

An Ecosystem Based Approach to the Common Fisheries Policy: Achieving the Objectives

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Summary

Introduction

1. The second report on *An Ecosystem Based Approach to the Common Fisheries Policy* outlines some of the basic conditions for its implementation in terms of policy measures and institutional frameworks. It acknowledges that existing policy, designed essentially to make short term adjustments to fishing effort while maintaining the overall *status quo*, is inappropriate to the implementation of an ecosystem based approach to management. It argues for the introduction of new policy instruments and a progressive restructuring of management institutions.

The policy approach

2. To date fisheries management has been conducted almost exclusively through regulation i.e. the imposition of rules limiting fishing activity. By comparison with agriculture, the policy approach largely neglects opportunities for persuasion in the form of financial incentives and market mechanisms. Although there are significant differences between agriculture and fisheries, which make the direct transposition of policy measures from one area to the other difficult or impossible, it should be feasible to develop a less regulatory and more balanced approach to fisheries policy.

Policy instruments

3. Translating the ecosystem objectives defined in the previous report into permitted levels of overall fishing mortality will require a considerable reduction in fishing activity and significant job losses throughout European fishing industry. Such changes can only be contemplated as part of a long term strategy. This needs to take particular account of the transitional problems in moving towards a more sustainable future for the fishing industry by phasing in the more drastic measures over a ten to fifteen year period.
4. Although the temptation within the policy hierarchy may well be to seek to achieve the new objectives by intensifying current management practice, existing measures offer little prospect of achieving the required reduction and restructuring of fishing activity. The industry has lost confidence in the efficacy of the existing approach and new measures will be needed to steer policy towards the desired outcomes. Considerable improvements can be effected by measures to reduce fishing capacity. Future Multi-annual Guidance Programmes (MAGPs) will, however, need to target the reductions more precisely and a large injection

of funds will be needed to persuade sufficient numbers to withdraw voluntarily from the industry. The provision of grant aid to assist the modernisation of the industry, will also need to be revised, to avoid the re-emergence of recapitalised fishing capacity and to ensure that overall capacity is kept within the target level.

Total allowable catches (TACs) and quotas - the cornerstone of present fisheries policy - do not serve the purposes of an ecosystem approach to management particularly well. The present system is prone to too many loopholes (black fish landings, misreporting, discards etc) and is largely discredited in the eyes of the fishing industry. Moves to introduce individual transferable quotas (ITQs) may go some way to remedying some of these problems, though evidence supporting the claims to 'stewardship' values in respect of the wider marine environment is at best equivocal. An alternative might be the introduction of more transparent effort quotas (days at sea) coupled with a discards ban.

For the purpose of ecosystem based management, the use of technical conservation measures (TCMs), eg. gear restrictions, closed areas, etc. seems more appropriate. Relatively little use has been made of these to restructure the pattern of fishing. More emphasis needs to be given to:

- the phasing out of fishing methods that cause unacceptable effects to non-target species and marine habitats;
- the introduction of more selective fishing gears; and,
- the systematic use of ground closures (including long term no take zones, NTZs) to protect essential fish habitats and vulnerable populations of non-target species.

Financial measures

5. The report urges a fundamental rethinking of the management strategy and a progressive switching of the emphasis from regulation to persuasion through the adoption of financial instruments. The tradition of free and open access to fisheries is already at an end. Licensing and quota entitlements restrict access to most commercial fisheries. But, until now, fishermen do not have to pay society for the privilege of using the common pool resources; nor do they contribute directly to the overhead costs (i.e. scientific assessment, administration and enforcement) of maintaining the quality of the resource base.

The EU has relatively little experience in using financial instruments to regulate the fishing industry. Two basic forms of financial instrument are examined: financial charges levied on fishermen as payment for access to the resource and financial incentives paid to fishermen to encourage the adoption of fishing practices in line with responsible fishing.

Entry fees, payable annually on licences and graduated according to vessel size and fishing activity, and/or *resource rents*, levied on individual vessel quotas at fixed rates or through an auction system, are the preferred methods of charging the industry for the rights to fish. Care would need to be taken to ensure that such charges did not have a perverse effect by increasing fishing effort in order to cover the extra costs. Alternative means of controlling

fishing effort through charges, which have been mooted in the past, involve levying *taxes* on landings or, more appropriately, on fuel (as a cost factor directly proportional to effort).

Financial incentives work to persuade fishermen to take decisions which conform with the general thrust of fishing policy. *Environmental resource payments* could, for example, be introduced to support responsible fishing practice in ‘environmentally sensitive marine areas’ (ESMAs), where the marine ecosystem is at risk from the use of certain types of gear and/or from fishing carried out at certain times of the year. ESMAs could form a third tier of designated areas after Marine Nature Reserves and No Take Zones.

Finally, *market incentive schemes*, eg. eco-labelling, similar to those being developed on a global scale by the Marine Stewardship Council, would be a useful addition to an ecosystem based strategy for fisheries management.

6. It will be important to present the new policy measures as part of a well integrated package. Financial measures would be used to reinforce the aims of regulation and to accelerate the processes of change by confronting fishermen with clear economic choices - whether to leave the industry voluntarily through decommissioning schemes, or, to remain and pay for fishing rights through resource rents etc. Equally, it will be important to convince politicians and the general public that the introduction of financial instruments will not impose a burden on public expenditure: over time, the incomes generated through resource rentals will be used to finance incentive schemes (decommissioning, environmental resource payments etc) and may best be seen as in the nature of a loan scheme to assist the development of the fishing industry.

Institutional reform

7. The centralised system of fisheries management which characterises the present CFP is unlikely to be appropriate to the needs of an ecosystem based approach. Indeed, a fundamental feature of the approach is the need for the regionalisation of management, so that the details of the regime can be tailored to the requirements of the particular ecosystem.
8. The basis for ecosystem based management at the regional level would be provided by *Integrated Regional Management Plans* (IRMPs). These would comprise a status report describing the current situation and a strategic management plan detailing specific management targets for the marine ecosystem and the commercial fisheries. IRMPs would be structured to provide short and long term objectives, in line with those described in *Defining the Goals*. They would serve as a framework for coordinating other environmental policy initiatives such as Biodiversity Action Plans (BAPs) and Special Areas of Conservation (SAC).

9. A nested structure of management regions is suggested, including:
 - a. *regional seas*, used as the basis for the IRMPs;
 - b. *national marine regions*, a subdivision of the regional seas falling within the Member State's EEZ; and
 - c. *Sea Fisheries Districts*, as the basis for locally devolved management of inshore waters.
10. It has become fashionable to argue that good governance in fisheries requires the adoption of co-management, involving stakeholders directly in the formulation and implementation of policy. There are, however, sound reasons for advising caution in the adoption of co-management systems in the early stages of developing an ecosystem based approach. What is envisaged, therefore, is a gradual progression towards true co-management, beginning with the establishment of regional consultative committees - combining scientific and professional expertise - but eventually evolving into devolved regional institutions, with a significant degree of autonomy in determining the detailed management strategies for the regional seas.

Possibly the most useful model for the consultative committees is the *Fisheries Resource Conservation Council* (FRCC) in Atlantic Canada, comprising 15 experts drawn from the scientific and fisheries communities together with *ex officio* members from the federal and provincial administrations, which makes its recommendations directly to the Minister for Fisheries and Oceans. The FRCC has already exerted a strong influence on fisheries policy and on research priorities.

Perhaps ten to fifteen years hence, one could contemplate the formalisation of the regionalisation approach through the establishment of *Regional Fisheries Councils* formed of scientists, stakeholder representatives and administrators drawn from the relevant coastal states with powers to develop regional management strategies for the regional seas, subject to ratification by the EU Council of Ministers.

Management of inshore waters is likely to remain the responsibility of Member States after 2002. The organisational arrangements are best left to reflect the natural conditions and also the political cultures of the individual Member State. In England and Wales a sound basic framework for inshore management exists in the form of the Sea Fisheries Committees (SFCs), though there are good reasons for recommending a review of their structures, powers and funding to ensure that they are adequately equipped to cope with the increasing pressures for the sensitive management of inshore waters.

A programme for implementation

11. The successful implementation of an ecosystem approach will depend on the careful synchronisation of the different elements of the new policy. The implementation programme, developed over a longer time scale than is normal, must allow sufficient time for both the industry and the fisheries administrations to adjust to the considerable

implications of policy reform. Well defined, interim targets at five year intervals, should be established as staging posts *en route* to the eventual goal, but the programme must retain sufficient flexibility to take account of any unforeseen events.

Although detailed targets may not be available much before 2005, there is no reason to delay the introduction of special measures to accelerate the planned reduction in fishing capacity. While the implementation of the new financial measures (resource rents and environmental resource payments) is likely to be deferred until after the setting of the detailed targets, the intention to introduce such measures should be announced as soon as possible, thus preparing the industry for what is a major change in fisheries management, and to give individual fishermen time to consider their options. Regionally specific measures, such as the introduction of gear restrictions, are likely to be phased in during the second five year period, after the completion of the IRMPs.

Broader implications

12. The introduction of an ecosystem based approach, as outlined above, will have far reaching implications. Reductions in fishing effort could bear heavily on the fishing communities and intensify quite dramatically the familiar spiral of job losses, out migration and ageing population structures. Decisions may have to be taken to protect certain socially important elements of the fishing industry through preferential access to resources and exemptions from resource rents. The scientific community also faces a radical reappraisal of its functions in relation to fisheries management and there will be important shifts in the roles and responsibilities of stakeholders and administrators in the evolving policy process. For the general public the impacts will be muted. Nonetheless some initial disruption to supplies of fish and, in the short term, higher retail prices are to be expected as a consequence of reduced fishing activity. The benefits in terms of improvements to the marine ecosystem and the recovery of threatened non-target species may go largely unnoticed.

Conclusion

Radical reform of fisheries policy in Europe is inevitable. There is, in effect very little choice. Either one can continue the largely unplanned decline of the fishing industry or develop a strategic programme of structural change phased over 15-20 years and based around a package of adequate compensation for those willing to leave the industry and financial inducements to restrain fishing effort and steer the industry towards more responsible fishing practice. Meanwhile a regionalised approach can integrate the broad thrust of structural change with more specific issues relating to the management of the ecosystem.

1. Introduction

This is the second of two reports exploring the opportunities for developing an ecosystem based approach to fisheries management in the context of the European Union's Common Fisheries Policy.

The first report - *Defining the Goals* - was concerned with identifying specific objectives by which to structure such an approach. The second report seeks to outline some of the basic conditions for the implementation of an ecosystem based approach in terms of policy measures and institutional frameworks.

Until quite recently, fisheries management was directed almost exclusively at safeguarding the continuity of commercial fishing activity in the short term by ensuring the renewal of resources sufficient to sustain fishing effort at more or less existing levels. In the past ten to fifteen years, however, there has been a growing realisation of a prior need to reduce fishing effort very considerably in order to guarantee the continuity of fishing over the longer term. Accordingly, the CFP has seen measures to reduce overall fishing capacity, significant reductions in total allowable catches, increases in mesh size, etc. But, in practice, these actions have fallen well below the best estimates of what is required to achieve sustainable levels of fishing effort for commercial fish stocks. Furthermore, very little action has been directed towards achieving ecosystem objectives.

The assumption has been that measures intended to reduce fishing effort would be sufficient to bring about significant benefits for the marine ecosystem. Direct action has been judged to be either unnecessary or impracticable and examples are therefore very limited.

It is becoming increasingly clear that this situation cannot be allowed to persist. Instead,

- the short term approach, involving periodic adjustments to the system with a minimal level of disturbance to the *status quo*, must be replaced by the development of a *long term strategy*;
- this strategy must be guided by a set of clear *objectives* for both fisheries and ecosystem sustainability;
- it must be punctuated by well defined *milestones* in the form of interim targets;
- it must be supported by an effective *monitoring system* and by provision for strong remedial action if the interim targets are not achieved;
- the development of an ecosystem based approach will require the reassessment of the efficacy of existing (or new) *policy instruments* for fisheries management in the light of revised objectives, targets etc; and
- a reconsideration of the *institutional frameworks* for the formulation and implementation of the strategic approach to a more integrated system of fisheries management.

