



FISHERMEN AND FISHERIES MANAGEMENT

by

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Abstract

This paper deals with the attitudes and responses of fishermen and fishing communities to fishery regulation measures. Any means used by Government to control, limit or direct fish-capture activities must necessarily affect the fisherman. His cooperation is essential to the success of the legislation. His attitude and reaction largely determine how workable any regulation will be in practice.

Fishermen tend to be individualistic and independent beings. This fact should not blind us to the enormous amount of cooperation that goes on within the industry, particularly within each port or community. To an outsider fishermen's behaviour may appear to be perverse or eccentric at times but it is little different in essence from that of any group or society whose livelihood, way of life, or existence is under threat.

The reaction of fishermen is viewed from the background of his profession and way of life. It is examined in two main areas: observation or infringement of regulations, and general communication with Government on the subject of fisheries management.

The specific purpose of management measures is then discussed and the situation facing fishery managers summarized. Some aspects of well-developed fisheries in industrialized countries are treated separately from fisheries in developing parts of the world as their situations are quite different and may merit different management goals and measures.

Ways of improving fisheries management and avoiding pitfalls are suggested in the concluding section. The importance of fostering good relations with fishermen and of involving them in the decision-making process is emphasized.

1. FISHERMEN'S ATTITUDES AND VALUES

1.1 Fishing Communities

The vast majority of fishermen live in towns or villages where fishing is the major single industry. Those residing in larger towns or cities tend to live in an enclave or section of the town close to the harbour. Within those tightly knit communities there exists a camaraderie and a set of values different from those of non-fishing communities. The prestige figures in town are the top fishermen. The daily gossip invariably centres around the fluctuating fortunes of the fishery. Fishermen's wives identify with each other both in the weekly fluctuation of their husbands' earnings and in the way they must assume more responsibility in the home when their husbands are at sea. In both these respects their lot differs from that of most shore-workers' wives. In some countries the wives are active in the processing and marketing of the fish catch.

While the fishing industry can and does accept small numbers of total newcomers, most new entrants come from a fishing family, or at least from within the fishing community. By the time a boy steps on board a vessel as a crew member proper, he has already absorbed years of folklore and peer pressure that have conditioned his outlook. He becomes a fisherman not just for the sake of earning money, but to commence a life career - and not just a life career, but for him the only logical career in life. Thereafter his experiences and companionships within the industry will further cement him into the fishing fraternity.

For a fisherman like that to leave the industry is a traumatic step, rather like denying the faith. Most traditional fishermen will leave the sea only if obliged to do so by reasons of ill health or severe economic hardship. Their natural commitment to fishing is beyond doubt. They are not "fair weather birds". In affluent countries the characteristic is less pronounced but most fishermen have this social and cultural attachment to their profession.

1.2 Fishermen as Hunters

Fishermen are hunters, members of the last remaining world-wide profession that involves pursuit and capture of its prey. Their whole training is geared towards maximising fish catch by every means possible. To this end, wits, stamina, intuition, experience are all applied. Risks to life and limb which would be unacceptable in any land-based job are faced regularly in the pursuit of fish. The fisherman battles with the elements, with the elusiveness of the fish, and in the face of severe competition at sea, to bring home his catch.

Any obstacle put in the way of a fisherman is instinctively seen by him as a challenge. He will use all his shrewdness and resourcefulness to get around it. This attitude must be faced by those attempting to regulate fishing by legislation. If the particular regulation has a loop-hole, the fisherman will find it.

1.3 Moral values and social acceptance

If a particular measure does not meet with the fisherman's sympathy (albeit grudging) then it stands little chance of effectiveness. Many communities of fisherman are extremely moral and demand high standards from all their members. But these standards may be based on subjective judgements, particularly in the case of fishery laws. Should the fishermen feel that a law has no moral basis or that it is not effective in achieving its objectives, then they will tolerate or sympathize with infringements by their fellows. Conversely a fisherman breaking a regulation that has widespread support will have to endure the opprobrium of his community, and that is something no fisherman can afford to ignore for long.

1.4 Remuneration systems

Most fishermen's earnings the world over are based wholly or partly on a percentage of net vessel earnings. Their income is directly related to their productivity. Even in fisheries where earnings are consistently low, the possibility of larger share-outs from a bumper catch is a constant spur to greater effort. Experience has shown that as soon as this element is withdrawn from the remuneration agreement, the fishermen begin to work to rule and are disinclined to take risks. Some basic wage security is sought in fisheries with a history

of exploitation, or in newly developed fisheries, and there a basic wage plus bonus system may prevail. In better developed and more prosperous fisheries there is usually no basic wage and earnings or shares are a complete percentage of net vessel incomes. As a rule, company-owned vessels operate a wage and bonus system and fisherman-owned vessels work a share system.

This is mentioned to emphasize the need for keeping the prospect of higher earnings before fishermen, to maintain incentive and productivity. An over-regulated fishery could discourage enterprise to the point where the total rent from the industry becomes uneconomic. A prosperous and productive catching sector can create and support prosperous marketing, processing and ancillary industries. But a half-hearted fishing effort will stimulate little industry ashore.

2. CONFLICTS, COMPETITION AND COOPERATION

2.1 Competition and Cooperation

Fishing is a competitive business. At sea fishermen compete with each other over limited fishing grounds and limited fish stocks. Ashore they vie with each other to obtain the best price for their catches and sometimes just for the sale of their catch on a limited market. The competition is seen in the way fishermen may withhold from one another, information about their fishing grounds or about their gear and techniques.

Despite the competition there also exists a strong element of cooperation, especially between fishermen from one particular port or village. They cooperate with each other at sea in matters of safety and to a lesser extent with fishing information. Ashore they may jointly purchase and share facilities for marketing fish and servicing their vessels.

Conflicts between fishermen are more likely to occur between distant communities than within any particular community. It is not that frictions are absent within localities but rather that the degree of closeness and the existing cooperation make it easier to resolve disputes. Conflicts between distant groups of fishermen are difficult to resolve in many regions because of the lack of organized leadership. Often ad hoc committees are set up to deal with a problem and then disbanded immediately after.

Organized cooperation has taken many forms over the years and in different cultures. Looser associations are often preferred to cooperatives proper, but their functions are similar and relate to bulk purchase of supplies, acquisition and management of facilities, and marketing of fish. Some self-regulation of fishing activities may also be practised.

