### by Menakhem Ben-Yami

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any marine scientists and fisheries managers have made their schooling or scholarships in fisheries science and management in Western European and North American countries. Some of them might've been coming from southern and eastern countries, where native science either hasn't yet developed locally, or has developed with different, often traditional approach. