource management regimes, such as systems of territoriality, are often undermined. Compliance or non-compliance with new legislation largely depends on its legitimacy in the fishermen's perception. If it is deemed illegitimate, rules will be circumvented or broken, turning fishers into 'pirates of piscary' (McCay, 1984).

### **Society**

As Wolf (1982: pp. 73–4) explains, 'the way [human beings] are organized socially governs the way they confront and transform nature, and nature thus transformed affects, in turn, the architecture of human social bonds'. It is therefore imperative that we devote attention to the social relations of production, including modes of access, appropriation, allocation and reallocation, both within and outside the fishing industry. If a subsection of society succeeds in convincing the state that entry to and appropriation and (re)allocation of renewable marine resources should be restricted to a greater extent than at present, then a number of fishers will be barred from extractive resource use. It follows that 'distributional conflicts inherent in any new property rights arrangement, even one that offers important efficiency implications, can block or critically constrain the institutions that can be adopted' (Libecap, 1989: p. 121). Moreover, such transformations can bring about new cooperative or competitive forms of resource use. But social dynamics are generated not only by processes of social interaction but also by endogenous and exogenous pressures for change. This brings us to the intersection of social and ideational systems.

Human action is always negotiated by culture and effectuated in social relationships. 'The impact of ecological constraints and environmental possibilities ... operates both in terms of cultural meanings, values, and goals, and through systems of social relations through which humans pursue these values and goals' (Keesing, 1981: p. 169). People's beliefs, social norms and values, relationships of cooperation and conflict, and the institutions they have developed should be taken into account to understand the shaping and constraining forces of ecological adaptations. According to Bennett (1976: p. 40), 'cultural considerations – symbolic values, tradition, socially stimulated wants – underlie every human relationship with Nature, directly or indirectly'. If socio-cultural relationships change, human action changes.

### **Culture**

Changes in social values, ethics and ideologies in the wider society have an impact on objectives and purposes concerning extractive use (or non-use) of marine resources. For

example, up until the 1950s the Dutch government put a premium on killing seals which were regarded as fish killers competing with fishermen. With the rise of conservationist groupings and environmental awareness, this changed radically within a short span of time. Today, killing seals is unthinkable; they are the 'holy' icons of environmentalism in The Netherlands. Almost simultaneously, the popular image of fishermen has also changed; they used to be perceived as 'noble savages' whereas, currently, they are reputed to be rapacious and selfish overexploiters. Again, this perception is fuelled by the recent upsurge of environmentalist groups who succeeded in mobilising public opinion.

'Ideology and political culture cross-cut any attempt to demarcate resource regimes in relation to resource types. Resource regimes are first and foremost systems of authority, and authority in turn depends on force and legitimacy. Legitimacy depends on acceptance of some of the ideology underlying claims to authority ("hegemony"). Political culture affects the structure and delegation of authority but also how people see themselves in relation to holders of authority.'

(Berkes & McCay, 1990: p. 28)

The conceptions, meanings and values of fisheries policy makers and managers will have a strong impact on the type of resource management regime that is introduced. It took a long time to realise that there is more than simple cause-effect relations in biology and economy that affect the fishing industry. Nowadays, administrators show a willingness to arrive at devolved management systems, although often hesitatingly and firmly based on a means-end approach. In many places, fishers still feel that their world views and practices are misunderstood and misrepresented. Top-down management regimes have had an impact on their status, cognition, skills, prestige and identity. For example, under quota regulations the once thoroughly enjoyed competition for recognition as a top skipper has made way for a less exciting harvesting of the allowed catch.

A last example of culture-related exogenous contextual factors affecting fishers are consumer patterns and preferences. In The Netherlands mussels have for a long time been regarded as an inferior type of food. Recently, this has changed as a consequence of advertisements. A home market is growing. Specific fish and shellfish species may be underexploited as a result of culturally and religiously constituted food taboos. Such taboos can affect the fishing industry in another way, too. Dutch Catholics were not supposed to eat meat on Fridays. Instead, they usually ate fish. However, with deconfessionalisation processes, this food taboo is hardly observed today. But it is difficult to assess the overall consequences for the fishing industry. On the other hand, certain food preferences of consumers can lead to increasing pressure on certain species which may be fished to unsustainable levels (Drummond & Symes, 1996).

## Conclusion

By its very nature, resource utilisation is dynamic and adaptations may be either functional or dysfunctional. 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).

Bennett (1976: p. 255) 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’.

Adaptive responses to resource deterioration, market fluctuations and social constraints often include diversification, intensification, specialisation or withdrawal. Diversification refers to a spreading of risks and increasing alternative modes of exploitation and employment. Intensification – or expansion – refers to a growing commitment to invest in one or another mode of resource utilisation. Specialisation means restricting one’s activities to a particular niche in the ecological or economic system. Withdrawal implies leaving the specific mode of resource exploitation altogether to find alternative sources of income, for example wage labour or social welfare payments (McCay, 1978; Pettersen, 1996). 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.

As stated earlier, fishers see natural processes as dynamic, unpredictable, complicated, disordered, chaotic, in perpetual flux. Against this background, 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: p. 75). This viewpoint is seconded by 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: p. 54)

However, this view seems to focus entirely on endogenous contextuality. Even local stakeholders cannot foresee 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 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, socio-ecological regimes may seem to be adaptive, but in the long term they may turn out to be maladaptive or dysfunctional. Although scholars frequently advocate proactive instead of reactive management policies, these can only apply to clearly bounded entities. The great challenge, then, is to create ample room in such proactive models to still be able to cope with uncertainty due to exogenous factors impinging upon localised systems of common pool

resource use. We should bear in mind, however, that there is no single best management structure: 'all structures involve trade-offs between stability and flexibility, authority and representation, social and individual' (Hanna, 1998: p. 31), while the outcomes of governance structures themselves are hard to control and predict. Therefore, managing resources in a complex, diverse and dynamic context involves a process of continual learning. These are important lessons for those about to embark on the modernisation of management regimes in Europe's southern waters.