The purpose of the present report is to examine the last two aspects - the efficacy of policy instruments and institutional frameworks - against the background of the objectives identified in the previous report. Those objectives may be summarised as:

- the provision of ecosystem impact assessments alongside advice on fisheries management options;
- the establishment of limit reference points for all target and non-target species and the definition of best fishing practice;
- the protection of essential fish habitats; and
- the taking of all necessary steps to ensure that no damage to the ecosystem results from irrational or irresponsible fishing activity.

While the agenda for change should be addressed, as far as possible, within a framework formed by the principles of non-discrimination and relative stability, these principles should not be allowed to obscure nor obstruct the prior goal of sustainable development for commercial fisheries and marine ecosystems developed in tandem. Should this prior goal be thwarted, those with a responsibility for fisheries and marine conservation will stand accused of failing to achieve inter-generational - as distinct from intra-generational - justice.

If the assumptions in the first report - *Defining the Goals* - concerning the necessary reductions in levels of fishing mortality are shown to be correct, then the changes required in the transition from the current situation to that envisaged under conditions of an ecosystem based approach are substantial. We are conscious of the need to manage these changes as sensitively as possible and without unwittingly destroying large parts of the fishing industry in the process. What is suggested in the report is a long term strategy involving the gradual build up of a new management regime. We cannot, however, afford to delay the introduction of new measures to reduce fishing effort too long. Although the aim is to develop a long term strategy over a period of perhaps 20 years, the scale of change will require the adoption of interim arrangements in order to maintain some degree of continuity to the management system. These interim arrangements should assist the progressive implementation of the longer term strategy. As far as possible, the distinction between short term arrangements and longer term objectives will be maintained in the unfolding of the report. The starting point for the progression towards a new order is 2002 when it is hoped that the revision of the CFP will signal a more robust approach to the conservation of fish stocks and the marine ecosystems which support them. Thereafter, we see a need to create milestones for the development of the new policy at five and ten year intervals.

The report begins by examining the broad approaches to fisheries management both present and future (Section 2), before analysing the policy instruments (Section 3) and institutional frameworks (Section 4) appropriate for an ecosystem based approach to fisheries management in the European Union. Section 5 attempts to map out a rolling programme for the implementation of suggestions contained in the previous sections. The report concludes with an assessment of the likely impacts of an integrated approach to fisheries management and the issues it will raise both for the fishing industry and for society in general (Section 6). The reader should, however, note that our intention is not to provide a detailed blueprint for achieving the ecosystem objectives associated with fishing but rather to explore various possibilities for developing a policy approach which could give a better guarantee of delivering a sustainable fishing industry in a sustainable marine environment.

2. Fisheries management: the policy approach

Unlike several other areas of environmental concern, fisheries management has been typically conducted on the basis of *regulation* i.e. the laying down of rules concerning specific limits to fishing activity. Infringement of the rules can lead to financial sanctions (fines, confiscation of catch and illegal gears, the impounding of vessels etc) and ultimately to the withdrawal of use rights. Most of the rules are introduced or amended in a more or less *ad hoc*, incremental fashion, usually in response to particular adverse trends within the fishery and with little or no strategic guidance. Fishing has become a chronically over-regulated industry. Under the changing conditions of an ecosystem based approach to management, therefore, a major challenge is how do we achieve the new objectives without increasing the regulatory and bureaucratic burden. There are no easy solutions. But a fundamental reappraisal of the broad thrust of policy working in fisheries may suggest some ways in which the policies may become less oppressive.

In agriculture, the multifunctional nature of land management demands a more structured approach and a much more diverse range of policy measures (Lowe *et al*, 1999). Thus managing the joint production of marketable goods and non-marketable environmental services can involve several different kinds of instrument, used either separately or in combination, including:

- *persuasion* through the provision of information, advice, training, voluntary codes of practice etc;
- *compulsion* in the form of legal prohibitions to prevent negative effects;
- *incentives* in the form of payments for voluntary action favouring the production of positive effects through management agreements etc;
- *market mechanisms* through adjustments to prices, product regulation and ecolabelling; and
- *public interest ownership* involving the dedication of land and consequent restrictions on development rights for the purpose of producing public rather than private goods (e.g. National Nature Reserves).

By contrast, in most systems of fisheries management to date only compulsion is used.

Similarly, the joint management of agricultural land for the production of market and non-market goods involves the development of a more structured policy approach as indicated in Figure 2.1. The pyramid describes four separate levels of policy, comprising:

- i. a baseline of minimum standards applicable to all agricultural areas to ensure the protection of environmental resources against irreversible damage from farming activities;
- ii. a basic tier representing contracts available to all farmers as an environmental resource payment for maintaining the essential fabric of the countryside;

- iii. a higher tier of targeted measures where resources are required either to achieve special management of areas with high environmental value or to restore degraded rural areas or to revitalise the rural economy; and
- iv. special sites, eg National Parks, SSSIs etc. (Lowe *et al* 1999).

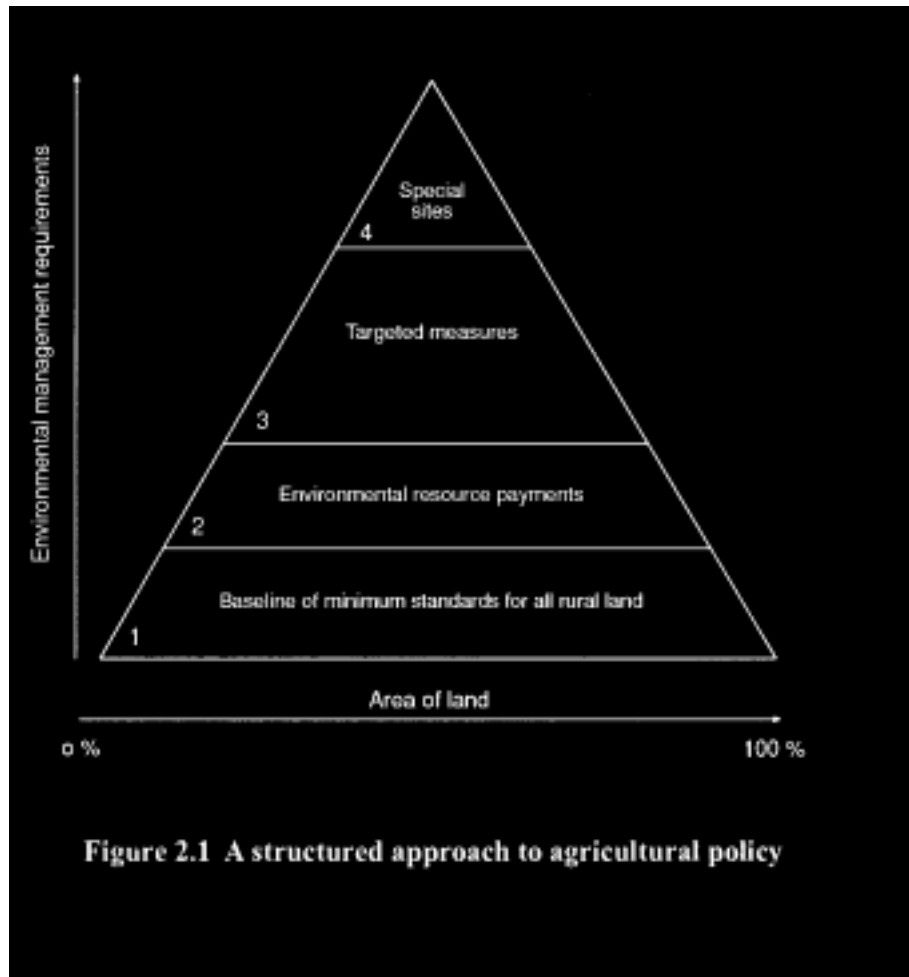


Figure 2.1 A structured approach to agricultural policy

Neither the range of instruments nor the pyramidal structure can be applied automatically to a policy for the integration of fisheries and marine ecosystem management. Among the principal reasons for this lack of transferability are the contrasting natures of land and water as productive media and differences in property rights. Whereas agricultural land in Europe is almost universally held in individual private ownership and occupation with a significant range of development rights attached to the ownership of landed property, in marine fisheries private ownership of the basic resource (the fish stocks) is not possible. The nearest one can approach to private ownership is the privatisation of use rights through a system of individual transferable quotas (ITQs). But privatised use rights (usufruct) rarely confer any significant development rights. For example, while a farmer may improve the quality of his land through drainage, fertiliser inputs, etc. or alter its use through investment in new buildings for agricultural or non-agricultural purposes, subject to planning consent, the fisherman's opportunities for exploiting his quota rights are much more limited

In practice, therefore, the second and third levels in the agricultural policy pyramid - environmental resource payments and targeted measures, both available to individual producers for the maintenance or improvement of the basic fabric of the countryside - have only a very limited application within fisheries, and the policy pyramid would need to be significantly modified. The present fisheries system is depicted in Figure 2.2(a), that is with the bottom and top layers remaining broadly the same but separated by a void of policy measures in the intervening tiers. It is not unreasonable, however, to contemplate the infilling of this void (Figure 2.2(b)) at some point in the future, through the introduction of policy instruments akin to 'environmental resource payments' applicable in certain designated 'environmental priority areas'. More radically, perhaps, one could also anticipate the introduction of 'environmental resource rents', whereby, fishermen would have to bid for access rights on the basis of payments graduated according to the anticipated ecosystem impacts from the proposed pattern of fishing activity (see Section 3). The introduction of such instruments, together with systems of ecolabelling, could help to switch some of the emphasis away from regulation (or compulsion), towards financial and market mechanisms. For the immediate future, however, the main scope for enhanced management action probably still lies in raising the level of the regulatory floor in terms of the minimum environmental standards applied to all marine areas within EU waters. This, in itself, will prove a contentious issue. However, the long term intention would be to reduce the burden of detailed regulations and to replace part of the regulatory function by a system of

financial inducements in order to underpin an ecosystem based approach to fisheries management.

3. Policy instruments

3.1 Introduction: what needs to be done

The objectives of an ecosystem based approach to fisheries management, as elaborated in *Defining the Goals* and summarised briefly in Section 1 above, give a fairly clear indication of the task ahead. Attainment of these objectives will involve:

- significant reductions in fishing capacity;
- stricter regulation of fishing effort to conserve both target and non-target species;
- moderation of the ecosystem impacts of fishing activity; and
- protection of endangered habitats and species.

Some of these objectives will require universal methods of regulation (or inducement) applied without discrimination throughout the whole of the EU's 'common pond' - or at least throughout its individual 'regional seas' (see 4.3a below). Other policy instruments will need to be adopted in a more locationally specific way in order to reduce the pressures from fishing with certain gears in particular areas and at specific times, where vulnerable species are to be found. As a result, greater demands will need to be placed on existing systems of regulation and, at the same time, new measures will need to be introduced in order to create the basic conditions for a sustainable future.

