When is fisheries management needed?[a)]

Daniel Pauly[b)]

Abstract

Following a brief review of the global fisheries crisis, a medical concept -triage is used to distinguish three types of fisheries, those that are (a) autonomous and healthy, i.e., may not require external management inputs; (b) affected by moderate resource decline problems, or resource access conflict, or (c) impacted by resource depletion or socioeconomic ills of a magnitude beyond that which can be addressed by dealing with the resource base, and its direct users. It is suggested that fisheries management *(sensu stricto*, or extended to include co-management), can best deal with the fisheries in (b), but not necessarily with those in (c). A few ideas – some perhaps new, most recycled – are then presented on how new governance arrangements may deal with fisheries in (c), and lead to sustained resource utilization even in areas where there is no official capacity to formulate and/or enforce detailed fisheries regulations.

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[b)] International Center for Living Aquatic Resources Management (ICLARM), Manila, Philippines and Fisheries Centre, The University of British Columbia, Vancouver, Canada (pauly@fisheriescom)

Introduction

Given the sorry state of the world's fisheries (Garcia and Newton in press), and their even gloomier prospects if business continues as usual, no one will contest the need to rethink the way fisheries are managed. They are many calls for this (e.g., Christy 1993, Beddington 1995). Indeed, we might have to rethink the way we *think* about management including perhaps the way we define it. The literature contains many definitions of fisheries management; in spite of their differences, however, most share enough features to be put into two subsets *viz.*

(i) fisheries management *.lensu stricto(ss),* concerned mainly with stock assessment, i.e., with the biology of the stocks, the deployment of fishing gears and their interactions (see e.g., Smith 1994); and

(ii) fisheries management *sensu lata* (s *I),* concerned with the performance of the fisheries sector as a whole (Gulland 1981), and implying, on the research side, multidisciplinary studies linking biologists with economists, sociologists, anthropologists, and interventions linking, and on the policy definition and implementation side, one or the other form of co-management.

The definition of (ii) implies that *multisectoral* coastal area development planning, is by definition not "a part" of fisheries management, even in the widest sense Rather, it is fisheries management *sl* that should be an element of such planning, at least when the local importance of fisheries warrants it (see below).

My personal area of expertise is the development of quantitative methods for the research in (i); also, I have developed some concepts pertinent to the multidisciplinary research in (ii). On the other hand, my experience is much more limited with regards to multisectoral coastal area development planning and the reader is thus asked to view the suggestions below as no more than food for thought.

In this spirit, I propose 'to follow through, with emphasis on resource-limited, small island states, on the ramifications of a medical metaphor for fisheries management, which, -who knows -may end up being more useful as a background to our research and other work than the metaphor drawn from operations research that most fisheries practitioners appear to use (see Bradbury and Reichelt 1981).

The latter, articulated in various contributions edited by Haley (1981), may be viewed as comparing the components of a fishery to the various components of a machine (or an industrial production process), the job of the manager then being to adjust the various rates (here: the application of fishing effort) linking the various components of the machine or production process.

As the title of this contribution implies, we should rethink the conditions under which (i.e., when) fisheries management (either ss or *sl)* is needed. The operations research metaphor does not help here, as it does not allow for fisheries systems to function as self-regulated entities, and thus for management to ever become superfluous, not even to assist in deciding how to allocate scarce resources (personnel, funds) that may be available for management.

A medical metaphor

In 1984 at a conference on multispecies fisheries, I had noted the analogy between fisheries scientists, whose advice is often not heeded, and the staff of a hospital that would diagnose diseases, but could not treat them (May 1984).

I now present another medical metaphor in the hope that it may help us answer the question in the title of this contribution. Although I tend to be a peaceful person, I base this metaphor on the experience of battlefield surgeons who, when faced with a large number of wounded and a shortage of time and other resources, put them (reluctantly, I am sure) into three groups:

i) those that will survive without immediate help;

ii) those that require immediate help for survival;

iii) those that will not survive, even if provided immediate help; and then devote all their attention to group (ii).

This concept of "triage" is the metaphor I propose to apply to fisheries, following the required adaptation to our purposes of the terms "survive" and "immediate help".