2.2 Self-regulation

Self-regulation of fishing activities has occurred from time to time in certain localities. Often it has broken down only after an influx of large numbers of vessels from outside the locality which were too numerous or too powerful for the locals to control. Self-regulation has taken many different forms and some are listed below.

Fishermen have agreed to observe non-fishing days and closed seasons for social as well as fishery reasons. The date for commencement of an annual fishery has often been agreed upon within a community. Some fishermen groups observe taboos or prohibitions on killing certain species. A common modern form of self-regulation is the scheduling of fish landings to avoid large gluts on the market at any one time.

2.3 Unregulated fisheries

Competition in an unregulated fishery assumes a new dimension when the total fishing capacity has increased past the point where returns per unit effort start to fall. Thereafter, any increase in effort tends to produce a 'dog eat dog' mentality in which only the fittest survive.

Under such conditions, survival instincts may result in two kinds of behaviour as regards capitalisation. The most common, particularly where money is available, is to invest in more powerful, better-equipped units to get the maximum technological advantage. The other reaction is to minimize expenses, particularly

operational expenses, as far as possible so that despite falling catches the vessel or unit will not go into debt. Thus a fishing fleet with excessive catching capacity may tend to have a number of very efficient units and a large number of marginal vessels.

Local self-regulatory agreements break down when a fishery is under pressure and any moderation in harvesting the resource is discarded. There is a rush to grab as much of the stock as possible in a short time because of the expectation that it will be completely harvested well before the season's end. This is especially true for migratory or pelagic species which appear in abundance for a few months only.

Diversification may occur provided that underutilized species are to be found and that a market exists for them. This may relieve pressure on the main resource but is not in itself a permanent solution if total fleet catching power and effort are allowed to grow unchecked.

2.4 Equity considerations

Competition within any single fleet of vessels is liable to result in over-capitalization with individual vessels increasing in size, power and sophistication. This increase in catching capacity worries fishermen as well as governments. Fishermen who would be content with a unit of modest size are pressured to acquire larger or more powerful boats. The additional power is not really necessary to catch fish, it is needed rather to maintain catches in the face of the escalating competition.

Attempts to control this problem take the form of limits to length or tonnage within an overall limited entry or licensing programme. Unfortunately, neither length nor tonnage are directly related to fishing capacity. Vessels can be built beamier, deeper and with larger engines regardless of length or tonnage restrictions.

A much more meaningful and effective yardstick for determining fishing capacity is engine power. This can be measured as total engine power in maximum continuous brake horse power. Auxiliary power would have to be added to that from the main propulsion engine. A ceiling on engine power in each vessel of a given fleet would give every fisherman a fairer chance of earning a decent income and would prevent excessive earnings by some who were able to afford much larger and more powerful vessels. It would also make control of fishing effort that much easier.

2.5 Inshore/Offshore Conflicts

A common and rather naive belief is that small boats fish close to land and big vessels fish far offshore where better catches are to be found. Unfortunately the real situation is quite different. The inshore zone is by far the most productive in fish, area for area, and the productive offshore zone extends only to the edge of the continental shelf. Beyond that there is very little fishing activity apart from those for oceanic species like tuna.

In the absence of any regulatory discipline, fishermen will take the line of least resistance and try to obtain a catch on the closest and most productive grounds. If thereby they infringe on the livelihood of local small-boat fishermen, their attitude will be 'it is a pity but fishing is a competitive business', without the protection of enforceable law, small-scale fishermen will always be vulnerable to unfair competition from fleets of larger vessels.

The competition is unfair because the large vessel can fish much farther afield and in deeper waters. It can travel long distances and can cope with the weather offshore most of the time. The small inshore boat has distinct limitations as to distance, weather, and fishing grounds it can work.

The small-scale fisherman also represents the coastal community situated closest to the inshore fishing grounds. These communities are often small and the fishing industry however small it is may be the chief basic industry on which the village or town has been built. Destruction of the inshore fishing fleet may cause serious economic and social repercussions in such communities.

Exclusion from inshore grounds is a measure offshore fishermen may resent but can learn to live with and

which would not seriously affect their productivity. For the small-boat fishermen on the other hand, unrestricted competition with larger vessels could ultimately bring about his extinction.

2.6 National/Foreign Conflicts

International fisheries conflicts have occurred for centuries but have tended to be periodic and localized. As distant water operations developed this century, they became more frequent and more prevalent. The establishment of 200 mile exclusive economic zones (EEZs) for the fisheries of most countries has been the most important single measure taken to cope with the problem.

But the 200-mile EEZ does not in itself remove all source of conflict. Foreign vessels are still permitted to fish within EEZ limits, under licence or under joint venture agreements. A 200-mile zone is a colossal area to police and for many countries adequate surveillance is too costly, so infringements may continue to occur.

From the national fishermen's point of view, two requirements are indispensable in any agreement to permit fishing by foreign vessels. Firstly, the limits of their licence as to vessel size and type, fish species, area to be fished, and quantity to be taken, must be acceptable to the local industry as a whole. Secondly, the method of policing and of enforcing the licence conditions must be seen to be effective.

If either of these two items are lacking to some degree then resentment and bitterness will result. This may occasionally flare up into violent incidents at sea, or may manifest itself in a refusal by national fishermen to obey local or national fishery regulations. Some governments have permitted foreign fishing within their EEZ's as a quid pro quo for other trading privileges. Sometimes the licence fee charged has been insufficient to cover even the cost of surveillance. Such agreements can generate only ill-will and hostility between national fishermen and their governments.

3. FISHERY REGULATIONS: PROLIFERATION, PURPOSE & PRIORITIES

3.1 Proliferation of regulations

Fishery administrators and scientists refer often to the enormously complex nature of fishery problems in multi-species fisheries with multi-purpose vessels. Fishermen for their part might be forgiven for expressing bewilderment at the array of management measures and proliferation of fisheries regulations.

A skipper-owner has to know and comply with marine transport regulations that govern navigation, vessel seaworthiness, safety equipment, radio communication and skipper certification. He must be aware of the rights of fishermen employees and the obligations their employers have to adhere to. The mesh sizes in the cod ends of his trawls have to conform to regulations for his area. At sea he must be aware of any limit lines or restricted areas, and of times or situations in which he may or may not use certain types of gear. On top of all this he may have to obey a quote limit on his catch of certain species of fish and/or a limit to the permissible by-catch. And these measures may change at short notice several times a year.