It is more than likely that translating precautionary limit reference points for both commercial and non-commercial species into permitted levels of overall mortality will require a considerable reduction in fishing activity within EU waters - at least equal to if not in excess of that recommended in the Lassen Report (1996) - and so have a traumatic effect on the European fishing industry in terms of employment. How, then, can one justify use of the term 'a quiet revolution' to describe the consequences of such changes? Certainly, the scale of change demanded of the European fishing industry in order to create a secure basis for its long term sustainability, in the context of a healthy and vigorous marine ecosystem, will be hard to comprehend. 'Pay now, live later' scenarios usually fail to bridge the gap between the realities of the short term costs of reducing fishing opportunities and the promise of longer term benefits of sustainable fisheries in the future - a failure which makes them difficult, if not impossible, to sell to the industry. The risks of dislocation for the industry, as a whole, and the very real threat of considerable job losses in fishing dependent areas makes them unacceptable. It is crucial that any policy for radical change should take into consideration the particular problems of transition from the currently untenable situation to a more secure future. The fears of the industry can only be quietened through the development of a carefully articulated programme of long term restructuring of the industry throughout the EU and the means by which it is regulated, together with guarantees of adequate compensation for individual fishermen and effective 'after care' for the worst hit regions through properly funded redevelopment projects.

In outlining a way forward, what matters is not the efficacy of particular policy instruments but the effectiveness of the overall package of policy measures. No management system rests solely upon a single instrument, though the present CFP comes close to an overriding dependence on TACs and

quotas. 'Effectiveness' is a function of several factors: the relevance of the package to the task in hand, its transparency and enforceability, and the perception of fairness in the minds of fishermen which will influence their willing compliance with the rules. For the package as a whole it will be important to retain a measure of flexibility both for management as a whole and for the individual fishing enterprise. In the early stages, at least, an ecosystem based approach must take on some of the character of 'adaptive management' (Hilborn and Sibert, 1988), willing to recognise and address its own imperfections, able to introduce emergency measures to rescue particular situations and ready to respond to unforeseen changes in the marine ecosystems themselves. Flexibility and adaptability are particularly important as fisheries policy will be venturing into the relatively uncharted waters of an ecosystem based approach at a time of potentially significant global climatic change.

The ensuing analysis of policy instruments begins with an assessment of how far existing policy measures can be taken in pursuit of the new policy agenda before examining the possibility of introducing new forms of policy instrument, including financial measures, and finally outlining a rolling programme of policy development over a 20 year period. This programme could, with the will of the EU and its Member States and the cooperation of the fishing industry, guarantee to create the conditions for the sustainable prosperity of the industry and help to ensure the integrity, diversity and productivity of ecosystems in what are, at present, highly stressed marine environments in European waters.

3.2 Turning the screw

Within the European Union's CFP, the management system has already developed an extensive system of policy instruments to help fulfil its conservation objectives in respect of commercial fish stocks. To date, however, the existing instruments have not experienced unqualified success in achieving even those limited objectives. Inappropriate regulation, weak enforcement and an unwillingness to plug the loopholes are some of the reasons why the fishing industry throughout Europe has lost confidence in the current system. Nonetheless, there will be a temptation to deploy these same measures in an attempt to fulfil the new ecosystem objectives. However, it is highly unlikely that these will be sufficient to arrest those aspects of the degradation of the marine environment that stem from fishing activity. New measures will certainly be needed to accelerate and steer the policy process towards the desired outcomes.

Some improvements in the general health of marine ecosystems can certainly be effected through a more stringent application of the basic conservation measures already in existence. Central among these are measures to take out excess fishing capacity, as currently embodied in the EU's Multi-annual Guidance Programmes (MAGPs), though these are at present rather too coarsely defined in terms of area and gear type to be really appropriate tools for ecosystem based management. Their effectiveness in downsizing the fishing fleet in terms of fishing capacity is undermined by the tendency to remove the least efficient units at relatively high costs and their overall impact will, in any case, be eroded by the inevitability of future technological advances in vessel and gear design. Moreover, the current level of incentive to decommission active fishing vessels is unlikely to be enough to generate a sufficiently large and rapid reduction in the fishing industry. A massive injection of European funds will be needed to persuade more fishermen to withdraw voluntarily from fishing, together with a complementary commitment by Member States to provide the matching

funds. At the same time, stricter controls over the use of Structural Funds for the modernisation of the surviving fleet are needed both to ensure that the effects of 'technological creep' do not outweigh the benefits gained through decommissioning and to prevent the re-entry of decommissioning capital into the fishing industry through the conversion of small boats (under 10 m) into the capacity equivalents of much larger boats.

Total allowable catches (TACs) and systems of quota management have provided the cornerstone of conventional fisheries management within the EU's CFP and, indeed, throughout most of the developed world. Once the allocation keys have been agreed, TACs and quotas become more or less politically neutral forms of regulation. They are relatively simple to implement, relying essentially on annual stock assessment and scientific advice - and the inevitable political negotiations - to fix the annual value of the TAC and quota. From the point of view of their future application in a system designed to conserve both fish stocks and the wider marine ecosystem, it is doubtful whether the present practice of single species TACs and quotas can adequately serve the new objectives. Multi-species TACs, calculated on a precautionary basis, though more in tune with the ideas of ecosystem based management, are likely to mean considerably lower levels of permitted fishing activity and could lead to increased levels of discarding due to high grading. The potential benefits of multi-species TACs and quotas might also be undermined by increased levels of discarding of the less valuable quota species in order to maximise the revenue from the fishing trip.

But part of the problem is that quota management has become discredited in the eyes of an industry unconvinced of the reliability of the scientific basis of the system and only too conscious of the loopholes (discards, blackfish landings, misreporting etc) which undermine its efficacy. Notwithstanding these drawbacks, the CFP is likely to stick with the current systems as the basis for its conservation strategy. At the level of the individual Member State the search will continue for ways of improving their reliability. Here, one of the key issues is the possible introduction of individual transferable quotas (ITQs) in the quest for greater efficacy. Among the advantages rightly claimed for ITQs is that they arrest the destructive 'race to fish', characteristic of common use rights, and the concomitant overinvestment in technologies designed principally to increase the capacity of the individual vessel to outfish its competitors. This clearly would be of some indirect benefit to the marine ecosystem. But the principal bonus of a market regulated quota system - at least in terms of public expenditure - is that the rationalisation of the fishing fleet would be achieved largely through the elimination of the marginal producers through the trading of quotas. The expectation is that through the mechanism of the open quota market, quota entitlements would be increasingly concentrated in the more competitive units. Otherwise, the conservation benefits of ITQs remain largely untested. Evidence relating to discarding is ambivalent and the argument that rights based management systems may lead to an increased expression of 'stewardship' values over marine resources among the quota holders seems at best equivocal. Rational use of an ITQ might encourage greater care for the target species but would be unlikely to do much for non-target species.

An alternative development in the management of fishing effort could well be the introduction of effort quotas (days at sea) in place of - or possibly in addition to - catch quotas. Effort quotas hold a number of theoretical advantages over catch quotas in that they are more easily monitored and enforced through modern GPS technology. They could help to eliminate some of the malpractices that have grown up in association with catch quotas and, used in conjunction with a discards ban, considerably reduce the level of wastage of raw material. The direct benefits in terms of the

ecosystem objectives are somewhat less clear. Indeed, the tendency could well be for vessel owners to invest heavily in production enhancing technologies which would increase their harvesting potential during the permitted fishing time and, which might imply greater risks of damage to habitats and non-target species. An effort based quota system would lend itself just as well to privatisation of fishing rights in the form of ITQs. In both instances, therefore, it might be desirable to introduce special measures to protect the vulnerable small boat sector from the risk of decimation as a result of the concentration processes engendered by the quota market.

Of rather more direct relevance to the specific objectives of ecosystem management is the suite of technical conservation measures, including the design and use of fishing gears and the regulation of access to particular fishing areas. Collectively such measures are sometimes referred to as 'parametric management' (see Wilson and Dickie, 1995). By ensuring that the appropriate precautionary measures are adopted in the right places at the right times, parametric management is capable of addressing some of the more important causes of degradation of marine ecosystems resulting from fishing activity, and of providing more closely targeted strategies for the protection of vulnerable habitats and species. Technical conservation measures, such as banning highly impacting gear and seasonal closures of important spawning and nursery grounds, could form the basis for preserving essential fish habitats.

To date, however, little use has been made of technical conservation measures to control the impact of fishing activity on the wider marine ecosystem: the phasing out of drift nets and restricted access to tuna fisheries to prevent the incidental capture of cetaceans and the decision to close the sandeel fisheries in some 20,000 km² of the North Sea off the coasts of north east England and Eastern Scotland to protect seabird populations, stand out as the main examples in the EU. Instead, technical conservation measures are used principally as a means of improving exploitation patterns in commercial fisheries by reducing the risks of capture for particular age classes of fish and at particular crucial stages in their life cycles. In general, technical conservation measures are underused in the context of the CFP. The EU has so far concentrated its efforts on defining minimum mesh sizes for use in broadly defined zones and for particular groups of species. Greater conservation benefits, for both target and non-target species, could be achieved by the wider adoption of recent developments in gear technology (separator panels, rigid grids, modified cod-end geometry etc), though there are problems with their implementation in the mixed fisheries which characterise much of the EU waters. Moreover, some measures (e.g. separator panel) require the willing, as opposed to the enforced, collaboration of fishermen.

Except in inshore waters under the control of individual coastal states, comparatively little use has been made of access restrictions. Area closures are regarded by many conservationists and some scientists as a principal tool for ecosystem based management. The term covers a wide spectrum of regulation including :

- i. total closures where no fishing activity is permitted at any time;
- ii. seasonal closures where fishing activities are banned for particular periods of the year (e.g. the spawning season);

- iii. temporary closures, introduced usually as emergency measures, as in Iceland when the composition of target species populations are found to contain significantly high proportions of immature fish; and
- iv. selective closures where specific fishing gears and/or vessel sizes are excluded on a permanent or seasonal basis either to conserve particular stocks or to protect the marine habitat or to separate non-compatible fishing activities (Symes, 1999b).

Recently emphasis has been placed by conservationists and some fishermen on the concept of No Take Zones (NTZs), a form of permanent closure successfully adopted in certain tropical reef fisheries, as a basic measure for restoring depleted stocks of commercial fish and/or protecting the marine ecosystem. In temperate waters, however, effective conservation of fish stocks may require large areas of sea to be permanently closed for fishing. For the fishing industry, therefore, NTZs would be regarded as a measure of last resort, although some might argue we are already at that point. From an ecosystem based management perspective they offer a potentially valuable policy instrument and management tool.

3.3 Paying the price

Apart from the introduction of regulations in support of more selective fishing gears and an increased use of closed areas, there is relatively little in the existing range of regulatory measures which offers a truly positive way forward for ecosystem based management. Nonetheless, from a conventional standpoint, shared by most administrators, some fisheries scientists and economists, and perhaps many in the fishing industry, the soft path for the development of fisheries management lies in sticking largely with the system we have and intensifying and fine tuning existing regulatory measures in hope that this will be enough to satisfy the demands of the ecosystem objectives. A likely scenario for a future CFP would therefore be characterised by tougher MAGP targets, further reductions in TACs, a tightening of bycatch limitation and minimum landing size measures and increased mesh sizes. If past experience is anything to go by, this would be as unlikely to resolve the resource crisis as it would be to arrest the degradation of the marine ecosystem.

The need, therefore, is to rethink the management strategy for the EU's fisheries and to restructure the overall package of regulatory measures by altering the emphasis given to certain features of the present system and, more importantly, giving serious consideration to the introduction of financial instruments. In this way, one would begin to shift the overall emphasis of management away from its current preoccupation with compulsion through regulation and more towards an element of persuasion through the use of financial penalties and inducements. The tradition of 'free and open access' to the fisheries is virtually ended. Access is increasingly restricted through licensing and quota entitlements but this mainly offers a means to cap existing fishing capacity rather than reduce it. In most instances of commercial, as opposed to recreational fisheries, access to the resource remains free in the sense that fishermen do not normally have to pay for the privilege of using what are essentially common pool resources. Nor do they have to contribute directly to any of the costs involved in maintaining the quality of the resource base. As indicated in Section 2 above, in agriculture financial mechanisms are commonly used not only to steer production towards socially desirable outcomes, but also to persuade farmers to use the environment rationally. There is no fundamental reason why similar financial measures should not be used in fisheries to the same ends.