Survival of a fishery should mean here I presume:

(a) the continued existence of the biological resource upon which the fishery relies; and

(b) In contemporary terms, the former implies the maintenance of local biodiversity, while the latter implies a social organization allowing for *sustainable* use of a natural resource, two themes to which we shall return below.

Without *both* of these elements, a fishery -the locus of interaction between fishers and a resource -will not survive.

However, at the risk of displaying a biologist's bias, **I** would like to stress that (a) and (b) are not equivalent or symmetrical' a resource can continue to exist (as "latent" resource) if the fishers disappear, but the converse does not hold, and hence the primacy of conservation and maintenance of biodiversity when dealing with the sustainability - i.e. the survival -of fisheries.

The concept of "immediate help" is easy to conceive when it applies to battlefield surgeons, and consists of stanching blood losses, avoiding shock, etc, Its analogy, as far as fisheries management is concerned, presumably includes those measures that must be taken to prevent collapse of fisheries, through

(i) massive and rapid build up of fishing effort, resulting in reduction of spawning biomasses and of biodiversity;

(ii) massive and rapid destruction of habitats, usually resulting in reduction of recruitment;

(iii) resource access conflicts among groups of fishers or between fishers and other coastal resource users, leading to (i) and/or (ii),

Let us now see if our new metaphor helps us find out when and/or where management is needed.

Fisheries that do not need immediate help

What conditions may occur in a fishery that would make it unnecessary for them to be "managed" (i.e., for an external agency to try to influence the way the resource is allocated and effort is deployed)? I should like to assume that such situations exist only when'

(i) catches are small relative to the size of the resources; and

(ii) a framework exist for formulation and enforcement of resource access and gear deployment rules.

Both of these conditions appear necessary: high catches relative to the size of the resources will invariably lead to increasing recruitment fluctuations, and an erosion of the biodiversity of the resource, and thus increasingly strain a local management system. Conversely the absence of *any* management system (traditional or not), and of the constraints such system implies will unavoidably lead to relatively high, and eventually unsustainable catches.

There appear to be several fisheries in the South Pacific region to which the above two conditions may still apply, and which thus may not need to be managed. The "task" ahead may indeed be, in such cases to allow "traditional" (i.e. local) management practice to remain uncodified, so they can continue to evolve and adjust to new challenges and opportunities (K. Ruddle, pers. comm.).

Fisheries that require immediate help

Virtually all textbooks in fisheries science and management are written in developed countries, for developed-country students, scientists or fisheries managers. Whether explicitly or

not, these books all assume developed country infrastructures, both administrative and scientific, and industrial fisheries (with sometimes considerations of sports fishing).

The constraints, in tropical developing countries, to fisheries management such as described in these books are rarely mentioned, and their assimilation into a global view of fisheries management is still pending (Pauly, in press).

For example quotas, either as free-for-all Total Allowable Catch (TAC) or as treasured Individual Transferable Quotas (ITQ), the state-of-the-art among developed country fishery management tools, are utterly useless when the administrative and scientific infrastructure does not allow for (at least nearly) real-time monitoring of catches and landings, i.e., in the small-scale fisheries of tropical developing countries (Munro 1980, Pauly 1996).

"Immediate help" to fisheries cannot thus be likened to the routine work of fisheries laboratories in developed countries, which largely consists of estimating next year's quotas.
Rather, providing "immediate help" may consists of timely interventions, e.g.,

- ? evaluating newly introduced gears, or of new fishing practices in view of their regulation;
- ? evaluating the prospects for expansion of a fishery;
- ? resolving acute access conflicts; or
- ? providing the scientific basis for new fishery legislation, including definition of protected areas and closed seasons.

Here, the idea is that a fishery management unit should not operate "tactically" i.e., run the fishery, or even provide annually renewed management targets, but contribute "strategically" to its long-term orientation, which once launched, should run largely on its own.

Timely response to such challenges implies that the Department of Fisheries or other administrative unit in charge of fisheries has staff capable of raising to such challenges, which brings up the concept of "critical mass".

In research, this refer to the size of a unit, the quality of its staff, and the resources available to it such that it can accomplish its mission. When a unit is below critical mass, it cannot do so, whatever its name and the legislation which created it.

