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Fishermen's Incomes and Fisheries Management

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Abstract *The improvement of fishermens' incomes is often a central objective of fisheries management programmes, especially in developing countries. This paper considers the determinants of fishermens' incomes and discusses the way in which different management methods may be expected to affect incomes. Stress is laid upon the difference between wealth and income. It is argued that many management measures are likely to have a significant effect on wealth but little, if any, on income. In designing management systems which have income improvement as a goal, care needs therefore to be taken if a sustainable improvement in incomes is to be achieved rather than a, perhaps unintended, wealth re-distribution.*

Keywords Fisheries management, fishermens' incomes, ITQs, taxation

Introduction

It is common to find the improvement of fishermen's incomes as an objective of fisheries management systems, especially in the case of developing countries (see, *eg*, Lawson, 1984). Indeed, the problem of low fishing incomes (in Canada) provided the initial impetus for Scott Gordon's pioneering work in fisheries economics. Yet, it remains very difficult to find cases where such an objective has been attained. The purpose of this paper is to consider the reasons for the widespread failure to achieve a sustainable improvement in fishermen's incomes and to make policy proposals designed to improve the chances of achieving this goal in the future. The conclusions reached seem likely to be especially relevant to developing countries, but may also apply to developed countries with regions that are dependent on fishing.

This topic has already received some attention in the literature (*eg* Smith, 1979 & 1981, Panayotou, 1980 & 1982, Pomeroy, 1991). However the discussion has generally been set in the context of open-access fisheries and the impression has been given that the problem of low fishing incomes would disappear with the removal of open access. For instance, Smith argues that "*as long as* the resource remains 'open-access' in nature, long-term solutions to the dual problem of over-

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exploitation of the resource and low fishing incomes will not be found within, but rather outside the fishing sector in the form of alternative or supplementary income sources" (1981, p. 22, emphasis added). This paper discusses reasons for low fishing incomes and considers the extent to which the problem might be resolved by management of the fishery itself.

It must be recognised that the improvement of fishermen's incomes is only one possible objective that a management authority might pursue. As Charles and Yang (1991, p. 294) note "fisheries development is a multi-objective activity". Nonetheless it seems of interest to consider the economic impact of fishery management systems at the level of the fisherman and thence to consider how such systems might be re-designed if one major objective of management is to increase the incomes of fishermen.

The paper begins, in the second section, by considering the view that the low incomes earned by many fishermen result from low opportunity incomes. The third section discusses alternative views on this issue, in particular the idea that fishing incomes might be linked to the levels of exploitation or employment. In the fourth section, the implications of different fisheries management policies are discussed with respect to their impact on fishing incomes. Finally, the fifth section concludes the paper with some suggestions as to how fisheries management systems might be modified to achieve the goal of increased fishermen's incomes.

The Determination of Fishermen's Incomes

Evidence that fishing incomes may be low exists for both developed (*eg* MacKenzie, 1979) and developing countries (*eg* Panayotou, 1982). Nonetheless it is also widely recognised that even within depressed fisheries some fishermen (the highliners) may earn high incomes. It is difficult to explain this situation within the standard fisheries economics model wherein labour and other inputs are assumed to be homogeneous. However, as Karpoff (1987) has demonstrated, the assumption of homogeneity is generally untenable. Moreover, this assumption is much stronger than that of the standard competitive model in economics (see, *eg*, Koutsoyiannis, 1979). This model does not imply that all firms and factors are identical. They will face identical long-run average cost curves because superior resources (such as highly-skilled skippers) will earn a rent which must be paid to the factors by the firm if they are not to be bid away by competitors. Hence once superior resource are costed at their opportunity cost all firms will face the same long run unit costs. In equilibrium therefore firms need not all be of the same size producing the same output. At the margin, no factor rents will be earned and the marginal fishing unit will just cover its opportunity cost.