Indeed, one might argue that there good grounds for insisting that fishermen should compensate society for any damage inflicted on the marine environment as a result of exploiting the marine commons.

So far, however, we have little or no experience in Europe of using financial instruments to regulate fishing activity beyond buy-out schemes to persuade fishermen to decommission their vessels, grant aid to assist the modernisation of the fishing fleet, and market intervention to maintain minimum price levels for first hand sales of fish. Significantly, the balance of expenditure in the EU in support of the fishing industry has been directed towards improving productivity and incomes rather than reducing fishing effort and conserving the ecosystems. At a time of resource crisis for the fishing industry and of growing concern for the state of the marine environment, it is surely appropriate that we should look to restructuring the limited financial aid available to the industry so as to shift the balance from production subsidies to some form of environmental management payments.

Financial measures can be grouped in several different ways. What follows is based on a very simple division into financial charges where fishermen must pay for their fishing activity, and financial incentives where fishermen receive financial inducements to modify their fishing behaviour in line with the concept of responsible fishing. As it is unlikely that there will be the political will, either in the EU or at Member State level, for a massive injection of public funds to assist restructuring of the European fishing industry, it is important that the schemes should be clearly seen to be self-financing in the sense that, over time, payments to fishermen (compensation, grant aid, environmental resource payments etc) should be funded through receipts from resource rents etc.

Financial measures are intended to act as mechanisms to persuade fishermen to make appropriate decisions as opposed to compelling them to act in accordance with rules and regulations. To an extent, therefore, their revenue raising function is secondary although revenues will be used to fund any incentive payments envisaged. In effect, financial measures should be seen as economic incentives or disincentives acting as market signals, either by raising the cost of undesirable patterns of fishing activity or by improving the returns from adopting more environmentally friendly practices. By altering the profitability of fishing activities, they can help to steer fishing in a particular direction. Thus, they are intended to influence fishermen in modifying their patterns of behaviour so as to conform with the principles of responsible fisheries and good environmental practice.

Financial charges, as the term implies, impose additional costs on the fishing enterprise. They can be subdivided into two groups:

- i. *fin*es for the infringement of regulations - at present these are generally considered to be relatively ineffective as sanctions against illegal practices because of the low risks of detection and the relatively trivial levels of financial penalty extracted; and
- ii. *charges*, levied on fishermen for participation in the fishery in the form of entry fees, resource rents or taxes :

Entry fees, could be made payable annually on licences, and could be varied according to vessel size, gear and fishing pattern so that enterprises likely to inflict more severe forms of damage on the fishery or its ecosystem are discouraged from participating in the fishery.

Resource rents, could be levied annually on individual (non-transferable) vessel quotas (IVQs) either at fixed rates or subject to auctions with either open or closed bidding systems. As with ITQs, resource rents would tend to discourage the marginal producer. Unpurchased quotas could be banked in order to reduce overall fishing effort, or become subject to competitive tendering from other fishing enterprises, or form a quota reserve for new entrants to the fishing industry. To facilitate the entry of new blood, start up enterprises might need to be charged lower rentals over, say, the first five years of their existence. Careful monitoring would be required to ensure that such concessions were properly targeted on genuine new entrants to the industry and not used for the restructuring of existing enterprises.

Care would also need to be taken to ensure that entry fees and resource rents did not have a perverse effect on decision making. The extra costs imposed on the enterprise could act as an incentive to increase fishing effort in order to maintain income levels. For this reason, graduated charges increasing in proportion to the scale of the enterprise or the level of production, are preferred to flat rate charges. More importantly, the charges should be designed to reflect the level of damage to fish stocks and the marine environment inflicted by particular forms of fishing activity.

A third form of financial charge on the industry is taxation. Economists have long argued that taxes on landings, differentiated according to species and even sizes of fish, could be used to manipulate patterns of fishing to favour under exploited stocks and species and reduce fishing effort on severely stressed stocks. It is, however, difficult to see how landing taxes would work to the benefit of non-target species, except through the indirect effects of reductions in fishing effort. Indeed, landing taxes would be likely to exacerbate the problem of discards through increasing the pressure to high grade the catch and to dump the least profitable components of the catch. An alternative might be to levy a tax on fuel - one of the most important cost elements of the fishing trip - and a tax that would therefore be proportional to effort. The rationalisation of the fishing trip so induced could, however, lead to increased pressure on local inshore waters, their sensitive habitats and ecosystems and thus prove counterproductive from an ecosystem point of view.

On balance, from an ecosystem management perspective, the most useful form of charges levied on the industry would be a combination of annual entry fees, imposed on licences and varied to penalise the more environmentally impacting forms of fishing, and resource rents payable on individual vessel quotas.

By definition, *financial incentives* work in the opposite direction: cash inducements are offered to fishermen to persuade them to take individual decisions which conform to the general thrust of fisheries policy. The CFP already deploys such inducements to assist the rationalisation and modernisation of the fishing fleet. On the one hand, Structural Funds are available to assist the decommissioning of fishing vessels in accordance with the MAGP, while on the other hand, grant aid is available to support the building of new vessels - and the modernisation of existing ones - in order to maintain a modern, cost efficient fishing fleet. More than one commentator has remarked on the apparent paradox of those two financial instruments, each pulling in opposite directions, co-existing side by side at a time of grave concern over excess capacity in Europe's fishing fleets.

Where Member States are in default over their MAGP targets, access to EU construction grants is restricted.

In the context of an ecosystem based approach to management, it is clear that these two forms of subsidy will need to be carefully appraised. The problem is to find a mechanism which assists modernisation and improves economic efficiency among the surviving units of the fleet, but does not offset the attempts to rationalise the structure by adding to aggregate capacity. Considerably more money will be needed to support the achievement of future MAGP targets at least in line with the recommendations of the Lassen Report (1996). Taking ecosystem objectives into consideration future MAGP targets should be more precisely defined in terms of area and vessel type. Likewise, the grant aid packages for the 'modernisation' of the fishing fleet should be restructured so as to discourage types of fishing known to have adverse impacts on the ecosystem and new grant aid schemes should be set up to help fishermen equip their vessels with more selective fishing gear. If the ecosystem based approach to management were to lead to the establishment of extensive No Take Zones, it should be incumbent on the relevant authorities to make provision for compensation payments to fishermen excluded from fishing their traditional grounds especially where alternative fishing opportunities are not readily available - as in the case of small boat inshore fishermen - providing, of course, that the enterprises do not relocate their fishing activities outside the NTZ. Compensation payments for loss of earnings, not uncommon in agriculture but rare in fishing, would be an automatic reciprocal to systems of entry fees and resource rentals.

However, under the heading of financial incentives, the main interest lies in trying to design schemes for *environmental resource payments* similar in style and purpose to the agri-environmental schemes established under EU Regulation 2078/92, which make provision for payments to farmers for undertaking environmentally sensitive agricultural practices. The scheme involves the Member States in drawing up national programmes in which payments are made to farmers on a voluntary basis. The best known of the initiatives in the UK are environmentally sensitive areas (ESAs) and the Countryside Stewardship Scheme involving ten year management agreements to maintain and restore habitats through reduced fertiliser use, lower stocking rates, maintenance of hedgerows etc.

The situation in fishing is clearly very different especially as it is virtually impossible to assign individual property rights to fishing areas (except in UK inshore shell fisheries through Several Orders¹). As a result, collective management agreements are likely to be confined to inshore waters, while individual voluntary agreements cannot guarantee the overall improvement of environmental standards simply because the benefits accruing from the actions of any one fisherman are subject to the actions of all other fishermen exploiting the same fishing grounds or fish stocks.

Nonetheless, it should be possible for the responsible authorities to designate the marine equivalents of environmentally sensitive areas (ESMAs) and for incentive payments to be introduced on a voluntary basis to either:

- steer individual fishing behaviour towards the accepted norms for responsible fishing and good environmental practice; or

¹ Several Order - Severs the public right to fish in a specified area for a limited time. It grants to a person or association the exclusive right to cultivate and fish for specified species of shellfish.

- provide support for the continuation of low impact fishing, as for example where the small boat sector uses lighter, less damaging gears; or
- offer support for the development of collective management schemes, involving the introduction of pilot projects for environmentally sensitive fishing, voluntary agreements over ground closures etc.

ESMAs could form a third tier of designated areas behind Marine Nature Reserves and No Take Zones. Some of these initiatives have previously come under the terms of PESCA funding which is to be discontinued under the reform of the Structure Funds in 2000. It is important that this kind of financial provision is not lost as a consequence of the reform.

Finally, one should not overlook the potential contributions from *market incentives* to persuade the fishing industry to adopt more sustainable fishing practices. Ecolabelling schemes, such as that being pioneered on a global scale by the Marine Stewardship Council, act by harnessing the power of consumer choice in guaranteeing premium markets for fish harvested by approved methods (eg the use of environmentally friendly fishing gears) and from stocks which are judged not to be overexploited. Such market oriented schemes would clearly be a useful adjunct to an ecosystem based management strategy, though they are unlikely to prove an adequate substitute for state led management systems.

3.4 Conclusions: an integrated approach

What this section has attempted to do is outline the basis for a more structured approach to fisheries management, supplementing the conventional approach based on regulation (or compulsion) by the persuasive force of financial (dis-) incentives and thus filling in the gaps in the policy pyramid (see Figure 2). It is intended that these approaches should work hand in hand : financial measures should be used to reinforce the aims of regulation (reductions in fishing capacity, control of fishing effort, conversion to less damaging fishing practice etc) and to accelerate the processes of change. Any attempt to hasten decommissioning within the existing fishing fleet can only hope to succeed if there is a considerable investment of extra funds to finance adequate compensation payments. For those who remain in fishing, a well balanced system of financial incentives will be needed to persuade fishermen to comply fully with the principles of responsible fishing. Those who wish to fish more intensively and with more environmentally damaging gears must pay more for the privilege, while those willing to convert to less intensive and more environmentally friendly methods should be rewarded financially for their actions.

It will be important to convince both politicians and the general public throughout Europe that the introduction of financial instruments does not imply an added burden on public expenditure. Revenues from resource rents and entry fees will be used to finance decommissioning schemes and environmental resource payments, though these income and expenditure streams may not coincide exactly. It will almost certainly be necessary to establish a substantial decommissioning fund at the outset, in advance of the anticipated flow of income from resource rents. Therefore, any such investment by the EU and the Member States should be clearly presented to the industry as an

interest free loan to help improve its economic efficiency, with loan repayments subsequently payable through resource rentals.

In reviewing the implications of an ecosystem based approach to management and the enormity of the task ahead, we have become convinced of the need to charge the European fishing industry for the rights to fish in order to achieve long term sustainability and stability. This need will become ever more urgent as the situation in terms of fish stocks and the state of the marine environment deteriorates. We recognise that this will be deeply unpopular with the fishing industry. The sooner it is done the less severe the financial penalties will be.

Broadly, as one moves from the current management system to the new regime for the EU's fisheries, a transitional system would need to be introduced. This would make available compensation payments over the short term for those forced out of fishing or compelled to reduce their activities drastically, and would gradually taper to very low or zero levels. Meanwhile, relatively low entry fees and resource rents could be charged in the initial stages - varying the charges according to vessel size, gears etc and gradually increasing the level of charges and the differentials in order to penalise more heavily those sectors most likely to damage the ecosystem through their fishing activities.

Over the longer term, and as the problems of overcapacity become less severe, we would also expect to see a shift in emphasis from regulatory to financial forms of management - and also from conventional forms of 'numerical management' based on TACs and quotas to 'parametric management' which targets its actions on assuring the protection of essential fish habitats and maintaining the integrity of marine ecosystems.

Clearly, these broad scenarios of change for fisheries management in the EU as a whole will need to be regionally differentiated in order to target actions more precisely on the specific needs of the distinctive regional and local ecosystems. This aspect is considered more fully in the following section.