It was C.F. Hickling who, over 25 years ago in a memorandum on fisheries to the British Colonial Office, warned of unnecessary legislation on management. That of course was in the days when many tropical fisheries were relatively under-exploited. He advised that no management measures be taken unless there was substantial evidence that fishing activities were threatening stocks, and cautioned that if measures were taken, great care be exercised to ensure that the regulations devised really did solve the problem, were easily enforceable, and had no serious side effects.

Bad legislation or unnecessary legislation will always bring good legislation into disrepute. Unfortunately, in most developed fisheries, we are already in the situation where fishermen are bitter at politicians and legislators over what they consider to be unhelpful regulations.

Part of the blame may lie in the lack of communication or inadequate communication between fishermen and legislators. The justification for and purpose of some fishery regulations may have been poorly explained to the fishermen. Some administrators may misrepresent measures by exaggerating secondary intentions

behind the laws. And law-enforcement officials may apply the letter of the law without sufficient regard to its spirit.

Perhaps the fisherman can be excused for viewing all kinds of regulation as coming from the same interfering hand of government, although he may be dealing with several different ministries and authorities, and with legislation related to matters as diverse as safety, investment, quality control, management of effort and conservation of resources.

<u>Management Measure</u>	<u>Detail or Example</u>	<u>Purpose or Intent</u>
Total Allowable Catch	Of any one species, for a whole fleet or country	Conservation of resource
Vessel/Fisherman Quotas	Maximum weight of species permissible per trip	Equalization of resource share
Fishery Limits	12-mile coastal limit	Protection of inshore fishermen
Closed Areas & Boxes	Closed bays & estuaries Haddock box, Pout box	Conservation of certain species
Closed Seasons	Prohibition of fishing during certain months	Protection of spawning fish
Moratoriums	e.g. Herring, North Sea, 1977–1982	Emergency measure to let stocks recuperate
Foreign Vessel Tax	On estimated catch from within EEZ	For revenue, foreign currency
Landing Prohibition	e.g. Berried lobster, undersized cod, etc.	Protection of immature or spawning fish
Vessel Restriction	Limited by size or power from any given area	Protection of small-boat fisherman
Licence Fee or Fishery Rent Tax	Applied or suggested for limited entry fisheries	Prevent windfall profits and share rent with State
Licensing	Of vessels	Facilitate control of fleet size & power
Licensing	Of fishermen	Provide job security & bargaining power
Licensing	Of gear (usually fixed gear)	Prevent conflicts & over-exploitation
Gear Restriction	Minimum mesh size	Reduce fishing mortality of juveniles
Gear Restriction	Overall gear size	Equalize effort & opportunity per unit
Gear Restriction	Specific gear prohibition	Reduce fishing effort and/or prevent excessive fishing mortality of vulnerable stock
<u>Development or Support Measure</u>	<u>Conditions</u>	<u>Purpose or Intent</u>
Grant or Loan on New Vessel	Size, type, fishery, specification. Qualifications and experience of applicant	To maintain a modern efficient fleet and direct development in approved ways. Also to encourage vessel ownership by fishermen

Vessel Withdrawal Compensation	For licensed boats within over-capitalized fishery	To reduce overall fleet size and effort, and so prevent over-exploitation and stabilize earnings for those left in the industry
Subsidy on Landed Fish	Species, whether gutted, size of boat & crew	To maintain supplies and support fishermen when market prices for fish are sub-economic
Fish Withdrawal Subsidy	Species offered for sale on market	To compensate fishermen when catches fail to realize minimum prices on fish markets
Internal Tax/ Subsidy on Species	Tax on high-priced easily-marketed species, used as subsidy on lower-priced less-exploited fish	To prevent over-exploitation of valuable species and encourage harvesting of less desirable fish, thus equalizing effort and encouraging market development

It might be a useful exercise sometime to identify all existing regulations applicable to any one fishery and ascertain their original purpose. One might note their current effects, side effects, nuisance value and costs of enforcement and compliance. Then one might make some estimate of the degree to which they have achieved or are achieving their original objectives. All management measures would have to be included, and not just those which apply directly to resource conservation.

The table above attempts to categorize and simplify major management and development measures and their basic purpose.

3.2 Priorities for regulations

Each interested party has a different set of priorities for fisheries management depending on their profession, training and/or invested interest. So we would expect differing approaches to management from resource biologists, economists, administrators, politicians, fish merchants and fishermen. The views of the other professions will be dealt with in other papers, here we might pause to list the main priorities for fishermen.

i. Resource conservation

Despite all the fears of biologists and the “tragedy of the commons” situation, practically all fishermen want the resource conserved, not just for the immediate future but for future generations. Any resistance to conservation measures would be due to doubts about their effectiveness or their fairness, but not to the purport of the legislation itself.

ii. Equality of opportunity

Few fishermen enjoy being in a vicious circle of unrestrained competition, particularly in an over-capitalized fishery. There is constant pressure then to acquire larger and more powerful vessels to gain a technological advantage over one's fellow. Competition itself is the spice of a fisherman's life and it is welcomed as long as it is competition by equals with the same rules and conditions applying to all.

iii. Balanced harvesting of resources

Some species are more marketable than others but most fishermen would agree it is not healthy for the marine environment to have fishing effort concentrated on a few species. A management system that can encourage a spread of fishing effort without penalising any one section of the fleet would be welcomed.

iv. Protection of inshore fishermen

The small need to be defended against encroachments by the large, the weak against the powerful. Fleets of small inshore boats need protection against uncontrolled fishing by offshore boats in their areas. Similarly offshore boats may require some protection against unrestrained fishing in their areas by distant water vessels or by foreign fleets. Compromise and adjustments will no doubt be necessary

in each locality but the principle itself would be acceptable to most fishermen.

v. Freedom and flexibility

Management measures should be sufficient to maintain fish stocks and control fleet size and fishing power. But they should not over-regulate to the point where incentive is killed or opportunity is seriously curtailed. Sacrifices will have to be made but legislators should leave the maximum amount of freedom with the fishermen, consistent with the goals of management. Do not take away from the fishermen more liberty than is really necessary.

vi. Stability and prospects

For most fishermen the past fifteen years have been ones of change and upheaval. Some management measures, hastily contrived to cope with events, have been a miserable failure. Fishermen would like to view their future with some confidence. They would like a management system that tends towards permanence, one that takes the long view rather than a series of temporary or short-term measures which simply take them from crisis to crisis.