The fact that many fishermen earn low incomes complicates matters since it gives the impression of causality. However, in this respect, MacKenzie (1979, p. 816, footnote 5) is surely correct when he says that "the received image of the poor fisherman is to be stood on its head—he is a fisherman because he is poor, not the other way around". Although straightforward, the proposition that fishing incomes depend on opportunity incomes is complicated by the well-recognised fact that, frequently, the utility of fishermen depends also on a psychic return to the activity, termed "worker satisfaction bonus" (WSB) by Anderson (1980) whose analysis of the open-access equilibrium in a two-sector model leads him to conclude that (1980, p. 862) ". . . the net real wage (the sum of the monetary wage

and the WSB) is equal in both industries. Since this is the case, there will be no incentive for workers to change industries''. His model is constructed in terms of two industries, A and F (fishery), so that:

$$w_F + WSB_F = w_A + WSB_A \quad [1]$$

As WSB seems likely to be less variable than monetary incomes, it is probably the latter that drives the fishery to equilibrium.

Anderson's analysis of the optimal situation leads him to conclude that:

$$w_F + WSB_F > w_A + WSB_A \quad [2]$$

His explanation is that ''the reason the fishery has a total net wage higher than the other industry is that there is a rent earned from the fish stock'' (*ibid*). This conclusion implies that net fishing incomes can be increased by optimal (economically efficient) management of the fishery, but it seems to be based on a confusion of wealth and income effects. If followed by policy makers interested in increasing fishermen's incomes it is likely to result in disappointment. So long as inequality 2 holds, it is to be expected that there will be pressure to enter the fishery which may manifest itself differently according to the management structure but will continue to do so until equality 1 re-emerges.

A further complication is that often labour services are supplied as part of a bundle—for instance, many fishermen are owner-operators of their vessels—so that it may be difficult to distinguish returns to labour and other (*eg* capital) services. The frequently-noted asymmetry between entry and exit from the fishery, where it exists, seems essentially to be a problem of asset fixity. It is the fisherman as capitalist rather than labourer who finds it difficult to leave the fishery. Yet, it has sometimes been suggested that, as a result, fishermen might earn less than their opportunity incomes. For example Panayotou (1982) argues that ''fishermen may continue fishing even if they earn far less than their opportunity costs''. This statement seems to be rather a contradiction in terms except perhaps as a short-run result. If the fisherman is unable to transfer to another region or industry for whatever reason then surely this implies that his opportunity income is low rather than that he is earning less than it.

Copes (1988) suggests six reasons why opportunity incomes may be low in small-scale fisheries. These are: (i) the isolation of many fishing communities resulting in poor educational facilities and infrastructure links as well as few alternative employment opportunities, (ii) the existence of surplus labour due to productivity gains, (iii) capital asset fixity, (iv) lifestyle preferences, (v) highliner illusion and (vi) perverse assistance (ie welfare state measures designed to provide an income safety net). Similar factors are advanced by Panayotou (1982) to explain labour immobility although he adds caste restrictions, cultural factors and simple lack of knowledge of alternative occupations.

The proposition that fishermen's incomes depend on opportunity incomes is reinforced by evidence presented by Panayotou (1982, p. 30) who notes that some Red Sea and East African countries found it difficult to continue fisheries exploitation in the face of more remunerative employment opportunities associated with the oil industry. A similar situation exists in the case of the Pacific island of Nauru where the guano industry has provided employment and wealth for the island's

population and attempts to develop fishing have not been successful. Heen (1988) finds that expected future income of alternative occupations is the major determinant of Norwegian fishermen's decisions to leave the industry.

Both standard economic theory and empirical evidence suggest therefore that fishermen's incomes are determined by opportunity incomes rather than by anything that happens within the fishery itself, except perhaps in the short run.

Fishermen's Incomes and the Exploitation Level

The relationship between incomes and exploitation level is straightforward if the argument above is accepted. Fishermen's incomes in excess of opportunity income levels, at the margin, will attract extra fishermen to the fishery. As fishing effort increases, both catch and revenue per unit of effort (RPUE) will tend to decline. As RPUE falls, income from fishing will decline and an equilibrium number of fishermen will re-emerge. However, views that contradict this scenario are frequently proposed and since these views influence management advice and behaviour, it seems worth while to discuss them.

