by **Menakhem Ben-Yami**

How to manage fisheries without replicating western follies

In the former article (A word of warning: West not always the best, INFOFISH 6/2013:51-53), the author promised to suggest some alternatives to the 'western' fisheries management system. Accordingly some basic issues related to the ecosystem and management has been addressed with examples to elucidate various aspects of fisheries development for the sustainability of fish stock through equitable sharing of wealth.

From the point of view of ecology, fishery represents an element in a complex ecosystem. But fishery ecology is hardly exact branch of science. In the 'commerce' that takes place in marine fishery ecosystems, values and vectors constantly change, interacting in various ways, and we don't even know all the players in the game.

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Fishery management must be alert for the role of anthropomorphic (due to human activities) factors and for the environmental fluctuating dynamics. It must take into account, in addition to fishing, polluting and destruction of habitats essential to fish spawning, also their growth and survival rates, as well as all sorts of predation. Hence, stock assessments are always approximate and should be critically reviewed by independent experts and knowledgeable fishers.

Fishery management: What for and by whom?

Fishery management's tasks are: Maintaining conditions that enable supply of fish to people and the well-being of fish producers, preventing fish depletion and sustaining bio-diversity. In some cases it allocates access to fish resources to different fishery's sectors. Fishing people are often the only element that fishery management can manage and those who'd enjoy or suffer from its consequences.

Political and ideological persuasions of those in power, determine the management's approach. It, for example, may let traditional, artisanal and commercial fishers, to run their fishery but may also put the government in charge, consulting other stakeholders but fishers, '*because you don't let cats to watch the cream*'. Between these two extremes there are many alternatives. One social-political question that the management must tackle is: What's more important? *Profits derived from the resource or the number of people making living of the fishery.* Maximising profits obviously benefits large scale owners and companies. Governments preferring to allocate to them the benefits from coastal fisheries would choose the latter approach. One Canadian Fisheries minister, a promoter of the ITQ system, had an excuse: 'Better to have two fishermen do well than ten

Tradable quota system may bring such ships to fish in coastal waters

The following is a layman's example how fuzzy logic can represent a given stock assessment

The biomass of a stock is estimated at 100 000 to 200 000 mt.
There's a little chance, say 10%, that it is between 100 000 and 120 000 and between 180 000 and 200 000 mt.
There's more chance, say, 20% that it is between 120 000 and 130 000 and between 170 000 and 180 000 mt.
There's more chance (about 30%) that it is between 130 000 and 140 000 and between 160 000 and 170 000 mt.
And finally, the best chance is, say 40% that the biomass is between 140 000 and 160 000 mt.

This is a reasonable approach, which along with other information should help to sensibly select management steps.

to starve'. We had a Fisheries Director, who was saying: 'We better have fishermen in 30 boats making a modest living, than half of them growing rich in 15 boats'.

Do not cause harm! Over 800 years ago, Maimonides, the great physician and philosopher, taught his students: *Doctors' first and foremost duty is not to cause harm to their patients.* The same should be reiterated to fisheries managers: *Don't harm fisher folk*. Wrong management can cost the fisherfolk their living, destroy or debilitate their communities or force them to risk life by forcing them to operate in dangerous conditions. The managers, who unintentionally or not, have deceived them won't have to pay for their follies. Only their 'patients' pay for managers' mistakes. Wrong management may also fail to prevent depletion of fish stocks through destruction of habitats essential for their reproduction and survival, failure to curb pollution and overfishing.

Beware of 'one size fits all' approach. Each fishery deserves discrete study and individual recommendations. Transferrable quotas (ITQs- individual transferrable quotas *etc*) considered by many a panacea, while helpful is some instances, is disastrous in others. There's a whole catalogue of ways and means to choose for specific cases and each of the suggestions and recommendations below should be critically weighed whether they could fit a particular fishery.

Purse seining in India in 2 stages; such traditional boat can be a source of living for at least 20 fishers and their families.

The law and fisheries management: It's not for national authorities to make laws that set targets and specifies ways and means to their implementation for different fisheries. They should set up discrete regulatory bodies for specific fisheries and areas, prescribing their composition, membership, terms of references, procedures *etc*. Species-related rules catch targets, gear and effort limitations, input or output management *etc* would be the task of the local/regional fisheries regulatory bodies. They may tribal authorities and community councils, or be state appointed, through various co-management schemes *etc*. It's highly advisable to shun any regulation, which is perceived by fishing people as erroneous, wrong, unjust *etc* for it'll never work.

Fishery management and non-fishing factors

Although western fisheries management is often paying lip service to non-fishing factors, its basic approach is that mainly fishing determines fish abundance. This may be right in a few instances, but wrong to various degrees in most others. There's a plethora of factors other than fishing and their various combinations, which affect fish abundance but cannot be quantified, which fishery managers must keep in mind while trying to understand the real-world dynamics of fishery resources.

Here's an abbreviated list of such factors: Availability of food; poor recruitment caused by unfavourable climatic fluctuation, and by diseases often resulting from overcrowding in a population, especially where associated with food scarcity; changes in species composition due to exotic immigrants on one hand, and departure of native fishes, on the other; loss of genetic variability; pollution and eutrophication by fertilisers seepage; coastal and estuarine habitat degradation including destruction of spawning or nursery areas; blockage of migration routes; diversion and drying of streams; seismic testing; oils slicks and the chemicals used to clean them; dumping industrial and agricultural waste and dredge-spoil and more.