These are some fishermen's priorities. There are others and their relative importance would vary from region to region. But none are really inconsistent with those of government, research or business, and a meeting of minds on appropriate and effective measures is surely not impossible.

4. REACTIONS TO SPECIFIC REGULATIONS

4.1 General reactions

With respect to any single piece of fishery legislation, there are four main factors which will influence a fisherman and determine the degree to which he will observe the law.

The first is his judgement as to the integrity and value of the legislation. Should he feel it has little moral basis or that it is ill-designed to achieve its objective, then he will feel little compunction in breaking it.

The second consideration is the behaviour of his peers. If the law applies equally to them or if they as a body tend to observe it then he will be much happier to comply with it himself. However, if some of his fellow-fishermen are exempt from the law or if a fair number of them are flouting it, then he will tend to disregard it.

Thirdly, there is the potential reward for disregarding a regulation. Would he increase his catch substantially by doing so? Generally speaking most fishermen break regulations only when they are having difficulty in obtaining an economic catch by legal means. Under such circumstances the greater the increased catch by illegal means, the greater the temptation.

The fourth factor is the strictness of the surveillance system and the punitive measures, or put simply, the risks and costs of being caught. No fisherman infringing a regulation expects to be caught, but the possibility is there and it is obviously a disincentive. This applies more to the generally law-abiding. Fishermen will admit themselves that the half-hearted poacher is much more likely to be caught than the determined and regular one.

4.2 Fishery limits

Local and national fishery limits, closed bays or inshore areas, and "boxes" at sea are the common forms of limit lines a fisherman may meet with. The purpose of establishing such limits needs to be clearly defined and should be acceptable to the industry as a whole. It may be to protect inshore or local fishermen, or to conserve fish stocks or safeguard spawning grounds. But whatever the reason, it must have a clear basis in fact and a consensus of support from the fishermen. Otherwise continuous surveillance would be necessary and even then enforcement would simply create bitterness and detract from the respect accorded to other more sensible legislation.

Generally speaking fishermen will observe limit lines unless under economic pressure to increase their catches by any means. In all fisheries where fleets are prohibited from fishing in certain areas, one may find

a small proportion of habitual poachers. These fishermen thrive on the existence of a limit, and amusingly, are usually the last to seek removal of the limit line.

Where a limit line exists to protect inshore fishermen one can rely on them to some extent to provide surveillance. Conflicts do occur however, but mainly in countries where the inshore fishermen have little economic or political power and where law enforcement is lacking.

4.3 Landing prohibitions

These take many forms. In several countries there are minimum sizes for certain fish offered for sale for human consumption. Egg-bearing or "berried" lobsters must by law be returned to sea in many fisheries. Industrial fish catches may not contain more than a certain percentage of edible fish under certain agreements.

There is little real resentment towards such landing prohibitions which most fishermen accept. Some like those for under-sized fish and percentage of edible fish in catches consigned for fish meal, may have a nuisance element. A trawler striking large quantities of small fish may face a problem in selection of acceptable sizes. There may be 2,500 small haddocks in one tonne weight of the fish.

A crew selecting and gutting several tons of the fish is bound to err with sizeable numbers of immature ones. Similarly, the presence of edible fish among trash fish is difficult to estimate with precision. But these considerations apart most fishermen would not view the landing regulations unfavourably.

4.4 Gear restrictions

These laws or by-laws may refer to minimum mesh size, use of otter boards or tickler chains, use of monofilament gill nets or nets above a certain size. This is one group of regulations whose observance depends largely on the fishermen's judgement of fairness. The questions in their minds will be:

- a. Is the regulation affording reasonable protection to a certain stock of fish or to a group of inshore fishermen?
- b. Is the regulation being fairly and firmly enforced? If most other fishermen are ignoring it, there will always be a temptation to do likewise.

It is essential that the fishermen are involved in the discussion and formation of any gear-restriction measures, and that these measures if adopted, be enforced without partiality throughout the fishery. Exceptions or loopholes will only cause bitterness and bring the law into disrepute.

4.5 Closed seasons and moratoriums

A complete ban on fishing for any one species, whether short-term or long-term, is much easier to enforce than any catch limit or quota. Fish must be sold, processed and retailed somewhere, and inspection at key centres can usually detect and prevent any violations.

From the fisherman's point of view, a complete ban is preferable in some ways to a quota. With a quota system it is easier to escape detection of infringements or to avoid compliance through legal or technical loopholes. Some fishermen will find ways of doing both. The attraction of a complete ban as compared to a TAC system is that it is usually applicable to all and the opportunities for violation are greatly reduced. There is a grain of comfort in the thought, however difficult a situation may be, that all others are in the same boat and are suffering equally as a result.

The major problem created by a closed season or a moratorium on fishing is that of alternative income. Few governments can afford to compensate all fishermen for an extended period and short-term employment ashore is seldom available. So some other marine resource has to be harvested.

For the fisherman this poses three questions. What alternative species may he fish for? How will he harvest

them? And does an adequate market exist for those fish? If all three can be answered satisfactorily then the moratorium will not seriously affect his livelihood. If alternative species or market is not available then his problems are extremely serious. Technological adaptation for harvesting a different species may pose some minor difficulties but these are not normally insurmountable.

4.6 Total Allowable Catches (TACs)

For the individual fisherman or for a small fleet operating from the same home port, the vital element in a TAC measure is not the total national or regional TAC but the permitted catch allocated to each fisherman or each vessel. No matter how generously his province or country has been treated as regards share of marine resources, the individual fisherman will judge the measure by the quota assigned to him or to his vessel. If this is sub-economic or creates operational difficulties, then he will resent both the regulation and its enforcement.

One of the most disappointing aspects of quotas, particularly on groundfish in multi-species fisheries, is that they may result in the destruction of more of those fish rather than less. If a vessel has already taken its quota of, say, haddock, and is trying to make up its catch with cod, whiting and saithe or hake, it may have to kill additional haddock in large numbers in order to capture the other species. This situation, reported by fishermen in both the east and west sides of the North Atlantic, adds neither logic nor respect to TAC measures.