One school of thought suggests that fishermen's incomes are related to the level of exploitation in the fishery. For instance, the mid-term review of the common fisheries policy of the EC state that "[Overexploitation] is causing a perceptible decline in the volume of landings and keeping fishermen's incomes below the optimum level" (CEC, 1991, p. ii). This statement implies, first of all, that the Commission has a view on the optimum level of fishermen's incomes, although it is not made clear what this level is nor how it was calculated. Second, and of more relevance to this paper, it implies that fishermen's incomes are inversely related to the level of exploitation. From a policy viewpoint therefore the conclusion seems to follow that the objective of increasing fishermen's incomes might be achieved by reducing the level of exploitation. Later in the same document, it is argued that "the market is a decisive factor in the formation of producers' incomes" (p. 79). In this context, the market refers to fish prices, and the expectation is that higher prices will improve the incomes of fishermen. At best, this statement means that gross revenue will be increased by higher prices, and in the short run incomes will increase. However, it seems difficult to escape the conclusion that higher incomes will attract more effort to the fishery until returns are depressed to their long-run equilibrium level.

The view that policy within the fishery can influence incomes is often expressed. For example, MacKenzie (1979, p. 815) phrases the management problem in terms of trade-offs between employment generation, enhancement of fishermen's incomes and appropriation of resource rent by the State. Similarly, Bailey and Jentoft (1990) discuss the trade-off between employment and fishermen's incomes. However, their discussion seems to deny that incomes depend on opportunity costs since they argue that "the easiest way to increase the income of a fisherman is to provide him (or her) with better technology".

It is difficult to generalise about employment because it is only one dimension of effort. However, the argument that incomes are determined by opportunity incomes implies that the relationship between exploitation level and fishermen's incomes is illusory. Although there may be some relationship in the short run, there is no long run trade off and to this extent the relationship between exploitation and incomes is reminiscent of the Phillips curve.

Income Implications of Different Policy Options

Economic advice in fisheries management has increasingly come around to the view that property rights systems should be established and that such rights should be transferable. The favoured alternative is some kind of individual transferable quota (ITQ) system and it is quite rare these days to find a fisheries economic analysis that does not end up advocating such a system. Since economics is generally silent on income distributional issues[1], the tendency is to argue that it makes no difference whether rights are sold or given away. In either case, an allocatively efficient solution will be obtained. It is however, recognised that the wealth distribution consequences will differ. However, in a situation where the management authority adopts as its major goal to increase fishermen's incomes, a number of questions may be posed. First, is transferability still necessary? Second, is the distributional method still irrelevant? And third, are alternative management mechanisms possible?

Non-transferable Rights

Copes (1988) argues that, in the interests of inter-generational equity, rights, in particular licences, should be made non-transferable. The problem with this approach is that it seems to sacrifice intra-generational equity in achieving inter-generational equity. If licences are made non-transferable then this seems to qualify as a transfer of wealth rather than income. Those fishermen who are fortunate enough to receive a permit will receive a return to it through their fishing activity. Those who do not obtain a permit receive nothing. Moreover, they can no longer earn any income as a fisherman since, assuming adequate enforcement, they can no longer participate in the fishery. It seems difficult to describe this as a situation of increased fishermen's incomes.

If the problem is only one of inter-generational equity then a simpler means would be to allow transferability but to limit the duration of exploitation rights to, say, twenty years. At the end of this period they revert to the resource owner who may then re-allocate them in whatever way is felt to be socially equitable. An approach such as this has been adopted by the New Zealand government recently following claims to fishing rights by Maoris (Pearse & Walters, 1992).