4. Institutional Framework

4.1 Introduction : who does what, where and how?

What kind of institutional framework is needed to secure the delivery of a more comprehensive and effective system of fisheries management in EU waters as outlined above? Can the new objectives be achieved through the same structures and processes that have characterised fisheries management in Europe over the past 20 years or so? Is a centralised and hierarchical system appropriate or do we need to decentralise and devolve fisheries management to ensure that the new approach is properly and sensitively implemented? These are some of the questions to be examined in the analysis of the infrastructures of good governance in the context of an ecosystem approach to fisheries management.

The distinctive feature of the ecosystem based approach is its insistence on regionalisation of management whereby the details of the management regime can be tailored to the requirements of the particular marine ecosystem and its component fisheries. In essence, regionalisation is the very antithesis of the way in which the CFP has developed in the first 20 years of its existence. The CFP has sought to harmonise and, as far as possible, to standardise the way fisheries are managed throughout the EU's 'common pond' through a system of centralised management driven by the principle of non-discrimination. Inevitably, therefore, an ecosystem based approach to fisheries management will have some sensitive questions to ask of institutional frameworks and policy processes which support the CFP. Three key parameters of governance are examined :

- the policy process;
- geographical scale; and
- organisational structure.

The three are closely interrelated and reflexive : decisions made in respect of one parameter are bound to affect the other two. Among the basic principles involved in shaping an effective system of governance for fisheries under conditions of an ecosystem based approach, three stand out as deserving of special consideration :

- decentralisation (or regionalisation) of management;
- administrative efficiency; and
- co-responsibility, through the incorporation of relevant interest groups in the decision making process.

4.2 Marine ecosystems and regionalised management

Regionalisation of fisheries management has previously been attempted at an international level in order to harmonise basic regulations for the management of the high seas, where the resources are shared among a number of states, and at sub-national level as a means of decentralising management

responsibility largely for reasons of administrative convenience. But so far regionalisation has not been used for the specific purpose of integrating the management process with the concept of marine ecosystems. Yet regionalisation clearly has a particular resonance in the context of an ecosystem based approach to management.

The GESAMP Report on *Marine Biodiversity: Patterns, Threats and Conservation Needs* (Gray, 1997) lays particular stress on the need to consider marine ecosystems as integrated wholes, quoting Begon, Harper and Townsend's (1990) assertion that.

'No ecological system, whether individual, population or community can be studied in isolation from the environment in which it exists'.

The same report also emphasises the importance of the interrelations which exist between the different scales of diversity and the concept of *landscape diversity* defined as the mosaic of habitats covering areas which may extend over hundreds of square kilometres. It reasserts the contention by Perrings *et al* (1992) to the effect that:

'...understanding and managing the habitats, as well as the landscape matrix of ecosystems... is therefore more likely to be more effective than focusing on species and populations alone, and it has been argued that in order to sustain biodiversity over multiple human generations biodiversity policy should in fact be set at the landscape level'.

Although the concept of 'landscape' obviously has its origins in a terrestrially based view of the world, and is less easily applied to marine space, the message concerning the critical scale for habitat management remains clear. An ecosystem based approach to fisheries management should be developed at a regional scale commensurate with the concept of an ecosystem.

However, marine ecosystems can be defined at various scales ranging from the oceanic basin to the local inshore waters of an estuary. Moreover, delimiting boundaries to marine ecosystems is bound to be a difficult task. While precise boundaries may not be needed for purposes of scientific description they most certainly are required for policy formulation and implementation. One is, in reality, trying to superimpose boundaries on a continuum of variation where there is a gradual gradient of changes rather than sharply defined differences. Ecosystem boundaries are essentially open: ecosystems change over time in response to both natural influences, such as global climatic change, and man made influences such as pollution and overfishing. Both will tend to modify the spatial boundaries, alter the energy inputs and outputs of the systems and affect the patterns of interaction both within and between neighbouring ecosystems.

At whatever scale ecosystem regions are defined, their principal purpose is to serve as a framework for developing integrated management strategies for fisheries and marine wildlife conservation. The basis for such strategies would be provided by *Integrated Regional Management Plans* (IRMPs) comprising:

- a *status report* describing the current situation for the environment, ecosystem and commercial fisheries and based on existing scientific information derived from a wide range of sources; and

- a *strategic management plan* detailing specific management objectives for both the marine ecosystems and the commercial fisheries and elaborating proposals for appropriate institutional arrangements and regulatory measures and for monitoring progress.

In the USA, where fisheries management is already regionalised through the Magnuson-Stevens Fisheries Conservation and Management Act 1976, a report to Congress on *Ecosystem-Based Fisheries Management* (National Marine Fisheries Service, 1999) has recently recommended the introduction of Fisheries Ecosystem Plans (FEPs) to complement the existing Fisheries Management Plans (FMPs) prepared by the Fisheries Councils for each of the fishery regions. The actions to be undertaken in the development of the proposed FEPs are summarised in Box 1. According to the recommendations, FEPs should be developed for each marine ecosystem under the jurisdiction of a Regional Fisheries Council as a template for incorporating the principles and policies of ecosystem conservation into fisheries management. In particular FEPs would be expected to:

- provide a description and understanding of the basic physical, biological and human contexts within which fisheries are managed;
- direct how that information should be used in fisheries management; and
- define strategies by which management objectives would be developed and implemented.

Translating the key features of these FEPs into the proposed IRMPs for European waters would provide a framework document, containing basic information on the structure and function of the ecosystem in which fishing activities occur, so that managers are made aware of the effects that their decisions have on the ecosystem and the effects that other components of the ecosystem may have on the fisheries. Thus the development of IRMPs would automatically satisfy the first of the ecosystem objectives identified in *Defining the Goals*, namely to inform fisheries managers of the ecosystem consequences as well as the economic consequences of particular management options. IRMPs could also be structured so that they progressively provide short and long term targets for each of the other recommended objectives :

- identifying ecological indicators;
- protecting essential fish habitats;
- balancing the needs of rational fishing patterns with those of ecosystem conservation ('rational exploitation' objective); and
- setting limit reference points for target and non-target species.

**Box 1. The development of Fisheries Ecosystem Plans
(National Marine Fisheries Service, 1999)**

“Each FEP should require the Councils to take, at least, the following eight actions :

1. Delineate the geographic extent of the ecosystem(s) that occur(s) within Council authority, including characterisation of the biological, chemical and physical dynamics of these

- ecosystems, and 'zone' the area for alternative uses.
2. Develop a conceptual model of the food web.
 3. Describe the habitat needs of different life history stages for all plants and animals that represent the 'significant food web' and how they are considered in conservation and management measures.
 4. Calculate total removals - including incidental mortality - and show how they relate to standing biomass, production, optimum yields, natural mobility and trophic structure.
 5. Assess how uncertainty is characterised and what kind of buffers against uncertainty are included in conservation and management.
 6. Develop indices of ecosystem health as targets for management.
 7. Describe available long-term monitoring data and how they are used.
 8. Assess the ecological, human and institutional elements of the ecosystem which most significantly affect fisheries...included should be a strategy to address those influences in order to achieve both FMP and FEP objectives."

Moreover IRMPs would also provide a framework for coordinating environmental policy initiatives such as Biodiversity Action Plans (BAPs) and marine Special Areas of Conservation (SACs) and fisheries policy initiatives including bycatch regulations, gear restrictions and No Take Zones.

4.3 Geographical structures: marine eco-regions and their administrative subdivisions

In defining boundaries for the purpose of fisheries management in Europe, it will be necessary to take account not only of the delineation of marine ecosystems but also the administrative boundaries at national and local authority levels (including the seaward limits of national responsibility) and the spatial units used for stock assessment and advice (ICES areas). Ideally, one can envisage a nested structure of management regions at three different scales, (i) the macro-level or 'regional seas' covering EU waters; (ii) the meso-level, embracing the Member States' EEZs; and (iii) the micro-level as divisions of the Member States' territorial waters. (see Figure 4.1)

Such a structure would not only satisfy the requirements of an ecosystem based approach by ensuring that management decisions taken at one level are able to take account of the ecosystem conditions at higher or lower levels, it would also facilitate the vital upward transfer of grassroots knowledge and opinion and the downward transfer of responsibility for policy implementation. It would also recognise the principle of subsidiarity which looks to bring responsibility for decision making as close as possible to those most directly affected.

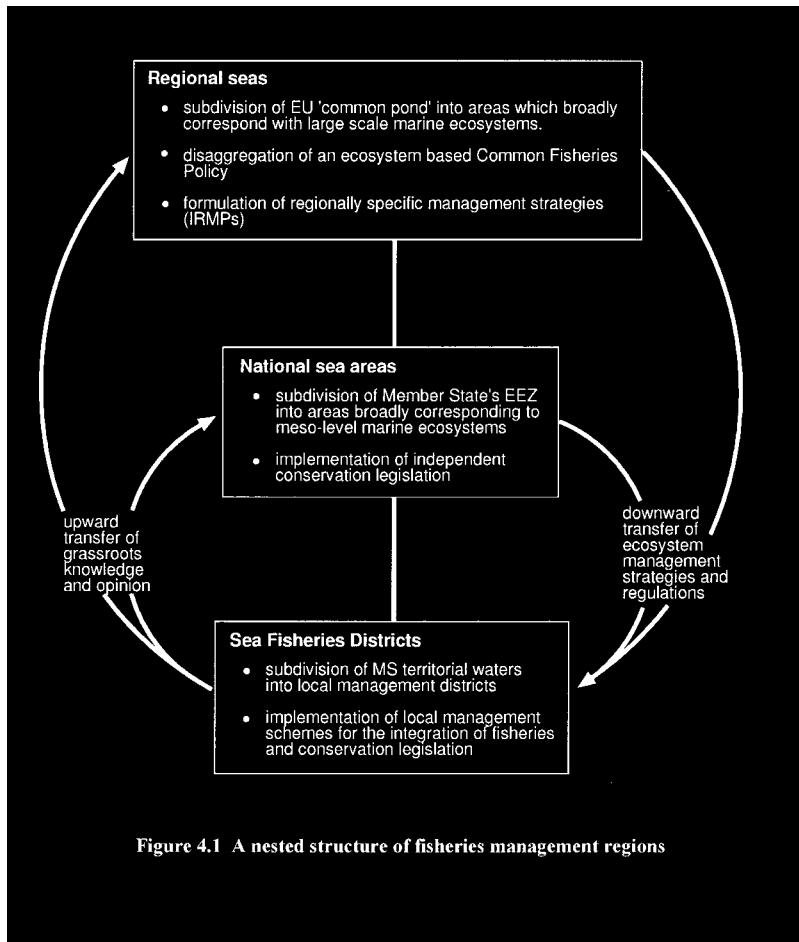


Figure 4.1 A nested structure of fisheries management regions

a. Macro- the regional seas level regions:

It is relatively easy to identify a number of ‘regional seas’ which correspond broadly with the concept of large scale, marine eco-regions. These would include the three semi-enclosed seas each with their own very distinctive ecosystem: the Baltic, Irish and North Seas - together with a more arbitrary division of the open Atlantic oceanic system. The delineation of ecological boundaries in the Atlantic is bound to be highly speculative. In Figure 4.2 a total of five ecoregional seas are identified, including the three semi-enclosed seas and a simple division of the Atlantic into a colder, northern boreal region (ICES Areas VI and VII) and the warmer, southern Lusitanian region (ICES Areas VIII & XI). The problem with this division is that it tends to ignore the significance of the ecologically transitional nature of ICES Area VII. Integrated Regional Management Plans (IRMPs) would be required for each of these six regional seas as the basis for implementing an ecosystem based approach to fisheries management.