A second major disadvantage to quotas is that they are not easy to enforce. Fish may be passed at sea from one vessel to another. Fish may be landed at obscure ports where no fishery officer is present. Landing dockets may be forged to list quota fish under a different species name. Some fishermen will violate the regulations in these ways, and the more widespread these infringements, the less motivation there will be for a law-abiding fishermen to continue to comply with the measures.

A third problem arises with respect to pelagic stocks for which fishing may commence on a certain date. These species are more subject to market fluctuations due to the timing and volume of the landings. If, as has been increasingly the case in recent years, fishermen fear that the total catch allocations are too large, they will fish as hard as possible to take their individual quotas before the annual stock is depleted. This results in sudden market gluts ashore and consequent falls in price with good edible fish often consigned to industrial plants for reduction to meal and oil.

Daily or trip quotas have been tried to prevent gluts on the market; these work best with demersal fish. Pelagic fish are caught in quantity and a vessel may search for them for a whole week before making a set. In such circumstances a strict daily or trip quota can only create frustration and increased bitterness for the men who are trying to earn a livelihood.

When vessels from different countries fish side by side on the same grounds under a quota regulation, the system of enforcement must not just be fair but be seen to be fairly and firmly applied to all. In the EEC common pond system, enforcement is the responsibility of the country to which the vessels belong. Fishermen from some countries felt that other governments turned a blind eye to infringements by their vessels. Whether their suspicions were justified or not, they existed, and this in turn motivated them to look for ways of getting around the quota regulations.

Fishermen's attitudes to quotas may be summarized in three statements or expressions of opinion. They do not work. They are difficult to enforce. And they are often unfairly applied or allocated.

4.7 Internal species tax

This is a measure taken by fishermen to equalise opportunity amongst themselves and to prevent over-exploitation of a valuable species. A tax is levied on the valuable fish, say cod, and is used to subsidize the price of a less valuable and less exploited fish, say redfish or saithe. Without the tax, most vessels would fish primarily for the cod and ignore the other fish. With the tax/subsidy, a substantial number of vessels will turn their attentions to the less desirable fish. There is then less intense pressure on the valuable fish and

the species previously ignored, begin to be harvested in quantity.

The measure then (it is hoped) has a third effect. Fish merchants, faced with increased quantities of cheaper fish, look around for new outlets for them and have them promoted in retail shops and restaurants. Consumption of the unfamiliar species rises and consequently their price rises. So the fleet of vessels concerned enjoys increased income from increased volume of landings and later further increases from higher prices for previously cheap fish.

This system has been tried in only a few isolated cases, as in Iceland, so it is too early to gauge fishermen's reactions. It is obviously an idea with some potential but which also calls for considerable cooperation and short-term sacrifices by the fishermen. Nevertheless, it could be useful in spreading fishing effort in certain cases.

4.8 Licensing and licence limits

The natural reaction of any fisherman to licensing must be negative. Traditional fishermen in particular, born into a fishing family or into a fishing community, will regard their entry into the industry (and their sons' and grandsons' entry) as a birthright which ought never to be relinquished.

Licensing then will never be a popular idea, initially with fishermen. At best it may be regarded as a necessary evil. To accept a system that will thereafter limit entry into their fishery, the fishermen must be convinced that the alternative is much worse. Retention of the status quo may result in a vicious circle of more or larger vessels and less fish all round with consequent survival of the fittest and extinction of large numbers of otherwise viable fishing units.

The most vociferous opposition to licensing usually comes from the highliners or top fishermen who are most likely to gain in a free for all situation and who would be at the forefront of technological innovation with larger, more powerful and better equipped vessels.

As with much other fishery regulation, a great deal depends on how fair the licensing system is seen to be, both in concept and in implementation. If it really will conserve stocks, stabilize incomes and make for a more prosperous fishing industry in the long run, then it stands a fair chance of acceptance. But if there is any suggestion of favouritism, special interests, paternalism or betrayal, then naturally no self-respecting fisherman will support it. The full participation of the fishermen at all stages in formulating and implementing such a fundamental change in management is absolutely essential.

One aspect of licensing that would in the long run receive the support of most fishermen would be limitations to the size or power of individual units. This prevents over-capitalization and thus undesirable increases in catching capacity or fishing effort. But it also prevents a small number of fishermen from taking the lion's share of the catch and growing excessively rich at the expense of the others.

Most licence limitations to vessel size have in the past been related to length or tonnage. Fishermen have found ways round these criteria by installing greater engine power and heavier equipment and by constructing vessels designed to gain maximum advantage from the legal or statutory definitions of length or tonnage.

A limit to total engine power would be much more realistic and this has in fact been applied to some fisheries. The criteria for determining engine power can be related to manufacturer's authenticated specifications, or to approved tests by certified marine engineers or surveyors. The latter would be essential in the case of devoted engines or marinised engines and an official seal would have to be placed on the governor. Thereafter any infringements would be treated seriously with possible loss of licence as a penalty.

Licence limitation by total engine horsepower would then have benefits in terms of equity, control of fishing effort, prevention of over-capitalization and reduction in total fuel consumption. Great care would be necessary in determining power limits for vessels operating in different areas and with different gear types, but most fishermen would support these measures in the long run.

4.9 Licence fee or fishery tax

In limited entry fisheries more than others it is possible for some fishermen to obtain high earnings in a short period of time. This phenomenon may occur in the early stages or may recur from time to time during years when yields are high and markets are buoyant. Some economists view this as a bad thing and suggest a fishery rent tax or imposition of fishing-licence fees.

Of all the management measures referred to in the foregoing pages, this must rank as the most obnoxious to the fishermen. For generations they may have struggled to extract a livelihood from the sea in the face of many hardships, fluctuating stocks, poor or limited markets and exploitation by merchants or vessel owners. Now when they are finally to reap a significant reward for their efforts, some artificial ceiling is to be placed on their earnings. It is not as though they do not already pay taxes on their incomes, personal incomes and vessel incomes, plus levies on fish landed for all sorts of purposes, plus taxes on fuel oil and some other purchases. No, on top of all that, some economic advisors suggest a further heavy licence fee or fishery tax.

A heavy licence fee would discourage primarily the average and below average fishermen. The top fishermen would always be able to afford it. It could result in unnecessary withdrawals from the industry during years when available fish stocks were low. The other social and economic costs would have to be considered. A fleet composed of many units of modest fishing power would support numerous secondary industries ashore in boatbuilding, engineering, net making, ice manufacture, electronics, marketing, transport and processing. To jeopardise the health and stability of the fleet which is creating and supporting secondary industry for the sake of an additional tax would appear to be unwise.