Transferable Rights

Generally non-transferability is rejected by economists on efficiency grounds. This however raises the interesting question of what is meant by efficiency in this context. One difficulty in the quest for economic efficiency is to decide the relevant geographical scale. Anderson (1980, p. 861) offers the following useful definition of the economic aims of fishery regulation:

> "On pure economic efficiency grounds, the goal of fisheries regulation is to cause a reallocation of inputs such that the value of the goods and services produced *in the economy* is increased." (emphasis added)

[1] Recently there has been some work on distributional aspects of management (see *e.g.* Dupont and Phipps, 1991) but relatively little such work is available.

Although most economists would probably subscribe to a definition such as this, its Achilles' heel is the definition of the economy. What aggregation is relevant for policy purposes—the region, the nation, the customs union, the continent, the world? From a first-best economic theory viewpoint, the world presumably would be the relevant entity, but this choice is hardly likely to influence fisheries policy. And once it is accepted that something less than world efficiency is at stake, questions naturally arise as to how to ensure that appropriate investment decisions are made so as to effect the input reallocation required.

The rejection of non-transferability leads generally to a proposal in favour of transferable rights, especially ITQ systems because ITQs can be shown to result in an economically efficient resource allocation and they fit well into the current vogue for privatisation. There seems however a danger that too much reliance is being placed on ITQ systems to the detriment of alternative management measures that might achieve equivalent or better results. The emphasis on privatisation also seems to result in some rather poor advice being offered by economists, especially to governments in less developed countries. For instance, Mauritania in 1989 raised 25% of government revenue from fish export taxes collected via a State Trading Organisation (STO). Such a result might have been considered a success, certainly in comparison with the kind of rents that States seem able to extract from their fisheries using ITQs *in practice,* yet the Mauritanian government was advised and seems to have been persuaded to discontinue the scheme, on the grounds that it had various problems and that in effect it constituted a subsidy to the fishing industry. Policies to improve the performance of the STO do not seem to have been considered, instead there has been pressure to move towards rights-based fishing, especially effort-licensing. It will be interesting to monitor the performance of the new system compared to the old.

In cases where rights such as ITQs have been introduced, they often seem to have been given away. There are probably a number of factors that explain this. To begin with, in many cases the distribution of wealth (via free rights) to fishermen seems to have as its basic aim making the position of the fisheries administrator tolerable vis-à-vis the fishermen. Regulatory failure is involved because inadequate objectives have been assigned to administrators by the management authority. Cruz (1982) argues that although technical innovation is expensive it profits those prepared to take risks, whereas institutional innovation is also likely to be expensive but the benefits are likely to be spread over a large group and will not necessarily benefit the innovator.

Second, it has often been argued that compliance with a management system will only be forthcoming if the fishermen have a stake in it and that therefore rights (and wealth) must be given to the fishermen. Yet a fisherman who has bought his right would seem to have as much stake in the fishery as one who was given it. Experience from other asset markets, eg housing, suggests that those who purchase their asset take at least as much interest in it as those who inherit it. In fact, this must also be expected to be so in fisheries since it is not anticipated that the management scheme will collapse once second-round fishermen have purchased their rights from first-rounders.

Third, there seems to have been a political dimension in that ITQs have often been introduced as property rights, ie as a mechanism for privatising fishing, rather than as exploitation rights, *ie* as a resource allocative device.

Fourth, some fisheries managers seem to have been led to believe that giving

away rights will increase fishermen's incomes. However, giving wealth to current fishermen, be it in the form of ITQs or any other manner, has only one impact: it increases the wealth of those fishermen. This wealth may itself generate income but this is independent of whether the wealth holder fishes or not and hence it does not increase fishermen's incomes. Where rights are transferable the owner always has the option to sell and reinvest the proceeds elsewhere.

Keen (1988) amongst others identifies the fundamental problem of giving away rights. He says (p. 49) "everyone would be worse off except the first recipients of . . . rights. Second and subsequent holders of these rights would be saddled with debts that left them in more or less the same income position as . . . before the rights . . . were created". Assuming that the number of fishermen declines under this system, everyone is indeed likely to be worse off, except the first rounders, because infra-marginal factor rents are likely to be reduced. Moreover, even first rounders only gain due to the transfer of wealth, rather than because of an increase in their incomes.