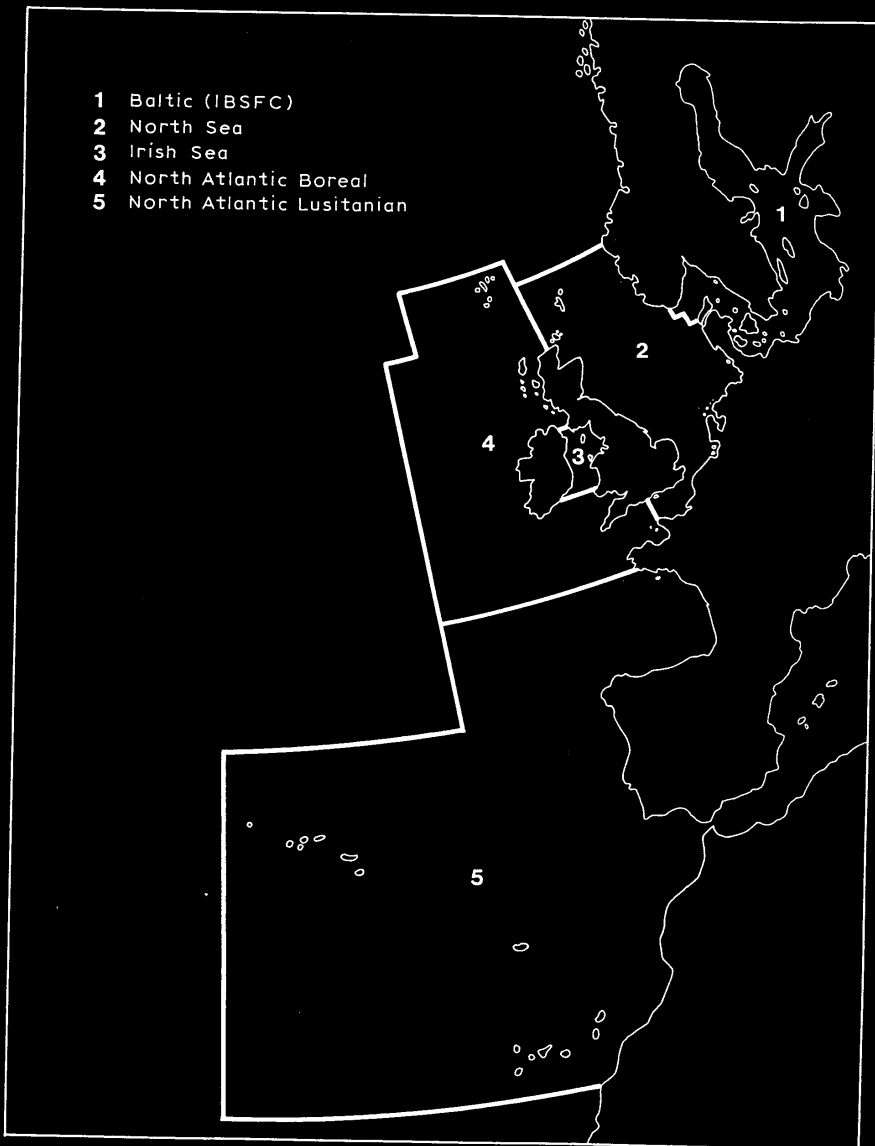


Figure 4.2 Europe's eco-regional seas

b. Meso-level regions: national marine regions

For the purposes of coordinating the national administration of fisheries and marine conservation policies it would be useful to subdivide those parts of the regional seas which form the individual Member States' sovereign EEZs into national marine regions. They would establish an essential link between the strategic management of the large scale marine eco-regions undertaken through the CFP and local management of coastal ecosystems. In terms of fisheries management there is very little scope for independent action by the Member State - mainly because the EU has assumed prior responsibility for fisheries management in the sovereign waters of all its Member States - but separate action in other fields (including marine conservation) remains vested in the Member State. For the purpose of creating a coordinated and strategic approach to the implementation of BAPs and marine SACs, a system of ecosystem based national regions is essential.

A series of subdivisions of the regional seas surrounding the UK based on ICES subdivisions (Figure 4.3) was proposed in 1995 as part of the output from a study of devolved management systems for fisheries in Europe (see Symes and Phillipson, 1996). Their

purpose was to provide a basis for improved consultation between the fisheries departments and the fishing industry and for closer coordination of the activities of different agencies involved in fisheries management. A similar, or slightly modified, system could also serve the present purposes quite well.

c. Micro-level regions: Sea Fisheries Districts

Within the present arrangements for the CFP, Member States retain responsibility for fisheries management within their 12 nm territorial waters and are therefore directly responsible for mediating the needs of both fishing activity and marine wildlife conservation within the highly sensitive inshore zone. To facilitate effective management within the 12 nm limits, the regional and national seas can be further subdivided into inshore fisheries districts, similar though not necessarily identical in form to the Sea Fisheries Committee Districts around the coasts of England and Wales (Figure 4.4). Assuming that local authorities will have a continuing function in the administration of such districts, it would clearly be sensible for the lateral boundaries of the districts to be delimited according to existing county boundaries in England and Wales and regional boundaries in Scotland. Moreover, the Districts should embrace the full extent of the territorial seas, extending to 12 nm rather than the 6 nm limits of the present Sea Fisheries Committee Districts.

Although it might seem appropriate to link the geographical definition of Sea Fisheries Districts to the boundaries of the recently established Regional Development Agencies (RDAs) for England, especially as the latter are already charged with responsibility for contributing directly to sustainable development in the UK, including protection of the environment and prudent use of natural resources (DETR, 1999). Unfortunately, as Figure 4.5 demonstrates, there is an unconformity between the boundaries of the existing Sea Fisheries Districts and the RDAs. More to the point, on the east coast of England RDA boundaries have chosen to divide key estuarine areas like the Wash and the Thames, both of which form distinctive ecosystems in their own right. A total of around 12 districts covering the British coastline would seem appropriate, involving a reduction in the present number of Sea Fisheries Districts in England and Wales and the creation of new districts in Scotland, together with separate arrangements for Northern Ireland and the Isle of Man.

4.4 Organisational structures: consultative committees or devolved regional institutions?

While it may, in the short term, be more important to persuade scientists and administrators to think regionally and act strategically than to establish separate regional authorities, it is nonetheless natural that the organisational structures associated with fisheries management should reflect the broad ambitions of an ecosystem based approach and the mechanisms for its delivery through regionalisation. The organisational structures will have to embrace several different strata of political authority (EU, Member State and regional or local authorities) and balance a range of potentially conflicting interests. This is bound to make the detailed design of the structures a complicated task.



Figure 4.4 Sea Fisheries Districts, England and Wales



Figure 4.5 Regional Development Agencies, England and Wales

The conceptual model for good governance in fisheries that has attracted considerable attention within the academic community and the fishing industry is ‘co-management’ (see Jentoft and McCay, 1995; Sen and Raakjaer Nielsen, 1996; Symes and Phillipson, 1999). Co-management implies the involvement of stakeholders in the making and implementation of decisions about the management of fishery resources through the processes of consultation and delegation. The importance of bringing the fishing industry directly into the decision making process at an early stage is now widely recognised. The idea that giving the industry a share in the ownership of policy, and therefore a heightened sense of co-responsibility for its outcomes, will achieve greater compliance on the part of the industry has become conventional wisdom. This is despite the fact that there are, in effect, very few examples of fully developed co-management systems.

However, there are a number of reasons why, in the context of developing an ecosystem based approach to fisheries management, the arguments in favour of adopting the co-management principle are less persuasive. Three reasons stand out:

- The general lack of understanding of the meaning, relevance and implications of an ecosystem based approach. An early and important task will be to educate all those involved (administrators, fishermen, conservation groups and, ultimately, the general public) to build a better understanding and create a greater empathy for the approach.
- The initial stages of developing an ecosystem based approach will inevitably tend to rely on the expertise of fisheries scientists, marine biologists and ecologists in the preparation of IRMPs (see Section 4.3 above).
- The very nature of the task ahead and of the management instruments involved (Section 3 above) implies that a heavy burden of responsibility must inevitably fall on the state, so that any partnership between government departments and the fishing industry in the formulation of policy is bound to be an unequal one. Although co-management remains the aspiration over the longer term, in the initial stages of developing the new system of fisheries management, the idea should be approached with caution.

What is envisaged at the EU level is an incremental progression towards true co-management. In the initial stages, consultative committees comprising a range of scientific and professional expertise would provide advice to the European Commission. Over time and with the benefit of a growing awareness and acceptance of the objectives and processes of an ecosystem based strategy, these consultative arrangements would be translated into devolved regional institutions (Regional Fisheries Councils) charged with responsibility for the formulation and implementation of fisheries management for each of the regional seas.

There already exists a proliferation of regional organisations, with varying levels of official recognition ranging from formal commissions and treaty organisations to informal committees and scientific fora with an interest in, or responsibility for, some aspect of marine management. The bewildering array of organisations in an area like the North Sea, for example, reflects in part an *ad hoc* approach to issues of sustainable development and an unwillingness to engage in a more holistic approach to the management of the marine commons. A key question, therefore, is whether it will be necessary to add to this confusion by creating separate organisational structures whose task it will be to develop the scientific basis for an ecosystem based approach to fisheries management. Although no existing organisations seem ideally suited to the challenge, it is strongly recommended that any new organisation be located within the existing ‘political’ or scientific infrastructure. In some cases the choice of location is fairly obvious:

both the Baltic and Mediterranean seas already have regional organisations responsible for fisheries management - the International Baltic Sea Fisheries Commission, which draws its scientific advice from ICES, and the independent General Fisheries Commission for the Mediterranean. Elsewhere, ICES would seem to be the natural home for such an advisory function.

As far as the style of organisation is concerned, several different models are available. Three are cited here simply to illustrate the range of possible options: (a) the Committee of North Sea Senior Officials (CONSSO), chosen primarily as an example of an existing European inter-governmental organisation; (b) the Canadian Fisheries Resource Conservation Council (FRCC) and (c) the well established Norwegian Regulation Council. Each varies significantly in composition, function and political status.

- a. **The Committee of North Sea Senior Officials** was formed in 1995 under the aegis of the North Sea Ministerial Conference. Its membership comprises senior civil servants from the eight North Sea coastal states, together with Switzerland and the European Commission (DGXI), and is supplemented by a large number of observers from (i) other European states, (ii) intergovernmental organisations with a direct or indirect involvement in North Sea management issues, and (iii) non-governmental organisations covering a very diverse range of interests (fisheries, conservation, shipping, industry, various etc).

CONSSO meets annually to review progress in the implementation of actions agreed by the North Sea Conference and to help shape the agenda for future conferences. The bureaucratic membership, the breadth of its interest and the monitoring role seem unsuited to the more specific tasks to be undertaken in relation to developing an ecosystem based approach to fisheries management.

- b. **The Fisheries Resource Conservation Council** is a 15 strong advisory group established in 1993 to form a partnership between scientific and academic expertise and all sectors of the fishing industry with the purpose of making recommendations to the Minister of Fisheries and Oceans on issues relating to the conservation of fish stocks. Its written recommendations enter the public domain. Members of the Council, who serve a renewable three year term, are appointed by the Minister and are chosen on merit and standing in the community rather than as representatives of particular organisations or interest groups. Membership is supplemented by three *ex officio* appointees from the Department of Fisheries and Oceans and further nominees from the five provincial governments in Atlantic Canada, together with the Northwest Territories.