I am not aware of any explicit study of the critical mass required for a fisheries management unit -indeed the only related study that has come to my attention is that edited by Daniels and Nestel (1993), assessing critical mass requirement for animal research in Africa and/or Latin America.

Its conclusions, however, appear to apply to fisheries research as well: below 4-5 professional staff, of which 2-3 should have at least an MS degree, with adequate clerical administrative and technical support (e.g., at least a small craft in the case of fisheries research), and a small library (see e.g., suggested book list in Appendix 3 of Pauly 1984), a local fisheries

unit may well be useless (see also Box 1).

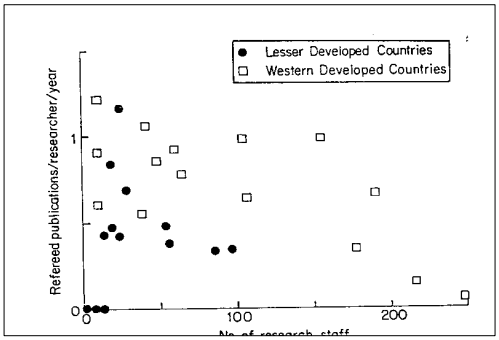
Box 1. Productivity and critical mass in fisheries research institutions.

Morgan and Hopkins (1986) in an attempt to estimate the relationship between scientific productivity and the size of28 fisheries research in laboratories in 22 countries assembled a useful data set, presented in the figure below, and from which they drew the following inferences

In both LDCs and western developed countries, there is a marked decline in productivity with the size of the laboratory; the decline appears at a smaller institute size in LDCs than in western developed countries;

Within the range of about 15-50 researchers, there is little difference in the productivity of laboratories in LDCs and western developed countries;

Very small laboratories in LDCs (less than about 15 research staff) have virtually zero productivity unlike such laboratories in western developed countries This implies that the concept of a "critical mass" of researchers is of greate' importance in LDCs than in western developed countries.



However, one cannot agree with these authors when they state that "the average number of publications [in the 13 LDCs laboratories] was 049 which is remarkably close to that for the 15 surveyed laboratories in western developed countries [and thus], the average fisheries laboratory in the LDCs was a productive as those in western developing countries"

As might be seen from the figure. the average productivity in western developed countries of 053 is strongly affected by the five laboratories with more than 150 staff, which have no counterparts in LDCs and which, because of the size effect noted above may not be included in a comparison Without these laboratories, "western" productivity increases to 086, markedly higher than the LDC figure of 049, and in line with the more limited funding and other resources available to them

A similar relationship between productivity and resources was found by Dizon (1995) in her recent study of seven Philippine fisheries research institutions.

This may imply, for small countries and/or provinces of larger countries that either:

- ? external input are sought for the above-mentioned tasks (e.g., from international organizations, such as e.g., FFA, SPC or FAG, or from private consulting firms),

or

- ? a partnership between institutions is formed allowing pooling of resources to reach critical mass (this is further discussed in Pauly et al. 1990).

Another aspect of (fisheries) research, implied in the critical mass concept, but is that it is expensive (Box 2).

Box 2. Scientific productivity and its costs.

Estimating the cost of research in a given country, e.g. of fisheries research is not an easy task, and it is even more difficult to assess productivity. However, if publications are considered the major output of resear, then productivity can be assessed and comparative studies do exist pertaining to fisheries institutions or projects (Rounsefell 1961, Morgan and Hopkins 1986, Pauly 1986, Dizon and Sadorra 1995, Dizon 1995).

Jointly, they indicate that the formal education of scientists increases their productivity (BS<MS<Ph.D.), as does the support and recognition they get through and/or from the institutions where they work.

Also, these studies suggest for all costs associated with generating publications (i.e., not only the "publications cost") a mean figure of about US$ 1,000 per page with values below this for technical reports, and above this for papers in international refereed journals [see Morgan 1983 and Mathews 1987 for attempts to reduce costs e.g., by using length-based, instead of age-based techniques for studying fish growth].

The implications of this for a small fisheries unit are obvious, and should be followed through - e.g., by relating the expected cost of studying a given fishery to the benefits (if any) to result from improved management of that fishery.