As the method of allocating ITQs is essentially a wealth distributional question, the view is often taken that economics has nothing useful to say on such issues. However, there are perhaps some reasons why economics should pay attention to this problem. First of all, issues of equity are involved that may come to undermine the management scheme if the wrong decisions are made. Second, the decision may have serious economic consequences since the investment decisions that follow the private accumulation of wealth are likely to be different to those if public accumulation is involved.

Giving away wealth is likely to be perceived as inequitable by:

- future fishermen, particularly those who would have fished in the very near future (see eg the debates between fishermen in *National Fisherman* on the giving away of ITQ rights). This is especially likely to be so because a common decision seems to be to favour those who happen to be fishermen on the day (or some reference period) that management is implemented. But in many cases the choice of which day is made opportunistically so that the distribution of wealth becomes the arbitrary consequence;
- non-fishermen, especially those living in the same locality or community as the fishermen;
- society in general if the view is taken that the government is custodian of natural resources on behalf of society.

The major risk associated with operating via the private sector is that the investments made may not improve the situation in the relevantly-defined economy at all. For instance, recipients of rents from, say, the Newfoundland fisheries might well decide that the best alternative for them would be to invest in salmon farming in the USA. It is possible that the opposition of fishermen to ITQs in places such as the Shetland Isles is based on the fear that the wealth of the fishery will be capitalised and invested outside the region. Of course, such opposition might also be based on apathy or an active preference for the status quo.

The key to solving the wealth issue is to resolve ownership. If ownership of fisheries resources is vested in the State then the State should collect the rents. In fact, one test of ownership might be to investigate who does receive the rents. In the case where transferable rights are given to fishermen, then effectively ownership of the fishery is being passed to them. It seems difficult enough to justify

such a course of action in the developed world where by and large countries depend relatively little on their fishery resources, but it seems almost impossible to justify in the case of a developing country for whom the fishery may represent a fundamental source of capital accumulation.

If it is accepted that ownership is vested in the State, then a first solution would be to modify the ITQ system so that the State captures the wealth that the fishery generates. One option would be to auction first round ITQs. Another would be to make it clear that resource rental charges will be applied. In practice however both of these methods seem to be difficult to use and there appears to be no example so far where an ITQ-system has generated large-scale rents for the State. In fact the law often seems specifically drafted to deny the State any ability to collect rents. For instance, in Iceland the Ministry of Fisheries can collect fees based on quotas to cover the monitoring and enforcement costs of ITQs. However, "the law imposes an upper bound on this fee amounting to *0.2%* of the estimated catch value" (Arnasson, 1993, p. 209, emphasis added).

Auctioning rights seems to be unpopular, probably because the only way to make any money is to auction substantially less than the open-access amount. Charging resource rentals also is generally not introduced immediately so that the expected value of rents over the life of the rights becomes capitalised into their price. If highliner illusion (Copes, 1988) exists then the price paid may reflect best rather than average practice so that introducing charges on second round purchasers may prove impossible without bankrupting at least some of them. Also if ITQs are effectively only to be used as a charging base for taxation, it surely is worth discussing whether at least in some cases simpler institutional structures such as State Trading Organisations might not achieve the same results more easily.

One practical problem with ITQs, that might be avoided by alternative management measures, is that they have tended to give the impression that the fishermen own the resource. Such a view seems unlikely to facilitate management especially if it is felt that such management has to include representation of the fishermen on various committees. The fundamental problem with commercial fisheries identified by economic analysis is not the employment level or the income level, but the overexploitation of resources to which access is free and open.