If a special fishery tax were to be introduced it would be much fairer from the fisherman's point of view to relate it to excessive vessel profits and make it a kind of surtax. Thus a vessel with a replacement value of say \$1 million might be eligible for a fishery tax on all pre-tax profits over say 30 percent of replacement value. The fishery tax would be at a rate which would still leave something for the owners after payment of other taxes. But to a fisherman the tax would still be rather pointless. Under a well-formulated licence arrangement it should not be possible to increase the fishing power of any unit or replace it with a more powerful unit, without buying out another licence. So any increase in income might be invested in minor vessel improvements but could seldom be invested in additional fishing capacity. Presumably the income would be invested in some other way of benefit to the community or the country.

Some economists have suggested a landings tax as an alternative to a licence fee. The government would exact a duty on all fish sold by licenced fishery vessels. This would have two obvious results. The fishermen would fish harder to land more fish and make up earnings lost by the tax. This would be more pronounced during lean years and would result in increased pressure on the very fish stocks the licence was devised to protect. A second effect would be increased cost of fish to consumers since there would be considerable pressure by the fleet to push some of the tax cost on to the market price. So the housewife would end up paying part of the landings tax.

Experience in limited entry fisheries to date would appear to suggest that the benefits reaped from having a stable and prosperous fishing fleet, creating wealth and supporting ancillary industry ashore, are too valuable to risk by over-taxing the primary producers.

For most free-entry fisheries the arguments about fees and taxes are rather academic at present, and in any negotiations on limited entry are a bit of a red herring. Windfall profits are being reaped by very few fishermen in unregulated fisheries. Many who made large sums of money with big new purse seiners, lost most of it shortly after when they were hit by increased fuel prices, high interest rates, quota allocations and/or depressed markets at around the same period of time.

Fishing has always been marked by brief periods of high earnings. These must be viewed in the light of two things: (a) the prolonged periods of low or modest earnings, and (b) the enormous risks involved.

Fishermen do not enjoy the security or benefits that go with more stable jobs on land. They get no holiday

pay whatsoever, no job-related pension, no guaranteed wage in case of catch failure, and no cost of living increase other than what the market affords, and it usually lags behind price increases for fuel, equipment, stores and services.

Statistics show the risks to life and limb which fishermen face are much greater than those in coal-mining, fire-fighting or any other major dangerous occupation ashore. In addition there are the financial risks in building or purchasing a vessel for which the fisherman has probably invested his life savings and mortgaged his home.

When occasional high earnings are viewed against the indirect benefits of having a viable fishing fleet which is making no demands on the exchequer for subsidies or welfare payments; and when they are weighed against the risks fishermen face and the periods of low earnings, then the idea of placing a high fee or fisheries tax on the primary producers appears to be both mean and self-defeating.

There are other much better ways of preventing windfall profits and sharing fishery wealth with the government and the community. One such method would be to eliminate gradually all large and powerful vessels from the fleet and retain only smaller powered units up to the minimum size deemed necessary for safe exploitation of the waters in the region concerned. Each unit would then be limited in capacity and fishing power and would be less likely to make excessive profits. Nevertheless, each unit would be more productive than in a free entry fishery and would be yielding tax revenues to the State and supporting numerous ancillary workers ashore. Fishermen employment would also be maximized, a matter of considerable help to any economy in these days of recession and unemployment.

This kind of management of units of effort could be implemented in distinct national fisheries where all operators are subject to licensing regulations. It would be difficult to achieve in fisheries where fleets from several states operate on the same grounds. But it might still be possible in common pond situations like the EEC, though only with the agreement of all member States.

5. POLITICAL EXPRESSION AND COMMUNICATION WITH GOVERNMENT

Poor communication is one of the major obstacles in achieving understanding between fishermen and government. Fishermen have difficulty expressing themselves to government, and governments generally have difficulty in understanding the fishermen's point of view. Conversely, government statements may be misunderstood by fishermen and its actions misinterpreted.

There are three main causes for this communication failure and they ought to be examined if a serious attempt is to be made to remedy matters.

5.1 Geographical and cultural isolation

Fishermen are isolated from others by the nature of their work and of their settlements or communities. The greater part of their time is spent at sea in almost total isolation from society. Their short periods ashore are largely spent in their own close-knit communities with their particular values, world view and way of life. The geographical and cultural isolation of fishermen makes them a more difficult group to communicate with than farmers, miners, truckers or other workers who also suffer from isolation or inaccessibility.

It takes time to set up a consultative meeting with fishermen. They need time to get ashore and to get from their towns or villages to the government office which is usually located in a city. Even if only one or two fishermen's representatives are called for, they need time to consult their fellows and to get authorization or guidance on negotiating positions and tactics. It would be better if government investigative bodies or consultative teams would spend a reasonable time in each of the main fishing centres, hearing testimony or reactions and answering questions. But that is an experience they are usually disinclined to submit to.

5.2 Inarticulateness of fishermen

Fishermen are remarkably articulate in their own environment. They have their own poets, prophets and

writers. At sea they are expert in verbal communication by radio-telephone and ashore they have no problem in expressing themselves to fish buyers, boat builders and net makers. However, bureaucratic and diplomatic language and procedures are quite alien to them and they can fail to convey articulately their views and desires to government.

Inarticulateness may be evident in several ways. To begin with fishermen find the maze of government bureaucracies quite confusing and may be unaware of the correct procedures or channels to follow in expressing a complaint or request. Secondly, they tend to be oral communicators and dislike having to put pen to paper. Many fishermen cannot understand why an oral expression or application is not sufficient for government. It is normally all that is necessary within his own environment. Thirdly, fishermen are not familiar with the language of law, bureaucracy or diplomacy. They may use such terms themselves without regard to their precise legal connotation and may read into diplomatic language by government officials, more or less than it was intended to convey.

As a result of this communication problem it may be very difficult to arrive at an understanding with fishermen though on the other hand it may be easy to pass legislation before the fishermen have realised its full implications. This may explain partly why fishermen so often appear to protest after the event.

5.3 Vehicles of expression and representation

Of all groups of primary producers, the fishermen must surely be the worst organized. The lobbying power and influence of farmers' and miners' unions is renowned. What group of fishermen ever brought down a government or changed the direction of trade or industrial law? Only perhaps those fortunate enough to be in a country where fishing was the major or one of the major national industries.