Not only has the formation of FRCC led to significant changes in the decision making process and exerted a major influence on policy, it has also acted on its mandate to advise the government on research priorities (Charles, 1997). In advocating the adoption of a multidisciplinary approach to fisheries research, it has stressed the need for an ecosystem approach to management. Although its specific remit still remains tied to a conventional view of fisheries management as concerned primarily with the conservation of fish stocks *per se* it has plans to reorganise along ecosystem based management lines in the near future. FRCC would seem to offer a useful model for the kind of consultative body envisaged in the early states of an ecosystem based approach to management through the CFP.

c. **The Regulation Council** established in 1983 forms a focal point for the system of 'centralised consultation' that characterises institutional arrangements for fisheries management in Norway (Hersoug *et al*, 1997). It is perhaps one of the most sophisticated and influential models of the incorporation of the fishing industry's position within the stream of professional and scientific advice and clearly embodies the co-management principle in establishing a direct channel of communication between the fishing industry and central government in formulating fisheries policy.

The make up of the Council is heavily biased towards the fishing industry which holds nine out of the 14 seats: of these five, are filled by representatives of the national fishermen's organisation, *Fiskarlag*, itself a rather fragile coalition of sectoral interests. Other members include the :

- Association of Fish Processors (2)
- Seamen's Union (1)
- Food and Allied Workers' Union (1)
- Marine Science Institute (1),
- Directorate for the Management of Natural Resources (1)
- Saami Parliament (1)
- Directorate of Fisheries (2).

Observers at the Council's meetings include representatives of the nature conservation community. The Council's recommendations on policy are reported directly to the Minister for Fisheries through the office of the Directorate of Fisheries.

Partly because of the way the membership of the Council is selected - as representatives of particular organisations with specific constituencies of interest - and partly because of the imbalance favouring the articulation of fishing interests, the Council is considered by some (Hoel *et al* 1991) to function largely as a political lobby group rather than as an advisory group of independent experts. Whether such a body, even after considerable reform of its membership, would be capable of addressing the issues of relevance to an ecosystem based approach to management is highly doubtful.

What this brief description of the three kinds of organisation shows is that none would be ideally suited to the task, but in the example of the FRCC we have the basis of an appropriate model. In the initial stages of developing an ecosystem based approach, an independent committee capable of reflecting a sufficiently wide range of expertise and professional interests, with a direct line of communication to the central authority (the Commission) - but somewhat distanced from the final decision making process - would seem most suitable.

Further down the road, perhaps some ten or fifteen years hence, it should be possible to contemplate the establishment of a devolved system of co-management for the EU's regional seas in the form of *Regional Fisheries Councils* (RFCs), as part of a general process of decentralising the CFP. The nature of a decentralised fisheries policy has been discussed in greater detail elsewhere (Symes, 1998; 1999a,b). Here it is necessary only to outline the salient features of the proposal in so far as they would affect the implementation of an ecosystem based approach.

The original aim of regionalising the management of the EU's fisheries was to disaggregate an overcentralised CFP into a series of separate strategies that would permit a differentiated and more sensitive treatment of the particular conditions in each of the regional seas and, at the same

time, allow a greater involvement in the management process of those most closely affected by the policy decisions. What was proposed, therefore, (Symes 1998) was the decentralisation and delegation of management through the creation of RFCs which would have the authority to propose detailed management strategies based on ICES advice in respect of their regional seas. The recommendations, consonant with the broad aims and principles of the CFP, would be forwarded through the Commission to the Council of Ministers for ratification. Membership of the RFC would be reserved for coastal states and other countries with established fishing rights within the regional sea and would reflect a broad policy community comprising scientists, administration and representatives of the fishing industry.

This broad structure would also have relevance for an ecosystem based approach to the management of the EU's fisheries. As indicated at 4.3 above, several of the regional seas equate quite well with large scale marine ecosystems, especially in the case of the semi-enclosed seas. The management strategy for each regional sea would be based on an Integrated Regional Management Plan. It would therefore be necessary to broaden the proposed basis of representation within the RFCs to include marine ecologists among the scientific personnel and marine conservationists among the interest groups. But there is a problem associated with expanding the size of the Council and broadening its representational base. It risks becoming increasingly unwieldy and prone to factional division. Care would be needed in the detailed design of RFCs to contain the membership while still securing an appropriate balance of national and interest representation.

For the management of inshore waters, developing appropriate structures should prove less problematic and less stereotyped. If, as seems likely, Member States continue to have responsibility for managing their territorial seas beyond 2002, the organisational structures will need to reflect local conditions within a basic national framework - though the example of the Wadden Sea demonstrates the value of international collaboration in the management of an ecologically rich and highly sensitive area of inshore waters. No single template can be constructed for local management institutions throughout Europe. These must reflect not only the diversity of natural conditions but also the particular characteristics of local fishing patterns and the prevailing political cultures. In a number of coastal states arrangements already exist for the devolved management of inshore fisheries. In the UK, for example, there is little reason to disturb the basic institutional framework - at least as it exists in England and Wales. But the time may be right for undertaking a major review of Sea Fisheries Committees (SFCs) to take account of the changing issues and responsibilities that inshore fisheries management has encountered in recent years and to reflect on the likelihood of further significant changes in the years ahead.

In many respects SFCs are a good role model for local co-management. Their management structures and membership patterns can provide a valuable mixture of scientific and professional expertise and a workable compromise between two important organising principles of modern governance - democratic accountability and participative management. SFCs have proved quite successful in achieving the harmonious development of inshore fisheries in potentially conflictive situations through judicious segregation of active and passive gears, limitations on the type and size of fishing gears and the management of shellfish fisheries through regulating orders. Moreover, they have demonstrated a willingness and aptitude for cooperation over locally sensitive environmental issues and, in a few cases, are taking the initiative in the management of marine SACs. Whether they will prove as willing and effective under the more stringent conditions of an ecosystem based approach to fisheries management is, however, open to question. In order to adapt to these new conditions, some restructuring of SFCs and their

funding arrangements may well be necessary. It would also seem logical to extend the concept of locally devolved management for inshore waters to both Scotland and Northern Ireland.

4.5 Conclusions: an evolving structure

As in the previous section dealing with policy instruments, some of our proposals for institutional reform contain quite radical elements - not least the suggestion that an ecosystem based approach to fisheries management should ultimately be devolved to separate regional authorities based on the concept of regional seas. It is unlikely that such a suggestion would meet with unqualified approval from within either the fishing industry or the political establishments at EU and Member State levels.

We have therefore approached the question of institutional reform with caution by setting out interim arrangements based on the establishment of independent expert committees for each regional sea which would elaborate the scientific assessments on which to base the regional strategies. For the time being at least, responsibility for formulating the regional strategies would rest with the established institutions of the EU - the Commission and the Council of Ministers. Eventually, however, it should be possible to transfer most of their powers and responsibilities to RFCs, thus decentralising responsibility for fisheries management in line with the principles of subsidiarity and participative management. The European institutions (Commission, Council of Ministers, European Court of Justice and Parliament) would still be responsible for defining the broad principles of policy, ensuring compatibility between strategies developed for neighbouring regional seas, monitoring the policy outcomes and adjudicating over matters of justice. But the detail of the new fisheries management strategies would be worked out at the regional level.

The regional framework outlined above should also make possible a closer integration of decision making at the varying scales - regional, national and local. IRMPs would form the basic framework document, or master plan, for fisheries management and marine conservation at all levels. Thus management decisions taken at the level of the Sea Fisheries Districts, for example, would need to be consonant with the objectives and targets defined in the relevant IRMP. The IRMPs would also prove useful in coordinating policy decisions across a wide range of maritime policy areas beyond those concerned simply with fisheries and the environment.

5. Pulling it all together: a rolling programme of policy reform

Throughout this report, strong emphasis has been laid on the need to phase in rigorous new policy to reduce fishing capacity and fishing effort, to convert Europe's fishing industries to the sustainable patterns of responsible fishing and to reform the policy institutions. This short section outlines the sequence and approximate timings for introducing the new management initiatives. These are summarised in Figure 5.1.

The success of the new strategy for ecosystem based fisheries management, intended to bring long term sustainability and security to the fishing industry at the same time as safeguarding the productivity, diversity and integrity of the marine ecosystems, will depend in part on the careful synchronisation of the different tasks. These tasks include the development of the scientific programme, the setting of targets in line with agreed objectives, the introduction of new or revised policy instruments and funding arrangements, and the evolution of appropriate institutional structures. The programme must allow sufficient time for both the fisheries administration and the fishing industries to adjust to the implications of policy reform. But it must not be allowed to sanction delays in the introduction of potentially painful measures to combat what is fast becoming a crisis situation.

Broadly we would expect the programme to set clearly defined short term targets at roughly five year intervals (though many of these will involve the satisfactory realisation of annual targets), which will progress the strategy towards the attainment of longer term targets set perhaps 10 or 20 years ahead. Despite the insistence on short term targets as important staging posts *en route* to the eventual goal, the management system must retain sufficient flexibility to allow the adjustment of targets in the light of unforeseen natural events. Only in exceptional circumstances should such unforeseen events be permitted to lower the interim or long term targets and so reduce the pace of restructuring of the industry.

Assuming that it would take roughly three years to prepare the scientific evidence and advice necessary for the completion of the initial IRMPs, it would seem reasonable to expect the announcement of detailed targets (limit reference points for target and non-target species, overall fishing mortalities, recovery rates for fish stocks etc) in 2005. This does not, however, mean that the introduction of specific measures for achieving these targets need be delayed until that date. The new generation of more ambitious MAGPs can be introduced with the expiry of the present programme (MAGP IV) in 2001 and supported by new funding arrangements. The need to reduce fishing capacity is not dependent on the calculation of detailed targets. Likewise, TAC and quota arrangements will continue but can be gradually altered in line with the expected and more severe precautionary targets.

On the other hand, although the eventual intention of introducing new financial measures (resource rentals and environmental resource payments) should be announced as soon as possible to prepare the industry for what is likely to be the most significant change in fisheries management and influence its thinking towards new decommissioning schemes etc, the schemes are unlikely to kick in until some five years after the start of the programme. Less radical schemes to persuade fishermen to switch their fishing patterns to more environmentally friendly forms could be introduced earlier, though major regionally specific initiatives - such as large scale NTZs - would depend on the proposals of the IRMPs and thus be phased in during the second five year period.

Finally, it is somewhat more difficult to anticipate the precise time for replacing the system of regional advice and central decision making by new semi-autonomous regional institutions (RFCs). Much would depend on how rapidly both the industry and fisheries administration were able to adapt to the demands of the new problems and to the concept of regional decentralisation and devolvement. A best estimate would be for negotiations for such changes to begin roughly ten years into the programme.

6. The broader implications of an ecosystem based approach to fisheries management

It would be wrong not to refer briefly to some of the broader implications of an ecosystem based approach to fisheries management as outlined in the two reports *Defining the Goals* and *Achieving the Objectives*. What is being proposed is certainly one of the most radical changes ever contemplated to the ways in which fisheries are managed. The fact that recommended rates of exploitation will no longer reflect the state of the stocks for the target species alone but will need to be guided by considerations for the overall health of marine ecosystems, the state of preservation of key habitats and the population status of non-commercial species marks a major shift in the approach to fisheries management. Even more controversial is the proposal to introduce new financial instruments to steer the industry towards a more sustainable future: to many, the idea of resource rentals will be unthinkable.

There can be no doubt that the approach we have outlined will bring pain and anguish to the European fishing industry. By seeking to map out - albeit very sketchily - a long term strategy for the adoption of an ecosystem based approach to fisheries management, we hope to soften the impact by providing a breathing space in which the industry can adapt to the demands for a significant downsizing of the fleet and for fundamental changes in fishing practice. But we do not intend that the essential processes of change should be further postponed.

Despite the attempt to soften the impact by phasing in the main elements of the new policy approach, the effects will be severe. They will reverberate not only throughout the fishing industry and its management institutions but also throughout society as a whole. Clearly it is the fishing industry and the fishing community that will have to bear the brunt of these changes. Job losses will inevitably be high affecting both the harvesting sector and the shore based activities in processing and the ancillary trades. To a degree, the main effect of an ecosystem based approach will simply be to intensify and accelerate many of the processes of modernisation of the industry already in train. It is likely, therefore, that left unchecked these processes will act to increase the concentration and centralisation of fishing activity and the marginalisation of the local, inshore small boat sector. This could prove counterproductive: the extinction of the small boat sector could remove the one element of the industry whose economic and social values are more likely to be sympathetic to the goals of ecosystem management and whose fishing practices may be closer to those envisaged in an ecosystem based approach. Moreover, the small boat sector generates far higher levels of direct employment than the large scale, capital intensive and industrially organised segments of the fishing fleet.