Taxes or Resource Rental Charges

If it is accepted that *ownership* of the resource is vested in the State then alternative mechanisms to extract rent may be attractive. The current emphasis on fishing rights may be misplaced, at least in some circumstances, *eg* developing countries where establishing such rights may be difficult. It may be that much simpler management systems might be used, especially those that control fisheries exploitation by controlling prices received by fishermen. Since the basic problem is that the price signals generated by the market are misleading why not correct these signals directly rather than using a rights systems to achieve the same result? At the very least this approach seems deserving of more attention than it is currently receiving given the widespread acceptance that rights cannot be implemented universally.

A tax has clear effects: high opportunity cost fishermen will be forced out, and

a new equilibrium will eventually emerge when the new marginal fisherman just covers his opportunity cost. Since this fisherman was previously infra-marginal, infra-marginal factor rents are reduced for everyone, which is one reason why fishermen can be expected to oppose a tax-based management system. However, flexible tax systems might be introduced gradually (using for example the notorious variability of fish prices) provided that legislators design the right kind of institutional framework. Of course, ITQs could be used to perform a similar role, but if the ultimate aim is to control prices, why saddle oneself with the additional difficulty of having to control catch? The enforcement difficulties seem likely to be similar since presumably the incentives to cheat will be similar under the two schemes (and related to the amount of rent generated).

Although taxation is the fundamental method, imaginative proposals are necessary as to precisely how it should be implemented. One possibility is a State Trading Organisation, buying low and selling high. Such organisations have tended to acquire a bad name in the past, but this is perhaps due to the way in which they have been operated rather any intrinsic flaw. Alternatives exist however even in dispersed small-scale fisheries. For instance, in many small-scale fisheries, although some catch is for auto-consumption, most is sold. Usually traders collect fish and transport it to commercial centres or export it, depending on the fishery. In every case however the number of traders is substantially less than the number of fishermen so that a price control scheme operating via the traders might be feasible. Such traders also often supply fishermen with inputs such as nets, fuel, food and so on. Again, some kind of price regulation might be a possible mechanism for bringing the fishery under control.

Where taxes have been considered by economists for use in fisheries they have often been rejected on grounds of impracticability. Sometimes taxation is simply considered to be politically unacceptable (*eg* Munro, 1993, p. 10). Sometimes the rejection seems to lie in a failure to consider the necessary institutions. Perhaps most frequently however it results from the approach of fisheries economics which is almost exclusively to consider optimal solutions. For instance, Arnasson (1991, p. 410) argues that ". . . to calculate the correct Pigovian tax, it is necessary to know practically everything about the fishery. . . . Clearly these requirements exceed the capabilities of any fisheries manager". He therefore concludes in favour of ITQ-type property rights systems. Although there may be something in Arnasson's argument, it is redolent of arguments about profit-maximising pricing by firms. Even though few, if any, firms use marginal analysis to achieve profit maximisation in the way suggested by economic theory, they generally achieve the same results through a combination of mark-up pricing and satisficing. Arguably, fisheries policy and fisheries economics has too readily rejected tax-based solutions. A satisficing approach to rent extraction could yield substantial amounts of rent to a government and, on a trial and error basis, could be expected to approach the maximum if a management-by-objective approach were used. The concentration on policy advice derived from optimisation models is all the more difficult to fathom since objective functions are often flat-topped so that the difference between a satisfactory and optimal performance may be very small.

One danger in all of this is rent-seeking behaviour (Bhagwati, 1982). However, successful fisheries management seems certain to face this problem so the challenge is to design management systems that can mitigate it.

A Management Plan to Improve Fishermen's Incomes

The previous sections have argued that the fundamental problem to be resolved in a fishery is the externality imposed by free and open access to fisheries resources. This problem is essentially one of ownership. Due to the value of fish resources, the owner of such resources can expect to become wealthy. An important part of the fisheries policy and management debate turns therefore on the question of who is to receive this wealth. Fisheries economics (at least of the neo-classical mould), despite its proclaimed agnosticism on distributional matters, is presently pushing many countries towards rights-based, especially ITQ, systems via which vast amounts of wealth are being transferred to first-round fishermen. The usual justification for this is that it makes no difference to efficient outcomes, although as the Anderson quotation above demonstrates, defining the relevant geographical entity for efficiency purposes is difficult, and is itself a political decision.