Jointly, staffing and funding constraints will tend to make it difficult for the Fisheries Department of small tropical countries to fulfil their mandate, and this has led to high expectation for arrangements wherein the fishing communities are involved in the management process, i.e., for co-management (Fig. I), a theme explored further below.

Fisheries that require more than fisheries management

Fisheries that have collapsed biologically, such as the Newfoundland cod fishery, or in which the massive ecological and social changes have occurred which 1 term Malthusian overfishing (Pauly 1994), e.g., in Bolinao, Pangasinan, Philippines (see McManus et al. 1992) and in Maqueda Bay, Samar, Philippines (see Saeger 1994) do not require "fisheries management" *(ss.* or *sf.).* Rather, what they require are intersectoral arrangements including onshore job creations for redundant fishers.

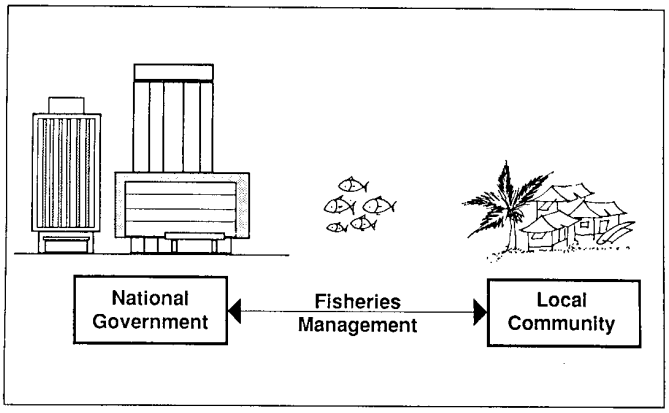


Fig. 1. Schematic representation (in ICLARM 1993) of relationship between Government <-> Fishery communities underlying the concept of co-management. The original legend of this graph read: "Co-management: shared authority for fisheries management between community and government. A partnership of capacities and interests of fishing communities with the capability of national governments to provide legislation, institutions and assistance".

In the above case this forced the Canadian federal government to:

i) close the fishery, and save the few spawners left, thus hopefully allowing an eventual rebuilding of the stocks; and

ii) provide economic support for over 40,000 fishers and their families, inclusive of training programs to enable young fishers to work in other sectors, and for older ones to retire.

In the Philippines and for understandable reasons, such interventions has not been forthcoming for ailing fisheries (although excellent management plans, inclusive of alternative livelihood programs have been proposed, see McManus et al. 1992). Instead, legislation has recently been passed which delegates much authority over coastal fisheries resources from the central government to local government. This has raised hopes that "co-management" schemes may evolve linking central and/or local governments with fisher communities in a shared responsibility for the resources, as illustrated in Fig. I.

Though now much talked about in the context of tropical fisheries, this concept cannot belie its Canadian origin (Pinkerton 1989), which shows in its implicit assumptions:

i) that the fishers are, with regard to the resources, the only stakeholders that the government needs to deal with; and

ii) that the government involved in the axis of Fig.1 has, indeed, "capacities" to contribute to the partnership.

Thus, in Canada, the scientists of the Department of Fisheries and Oceans have the capacity to evaluate fisheries stocks, to estimate TAC, etc., and to propose management regimes which the government has the capacity to enforce, etc.

Co-management emerged in this context as a battle-cry of marginalized groups with a tradition of fishing (such as the First Nations of Canada) who -understandably want to participate in the resource allocation process, if mainly to increase their share of the resource.

"Tropicalizing" the co-management concept thus involves assessing the capacity of local or central governments in tropical developing countries to serve as counterpart (or counterweight) to fisher communities, and evaluating of whether these fisher communities should indeed be considered the sole legitimate stakeholders as far as fisheries resources are concerned. I believe this critical evaluation should be performed in the context of the general framework of the "new governance" defined in Kooiman (1991), and allowing for government to perform several of their functions by empowering groups of stakeholders.

Thus, rather than for government to remain actively engaged in management of a given resource(as implied in Fig 1), governance *sensu* Kooiman and colleagues implies the creation, through appropriate legislative action, of a "level field" through which various stakeholders are given the means to articulate their demands for access to certain goods or services[a)] and to exert pressure on each other, but where action must result from consensus, or a least majority agreement among groups of stakeholders.