The point was made in *Defining the Goals* that ecosystem objectives would have to stand alongside the established economic and social goals. Although the ecosystem objectives may need to be prioritised, they cannot obviate the need to ensure economic efficiency and social justice. Future fisheries policy could decide to protect certain elements of the industry which were considered 'socially important' from the rigours of an ecosystem based approach, through preferential access to resources, exemptions from - or reduced rates of payment for - resource rentals etc. But these are issues which lie beyond the scope of these two reports.

Significant changes can also be expected in the way in which fisheries policy is formulated and in the relations between the key actors in the policy community - the scientists, administrators and stakeholder groups. The adoption of an ecosystem based approach will require the redesigning of institutional frameworks, the relocation of decision making responsibilities and

a broadening of the policy community. Perhaps the greatest changes in the policy process will affect the scientific community. Not only will the science base have to be widened to include marine biologists and ecologists in addition to the fisheries scientists skilled in stock assessment, but a much stronger multidisciplinary ethos will need to be developed to gain the knowledge and understanding of the interaction between fisheries and the marine ecosystem. Such changes are already evident within ICES. In extending the scientific basis of management to include the setting of precautionary limit reference points for non-target species within the marine ecosystem and the protecting of essential fish habitats as part of the agenda for an ecosystem based approach, there will inevitably be a significant increase in the scope of scientific research and monitoring.

The development of an ecosystem based approach, as outlined in this report, also anticipates some significant changes in the roles of the key stakeholders from lobby groups on the edge of the policy making process to more centrally located consultative organisations and, eventually, to full partners in the policy community. The increasing sense of responsibility that this translation entails is bound to have important consequences for the nature of both fishermen's organisations and conservation groups requiring a greater willingness to understand and appreciate alternative points of view and more conciliatory style of negotiation. Indeed stakeholder organisations may have to forego some of their more outspoken criticisms of policy as they become incorporated within the process itself and have an increasing share in the ownership of the outcomes of policy making.

As 'pig in the middle', the professional bureaucracy responsible for the administration of fisheries policy will have to cope with both these new tendencies - the broadening of the scientific basis of policy making and the increasing level of formal consultation with stakeholder groups representing the fishing and conservation interests. Hitherto, the administrators have been able to rely on a single more or less unequivocal source of scientific advice and to 'consult' with the fishing industry only after the policy has been formulated. Their skills in the interpretation of potentially conflicting streams of advice and in handling diverse opinions on what constitutes sensible and sustainable policy actions will be sorely tested. But over the longer term perhaps the greater challenge to the bureaucratic establishment will come from the shift in the location of decision making from the centre to the regions.

For society in general the impact of an ecosystem based approach will be muted. Depending on how widely the approach is taken up, the public can expect reduced supplies of fish at higher retail prices, at least in the short term until stocks recover and levels of catch begin to rise again. In the UK the effect will be most pronounced for those species already suffering from high rates of exploitation, notably the popular species like cod and haddock. Overall, the expected reduction in supplies to the European markets could be offset by increased international trade in fish and fish products, though one should be careful not to end up exporting Europe's problems concerning fisheries and the marine ecosystem to other parts of the world. For most of society the benefits of an ecosystem based approach in terms of arresting the degradation of habitats and the recovery of non-target populations may go largely unnoticed. By contrast, those living in the fisheries dependent regions will be only too acutely aware of the intensification of the familiar cycle of deprivation involving declining job opportunities, rising unemployment, low household incomes reliant on social welfare payments, out-migration, an ageing population and low levels of aspiration and innovation. Governments will have to meet the costs of achieving long term sustainability of the fisheries through short term remedial action in terms of social policy and measures to stimulate other sectors of the local economy.

7. Conclusions

The present situation facing the EU's fisheries cannot continue indefinitely. Even if we were to set aside arguments for an ecosystem based approach to fisheries management, it is clear that the existing policy approach is incapable of addressing the deep seated problems which now face Europe's fishing industries. Not only is it dangerous to continue to barter the future of commercial fish stocks in annual quota negotiations, it is also unacceptable that the industry should be deceived by false promises that resources and livelihoods can be sustained by short term adjustments to TACs, marginal changes to rules governing fishing gears and unconvincing attempts to reduce fishing capacity.

Based on the precautionary approach, the severe cuts in TACs for key commercial species imposed at the Council of Ministers' meeting in December 1999 may have helped to expose the true depth of the crisis and to banish misguided optimism that future prosperity can be achieved without fundamental reform of fisheries policy and major restructuring of the industry throughout Europe. There can be no lasting solution to the fisheries crisis - and little hope for long term sustainability of marine ecosystems - until the problem of overcapacity has been tackled and a new and enduring equilibrium established between fishing effort, on the one hand, and the size, structure and reproductive capabilities of the fish stocks, on the other. Ultimately, there can be no guarantee of the recovery of commercial fish stocks unless the overall biodiversity and productivity of the marine ecosystems, on which they depend, are secured.

Despite the best efforts of the CFP over the past two decades, the situation has continued to deteriorate : the imbalance between resources and fishing capacity has increased rather than diminished. As the report has argued, there is little scope within the existing regulatory system to arrest this tendency. Quota management is concerned with only the tip of the problem, not its root causes; and, in any case, the industry has lost confidence in the system. Hence, we are forced to the conclusion that only a fundamental shift in policy approach - and in attitudes within the industry - can offer any real prospect of long term security and stability for the fishing industry and, at the same time, address the complementary question of an ecosystem based approach to management. The proposals outlined in the report are intended as a pragmatic approach to these issues. The key lies in effecting a significant and speedy reduction in fishing capacity throughout the EU. This can only be achieved by the introduction of new financial measures which combine the 'carrot' of inducement, through restructuring funds and environmental resource payments, with the 'stick' of resource rentals. Once fishing capacity and resources are in balance, TACs and quotas can become indicative rather than mandatory targets and the emphasis of ecosystem based management newly focused on the conservation of fish stocks and the protection of non-target species and essential habitats through parametric management.

The development of an ecosystem based approach will require the extension of the precautionary approach in calculating permitted levels of fishing effort over the short and medium term in line with limit reference points, etc. outlined in *Defining the Goals*, in determining future technical measures and in deciding the detailed design of the new financial instruments. An ecosystem based approach will certainly involve more science, new science and hopefully 'better' science, in the sense that it will be less narrowly based and more effectively presented to, and understood by, the fishing industry. A key feature of our suggestions for institutional reform relates to the establishment of formal consultative committees - and their eventual incorporation within Regional Fisheries Councils - to ensure that the industry has sufficient opportunity to discuss and

comment on scientific recommendations before they are acted upon by the Commission and/or Council of Ministers.

There can be no denying the severity of the impacts that implementing a more responsible fisheries policy will have on the fishing industries of Europe. But there would appear to be little choice. Consider the alternatives. One can continue the present, largely unplanned but progressive erosion of the industry, with its attendant risk and uncertainty, through *ad hoc* adjustments to its structure and pattern of activities. Or one can embark on a coordinated programme of structural change, phased over a 15-20 year period and guided by a clear long term vision for the industry, with adequate compensation for those willing to leave but also recognising the need to restrain fishing effort and steer the industry towards more responsible fishing patterns through financial instruments. Is there really a choice ?

We acknowledge that the suggestions outlined in this report will not find favour with many in Europe's fishing industries. It will be difficult to achieve consensus among all sectors and all Member States over the need for such radical change to fisheries policy. There will be those who argue that the circumstances - and, therefore, the problems, affecting their particular fishing activities are different to those outlined in this report. Regionalised management systems are intended to reflect such differences. But it will be very difficult for anyone to deny that overcapacity, inadequate restraints on fishing activity and degradation of marine ecosystems are common denominators of the fisheries crisis throughout Europe.

8. References

- BEGON, M., HARPER, J.L., & TOWNSEND, C.R. 1990. *Ecology: Individuals, Populations and Communities*. Oxford: Blackwell Science.
- CHARLES, A.T. 1997. Fisheries management in Atlantic Canada, *Ocean and Coastal Management*, **35**(2-3), 101-119.
- DEPARTMENT OF THE ENVIRONMENT, TRANSPORT AND THE REGIONS. 1999. *Guidance to the Regional Development Agencies on Sustainable Development*. London.
- GRAY, J.S. 1997. *Marine Biodiversity: Patterns, Threats and Conservation Needs*. London: GESAMP Reports and Studies No 62.
- HERSOUG, B. & RÅNES, S.A. 1997. What is good for the fisherman is good for the nation: co-management in the Norwegian fishing industry in the 1990s. *Ocean and Coastal Management*, **35**(2-3), 157-172.
- HILBORN, R. & SIBERT, J. 1988. Adaptive management of developing fisheries. *Marine Policy*, **12**, 112-121.
- HOEL, A.H., JENTOFT, S. & MIKALSEN, K.H. 1991. *Problems of User-Group Participation in Norwegian Fisheries Management*. Institute of Social Sciences Occasional paper No. A56. Tromsø: University of Tromsø.
- JENTOFT, S. & MCCAY, B. 1995. User participation in fisheries management: lessons drawn from international experiences. *Marine Policy*, **19**, 227-246.
- LASSEN REPORT, THE. 1996. *Report of a group of independent experts to advise the European Commission on the fourth generation of multi-annual guidance programmes*. Brussels: DGXIV.
- LOWE, P., FALCONER, K., HODGE, I., MOXEY, A., WARD, N. & WHITBY, M. 1999. *Integrating the Environment into CAP Reform*. Final report to the Countryside Commission, Countryside Council for Wales, English Nature and Scottish Natural Heritage. Newcastle: Centre for Rural Economy.
- NATIONAL MARINE FISHERIES SERVICE. 1999. *Ecosystem-based Fisheries Management*. A Report to Congress by the Ecosystem Principles Advisory Panel.
- PERRINGS, C., FOLKE, C. & MÄLER, K-G. 1992. The ecology and economics of biodiversity loss: the research agenda. *Ambio*, **21**, 201-211.
- SEN, S. & RAAKJAER NIELSEN, J. 1996. Fisheries co-management: a comparative analysis *Marine Policy*, **20**, 405-418.
- SYMES, D. 1998. Towards 2002: subsidiarity and the regionalisation of the Common Fisheries Policy. In: GRAY, T.S. ed. *The Politics of Fishing*. pp 176-193. London: Macmillan.

- SYMES, D. 1999b. *The Integration of fisheries management and marine wildlife conservation*. Peterborough: JNCC Report No 287.
- SYMES, D. & PHILLIPSON, J. (1996). The imperative of institutional reform: alternative models and the UK fishing industry, pp 229-243 in *Proceedings of the VIIth Annual Conference of Fisheries Economists*. Portsmouth: CEMARE.
- SYMES, D. & PHILLIPSON, J. 1999. Co-governance in EU fisheries: the complexity and diversity of fishermen's organisations in Denmark, Spain and the UK. In: KOOIMAN, J., VAN VLIET, M., & JENTOFT. pp 59-93. S. *Creative Governance: Opportunities for Fisheries in Europe*. Aldershot: Ashgate.
- WILSON, J.A. & DICKIE, L.M. 1995. Parametric management in fisheries: an ecosystem - social approach, pp 153-167. In: HANNA, S. AND MUNASINGHE, M., eds. pp 153-167. *Property Rights in a Social and Ecological Context*. Washington DC: The Beijer International Institute of Ecological Economics and the World Bank.