If, however, the goal of the management authority is specifically to improve fishermen's incomes then the wealth distribution does matter. The same outcomes are not to be expected if wealth is given to the private sector as if it is appropriated by the public sector.

The policy proposition is as follows. First, it is most important that the management authority recognise that management cannot increase fishermen's incomes directly. Incomes depend on alternative employment opportunities and therefore specific policy measures to increase opportunity incomes will be required. Many fisheries are located in depressed regions and it is important therefore to ensure that investment is directed at these areas. By and large, federally directed regional policy has failed to achieve this goal. An alternative approach would be to manage the fishery within the coastal/regional context. The ability of the fishing industry to contribute is a function of the resource rent available. This rent should therefore be extracted and used to fund specific investment projects in the coastal region. Since such investment will require clear orientation from a management agency, it seems to make sense to establish, say, a commission with responsibility to manage and develop both the fishery and the coastal region.

If opportunity incomes do increase in depressed coastal areas, why will they not be eroded by movements of workers from elsewhere in the economy? Of course, there is no guarantee that they will not be. If workers are mobile then the policy debate is somewhat different. Essentially the debate is about the relative position of fishermen, in which case as Wright (1991) points out, it will be necessary to adopt specific supply-side measures such as training to ensure that the value of fishermen in the labour market is raised. However, the policy debate, in many cases, is more than this. It is a debate about the absolute condition of fishermen and fishing communities. These communities are poor because there is a lack of investment providing alternative employment opportunities and this much is recognised by attempts at regional policy in places such as Newfoundland and the European Community. The advantage that the fishery offers is a perennial source of funding based on regional wealth.

This plan is especially relevant to LDCs where to date the tendency has been to consider fisheries development. What now seems to be required is to consider fisheries within the development process of the economy as a whole and in particular to consider what the fishery resource might contribute to this process. Integrated coastal area management with fisheries as a central resource seems an

obvious way forward. Such management could be community-based although there is no reason that this has to be the case. There is also a need for work on institutions and methods of management, and particularly for an analysis of alternatives and/or supplements to fishing rights such as ITQs.

The main argument in favour of government intervention and wealth appropriation is that much greater control is thereby obtained over the fishery. If ITQs are given to the fishermen and the wealth of the fishery is capitalised into their price, there is no guarantee that those who sell and realise this wealth will invest it so as to benefit the fisheries-dependent, or even the national, community. In fact, the wealth generated by the fishery will be indistinguishable from private wealth generated from other sources, and since this latter wealth has clearly not been invested in the fishery region, there are good reasons to think that nor will the fishery-generated wealth. In the case of developed countries, the failure to control wealth may leave the country facing a regional policy problem. In the case of developing countries, the problem is likely to be far worse since wealth is most often invested abroad. In such cases the country may find itself facing some strange capital flows where wealth generated by its fish resources is placed with banks in the developed world from which it re-appears as loans or aid. It seems a somewhat more sensible policy that the developing country should ensure that its resource wealth is used to develop its own economy. It is certainly the case that expectations of what economic management of fisheries can achieve must be realistic. Economic management will not suddenly make everyone associated with the fishery much better off. On the other hand, the fishery may be a very important source of capital that enables investment to occur in productive activities that gradually enable sustainable living standards to improve. This seems to be the true nature of development.

If economics is to advise policy, it seems difficult to believe that the distributional issue can simply be swept aside. The issue of who is to receive the wealth associated with the fishery and the impact that this wealth will have on the regional and national economy is intimately linked to the kind of management system adopted and the way in which it is implemented. In formulating advice on the implementation of management systems, therefore, economics should consider the distributional as well as the efficiency implications of policy options. This is *a fortiori* the case when one is advising developing countries, for whom the fish resource may provide a (or even the) major source for capital accumulation within the economy.

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