In almost no country can any single organization speak with authority on behalf of fishermen. Instead we have a proliferation of organizations and elected representatives. In this respect the fishermen are perhaps their own worst enemies but one suspects that other vested interests prefer to keep the fishermen divided and disputing among themselves. In the UK, for instance, there are regional fisheries associations and associations organized by species fished. There are fish producer organizations, fishermen's cooperatives, trawlermen's unions and a fishermen's federation. Elected representatives a fisherman may approach include Regional Councillors, Westminster MPs, and Euro MPs.

In some countries, federations or associations representing large fishing companies have enormous political clout, while those representing small-scale fishermen or owner-operated vessels are both fragmented and poorly represented. This may result in excessive government support for big companies or industrial fisheries and neglect of the small-scale sector which actually produces most of the fish in the majority of countries.

5.4 Confusion of issues and interests

Fishermen's interests in management measures fall into two overlapping categories, namely vessel size and sphere of operations, and fishing gear or species harvested. Each category has three main sub-divisions as follows:

- a. Vessel size and sphere of operations:
 - i. Inshore boats operating close to land and usually within 10 to 30 miles of their home port.
 - ii. Offshore vessels operating within the 200-mile zone in national waters.
 - iii. More distant-water vessels fishing in international seas, within the EEZs of neighbouring states, or in "common pond" areas of their own waters.
- b. Fishing gear and species harvested:
 - i. Demersal fisheries or trawler fleets.

- ii. Pelagic fisheries or purse-seine fleets.
- iii. Shellfish fisheries or coastal fleets.

The particular designations may vary from country to country and there may be additional groups or sub-groups but the broad divisions remain similar. Note that each size and area category may overlap with each gear and species category. This leads to confusion of issues and interests.

Add to those interest groups the various vehicles of political expression and representation and it is small wonder that fishermen's protests and lobbying are characterized by confusion and discord. Certainly the public, if not the government, is rarely able to appreciate what the fishermen want.

The meanest trick a government can play on fishermen in such circumstances is to use testimony from one group to discount the pleas of another whose interests are totally different. A classic example of this occurred when one country signed the EEC common fisheries policy. The domestic fleet appealed for a 50-mile exclusive limit within the common pond. But the trawlers federation, none of whose vessels operated within 100 miles of the country stated that six miles was more than adequate. The government of the time jumped on this as justification for signing away access to all the inshore and nearwater fishing grounds.

5.5 Principles of communication and negotiation

The task of a Fisheries Administrator faced with a confused mixture of appeals and demands is to negotiate skillfully and impartially to ensure that no one group of fishermen suffers unduly. If sacrifices are called for to achieve conservation of fish stocks he must see to it as far as possible that the burden is equally shared by each group.

However tiresome the procedure may be, governments should ensure that the views of every legitimate fishermen's group be heard and not just those of the most powerful or most vociferous. Spokesmen for fish merchants, processors, plant owners or other shore industry should not be allowed the pretense of speaking for the fishermen. Similarly, companies and businessmen owning fishing vessels are a different breed from fishermen and have different priorities.

When a group of fishermen are in serious economic plight, their leaders - having little bargaining power - may accept a settlement that they feel is unjust or extortionate. Such an achievement in negotiations may prove to be a hollow victory in the long run for the powers that be. It would sow the seeds of discontent, bitterness and inclination to violate regulations which could jeopardize the success of any fishery management scheme.

6. FISHERIES OF INDUSTRIALIZED COUNTRIES

6.1 General description

The fishing fleets of the industrialized states are characterized by power, sophistication and versatility. Even small inshore boats may be equipped with radio-telephone, radar, echo-sounder and hydraulically operated steering gear, winch and net hauler. The investment cost of most fishing units lies in the range of \$50,000 to \$1,500,000. This is in contrast to developing country fisheries where individual fishing units may cost from \$1,000 to \$300,000 with the vast majority costing less than \$10,000.

Numbers employed in the catching sector are modest. Catch per fishermen varies from about 20 tons to 60 tons for human consumption and from 100 tons to 300 tons for those countries with large industrial fisheries. So the production per man is from ten to a hundred times that of the least developed countries (LDCs).

As most industrialized countries are located in the temperate north where there are less species, this is reflected in the catch, both in its composition and in the smaller number of methods used in harvesting.

Despite the enormous power and sophistication of the industrialized country fleets it would be a mistake to

assume that the bulk of their production is from large vessels. With the exception of a very few countries like the USSR, most developed country fleets are composed of vessels of less than 100 tons.

In the UK, for instance in 1981 there were only 239 trawlers above this size and they took only 21 percent of the demersal catch. The other 342,000 tons was taken by 1,976 smaller vessels.

6.2 Conflicts between fleets

The developed fisheries are being harvested at levels close to and sometimes rather beyond sustainable yields for some species, and by fleets of vessels equipped with powerful and sophisticated aids to fish location and capture. Both the overall level of effort and the intensity of the competition make conflicts inevitable. These arise between fleets of inshore and offshore vessels and between local and foreign vessels.

Because inshore fleets are limited in the distance they can travel, they are vulnerable to local fluctuations in inshore stocks. Even when several species are fished, the loss of one may greatly reduce annual income. It is important therefore to provide these fisheries with some kind of protection from competition by large vessels.

There is no need for large sea-going craft to fish inshore and a protective belt would not hurt the offshore fleet unduly. But it could mean salvation and preservation of viable inshore fishery with all its attendant benefits for small coastal communities.

The extent of the protective coastal belt will vary according to local requirements, but could be 6, 12 or 15 miles with some bays or firths completely enclosed. As far as possible the local communities and local fishermen's associations should be given substantial authority over the section of the belt adjacent to them.

Offshore fishermen face two kinds of competition, that from other domestic vessels and aggravated perhaps by over-capitalization, and that from foreign vessels permitted to fish in their waters by licence or under common pond agreements. Both kinds of competition need to be controlled to limit total fishing effort to a level which will not damage stocks.

Fishermen will suffer the foreign encroachments if at least they are fully subject to the conditions of their licence. Enforcement has to be thorough and if necessary severe, and it must be implemented by the home state itself. The local fleets must be fully satisfied with the monitoring, control and surveillance of foreign vessels.