In the fisheries context, this implies the identification of groups other than fishers with legitimate claims to the resources, e.g., NGOs promoting non-fisheries livelihood programs including mariculture and rural and town-based enterprises, conservationist NGOs interested in the biological integrity of fish populations endangered by excessive fishing or, in coral reef fisheries, the owner/operators of dive resorts, who will fail to attract tourists if the fishers have blasted the reefs, etc. Fig. 2 is a feeble attempt to illustrate this concept.

This implies that such groups be handed over, through government legislation, *joint* authority over the management of a resource. Fisheries management advice, in such context, would go to the joint authority (e.g., a Management Council), which would then have to balance such advice against alternative recommendation encouraging nonextractive use of the resource.

Such balancing, if it occurs, would imply that fishers would have to reduce or at least stabilize their effort level to accommodate the interest of other groups not involved in resource extraction. This could, in favorable cases:

- increase catches (and decrease their variability) for those remaining in the fisheries;
- increase diversity within the exploited species complex;
- allow for society at large to extract some resource rent from fishers (if indirectly, via taxes paid by other, taxable groups whose activity require healthy stocks, e.g., tourism operators), i.e. a group that generally cause resource rent to be completely dissipated.

This last point may seem moot to those who consider fishers the only legitimate users of fish resources, but perhaps may be appreciated by others, who can conceive of fish resources being viewed the same as e.g., wetlands or tropical forests, now widely perceived as being "public" resources, which not even their formal owners have the right to wantonly destroy.

[a)] Dr Jacqueline McGlade, with reference to the German philosopher J Habermas calls the resulting interactions "herrschaftsfreie Diskussion" ie discussion not under (government) rule.

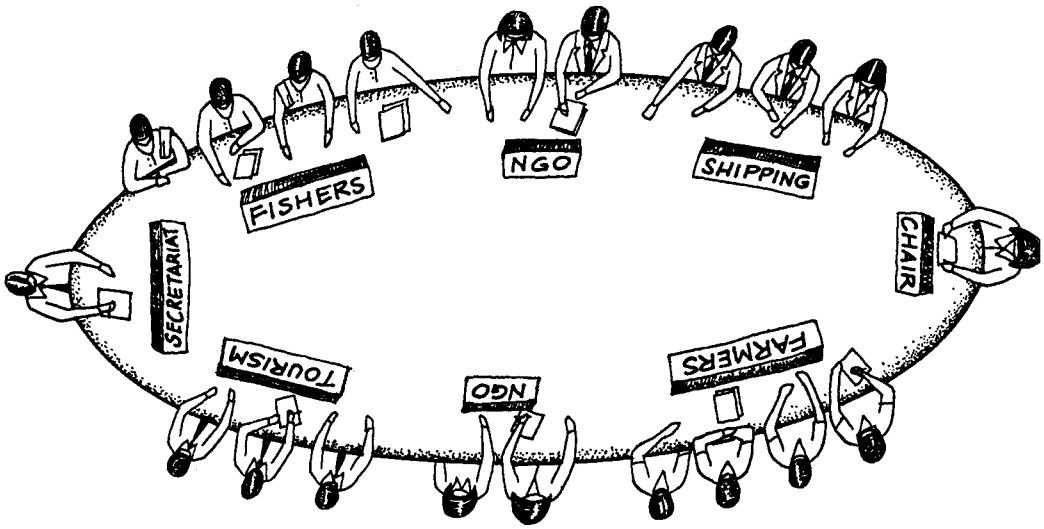


Fig. 2. Schematic representation of a situation where joint stewardship of the natural resources of a coastal area has been jointly entrusted to groups of stakeholders, including fishers. NGOs, devoted to local development, or conservation, along with e.g., tourism representatives may, in such case, counter any exclusive claims or actions by the fishers, and in this capacity, replace or at least complement (local) government action.

Conclusion

Table 1 presents a summary of the ideas presented here. These ideas may appear remote from the realities of day-to-day management of fisheries. However, being aware of the limitations of our discipline, fisheries management, can only help us become more modest, and hence willing to listen to the ideas of others.

State of fishery	Management
OK	None
Needs help	Standard management
Social welfare only	Governance

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