Management without figures? Not quantifiable information, ignored in the present models, can be explained

in qualitative, descriptive terms and incorporated in stock assessments. Fishery managers should learn life history and ecology of the targeted fishes, their interaction with other species, and listen to the traditional knowledge and experience of the fishermen involved. Last January, American scientists of the US NOAA's Northeast Regional Science Center admitted that their system is inadequate and called to consider formerly ignored data and information from industry, from their own social science division, and from the Massachusetts University's studies.

When data is poor, intelligent and prudent managers whenever forced to quantify stock abundance and TACs (total allowable catch) on the basis of inadequate data, should use 'fuzzy logic'. It's a methodology, whose proponents point out that the more complex is a system the less is our ability to make precise and significant statements about its behaviour. With roots firm in the real world, fuzzy logic breaks out of the cult of model-driven precision paradigm dominating the western fisheries management.

It often happens that decisions by local bodies depend upon who the managers side with and, consequently, determine who's going to gain and who's going to lose. In my opinion the right approach is to allocate benefits from a fishery so that maximum number of people and families can make their living of. Accordingly, in my report to India's National Workshop on Low Energy Fishing (Cochin, 1991), *(Fish Tech Spec Issue, p 122)*, I set forth what I call the MB-Y's allocation principle:

1. Fish that can be caught by artisanal fishers should be caught only by them;
2. Fish that cannot be caught by artisanal fishers, but can be caught by small-scale commercial fishers should only be caught by them;
3. Fish that cannot be caught by small-scale commercial fishers, but can be caught by medium-scale commercial fishers should only be caught by them.
4. Only such resources, which are not accessible to any of the above fishery sectors, or which cannot be feasibly caught, handled, and processed by them, should be allocated to industrial, large-scale fisheries.

This, of course, can't fit every fishery, but it could do as a sort of guiding principle.

Co-management

Enforcing 'top-down' management rules that are contrary to fishing people's knowledge, experience, and common sense, which they cannot materially support and comply with, is both expensive and ineffective. In most, southern countries, it simply doesn't work. Especially, when authorities try to impose 'western' systems of single-species management, quite nonsensical in warm-water environments, where most fisheries are typically multi-species or output management systems that

Such European boats represent the consequence of management by length limitations; they're extremely wide, deep and heavy in relation to length, which makes them 'Fuel guzzlers'. To go **through water they have, as fishermen say, 'to push half Of the sea in front of them, and pull** the other half behind'.

most such countries are unable to monitor and enforce.

Prof Elinor Ostrom got the Nobel Price for showing that while governance of ocean resources is flawed, many inshore fisheries have been handled very well by local communities that control access, fishing rights and ways *etc*. Local and traditional institutions and regulation often *can do better than state or privatised systems*. Bureaucratic mythology says that 'locals can never organise/manage themselves', but Elinor Ostrom proved that they're wrong.

While TACs and quotas represent output management, input management may consist of DAS (day at sea), closed areas, closed seasons or a combination of both, as well as limited access (number of vessels or fishermen or total/individual horsepower), gear limitation such as number of nets set and meshsize, fishing grounds and seasons closed to certain sorts of gear *etc*. See also: *FAO Fisheries and Aquaculture Technical Paper* (582).

Co-management has been practiced or attempted at in many fisheries. While it means different things in different settings, it always involves partnership and power sharing between the authorities in charge, commercial fishermen and if necessary, other shareholders (*eg*, sport fishermen, marine fish farmers *etc*). Some of the experience gained and lessons drawn are summarised and explained in the book: 'The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects', edited by: DC Wilson, P Degnbol and J-R Nielsen published in Holland by Kluwer, Dordrecht.

China: China uses input control as a major strategy. Regulations issued in 2002, prescribe overall fishing capacity (vessels, gear and fishing permits). Since 1994, China has been also imposing a hot season moratorium in the Yellow Sea and the East China Sea that affects 120 000 fishing vessels and one million fishermen. During this period, trawling and stake-net fishing are banned, and setnets are closed for at least two months in all marine areas. From 2004, only gillnets with mesh size over 90 mm, are allowed in Bohai Bay from mid-June to September.

Japanese management system with its large community-based cooperative organisations seems to operate quite satisfactorily. According to Dr Mitsutaku Makino of the Japan's Fisheries Research Agency: *'Due to the complexity of the system and its intensive nature, fisheries coordination and resource conservation cannot be implemented effectively in a top-down, command-and control manner'*.

Japan's management system, however transformed with time during its hundreds years long history, remained quite different from western variants. Nowadays, some 190 000 fishermen, which form almost 90% of the total, operate in inshore and coastal waters. Doubtless, Japan's fishery management system, is working without the western ITQs, catch shares *etc*, which, Dr Makino writes, *'are costly, crude and hardly adjustable to species' life cycle, and to fluctuations and assessment errors'*.

In Japan, management of coastal fishery resources has the form of input and technical controls, with the resource users in charge. In the offshore, industrial fisheries, the national government plays a principal role in the plans and rules making, and fisheries organisations participate in their implementation. Presently, TAC directed at only 8 stocks of mostly pelagic species, is based on the results of seaborne fishing surveys, and set in a participatory process with fishermen's organisations, and prefectural and national authorities. In the sea-cucumber dredge fishery, TAC is set by the fishermen themselves.

Conclusion

Before trying to fit any of the above examples and general advice to your fishery, do consider them critically all, for you may find that it may need something entirely different.

Menakhem Ben-Yami is a well acknowledged fishery ecologist, a free-lance fisheries adviser and writer on fisheries. In 1996, the Kaliningrad State Technical University awarded him 'Doctor Honoris Causa' for substantial contribution to development of fisheries science and for training of specialists.