Competition within the local fleet can only be kept within manageable levels if overall effort is controlled. This will mean sacrifices but it should be the goal of administrators and legislators to minimize these and have the burden shared as equally as possible. Ultimately there must be ceilings for all fishery effort and these need to be translated into ceilings on the power of individual units of effort. This will affect primarily engine power but may also involve the type and size of fishing gear that may be used.

The goal must surely be a system of permanence. One that will ensure conservation of fish resources for generations to come, security of work and income for the fishermen and the ancillary industry workers, and one that will provide the market and the consumer with a regular supply of quality food fish at reasonable cost.

7. DEVELOPING COUNTRY FISHERIES

7.1 Artisanal fishing fleets

Most developing country fisheries have very large artisanal sections and these constitute a social and economic problem not present to the same extent in industrialized countries. Countries with particularly large artisanal fishermen populations include India, China, Indonesia, Bangladesh, Philippines, Korea, Nigeria and Brazil. Japan is perhaps the only industrialized country with an equivalent large number of small-scale fishermen, but their average incomes are high in comparison with most artisanal fishermen.

Most artisanal fishing fleets are characterized by extremely small units of effort utilizing mainly passive methods of fish capture such as gill nets, hand lines, traps, tangle nets, long lines, lift nets and cast nets. Catches per unit of effort are very low, often at marginal or subsistence level. Most of the fishing is conducted within 12 miles of land though some artisanal boats may travel many more miles from their home village.

The mechanization of artisanal fleets is limited and the vast majority of them still rely on sail and paddle for propulsion. Some experts now question the wisdom of mechanization programmes, believing that the best technological option for these craft to be a gentle combination of both sail and modest power. Of the estimated 900,000 artisanal fishing boats in the combined fleets of India, Philippines, Indonesia, Nigeria, Korea and Brazil, some 100,000 or just over 10 percent were reckoned to be mechanized in 1979(FAO Fishery Country Profiles). Actual mechanization rates can vary from country to country, from under 5 percent to over 50 percent. Because of this, the artisanal fleets use on average only 60 litres of fuel to catch a tonne of fish compared with 300 litres consumed by commercial boats to produce the same amount.

7.2 Fishing pressure of artisanal fleets

Nearly 20 million tons of fish are caught annually by artisanal vessels. From an estimated 10 million fishermen and 2.5 million boats, that breaks down into an annual average catch of 2 tons per fishermen and 8 tons per boat. In a 200 day fishing year that would average out at 10 kg per fisherman and 40 kg per boat each fishing day.

Catch per unit is low because of the simple technology used and because of the sheer numbers of vessels concentrated in some localities. However, because the methods used are mostly passive and unsophisticated, pressure on the resource may not be too great. Catches per unit may decline if fleets increase in number but the stock itself may not be threatened if only artisanal boats are working it.

This is an extremely important fact both from the point of view of resource biology and of socio-economics. Sedentary species and marine mammals have been over-harvested, but to date there are no cases of a fish stock being destroyed by the actions of artisanal fishermen. All the drastic resource failures of the past 30 years have been due to the pressure of commercial or industrial fleets. The Peruvian anchovy, the South African pilchard, the North Sea herring, the Californian sardine and the whales all succumbed to such commercial efforts. The depressed state of demersal stocks in S.E. Asia has been brought about through over-capitalization in the trawl fisheries. In none of these cases did artisanal fleets, however large, play any more than a very minor role.

Problems arise when commercial fleets begin to operate in artisanal fishing grounds as has been happening in the Philippines and Indonesia. Then over-exploitation may well occur, but to blame it on the artisanal fishermen is a dishonesty and an injustice which adds insult to injury. Yet this view has been advocated at times in an effort to justify continued commercial operations on artisanal fishing grounds.

7.3 Enforcement of fisheries regulations

A major problem for any poor or under-developed country is the cost and technical demands of monitoring, control and surveillance. It is relatively easy to pass a law prohibiting fishing in a certain area, but if there is no fishery protection vessel to apprehend offenders, then the law becomes worthless. It is worse than no law because on paper at least there should be no cause for complaint. A similar situation exists if the powers of arrest and charging with offences lie with very junior local officials. A large and wealthy company can intimidate such persons with ease by one means or another.

There are some countries which have had fishery prohibitions on the statute books for many years and yet have not had a single successful prosecution against a commercial fishing company although hundreds of artisanal fishermen may have been tried and punished for similar but smaller violations.

A law is only as good as its enforcement. If the enforcement mechanism is lacking, the law has no teeth and

is of no help to the fishery. Fishery management in developing countries may therefore be an impossible task until a competent protection service is established, large enough to police the waters and with sufficient authority and integrity to be able to do so without fear or favour.

Perhaps the Japanese system of management of coastal zones by local authorities with their own protection service may be a guide for such situations. Local fishermen's leaders and elected community representatives guide the management authority in its monitoring, control and surveillance activities. Alternatively, a strong Federal MCS unit as established in Malaysia might be able to effect enforcement without yielding to influential local business or political interests.

8. CONCLUSIONS & SUMMARY

For fisheries legislation and management measures to be really successful, the cooperation and agreement of fishermen is very necessary. The fishermen should be consulted and involved at all stages of the conception and formulation of regulations.

As most fishermen are to varying degrees members of rather inaccessible and inarticulate groups vis a vis government bureaucracies, special efforts in communication and liaison are necessary for proper consultation.

Fishery regulations should be adopted only after fishermen and administrators are satisfied that they would achieve the desired objectives, would be fair to all groups affected, would be enforceable at acceptable cost and would not have any serious side effects.

Control of fishing effort is scarcely possible without fixed limits to fleet size and fishing capacity. The most realistic measure of fishing capability is engine horse-power. Vessel length and tonnage are extremely poor guides. So a limit may have to be placed on the engine power of individual units. Some gear control may also be necessary.

Failure of management measures in developed countries can hardly be blamed on lack of enforcement facilities, data or research. Rather it has been due to poor work in the conception and formulation of regulations.

Developing or poor countries have different management priorities particularly as they mostly have large populations of artisanal fishermen with no alternative job prospects. As most LDCs are located in the tropics where many species of fish abound, they also have more complex stock management problems.

In both developed and developing fisheries, substantial protection should be afforded to the coastal belt for the benefit of small-scale fisheries and inshore stocks.

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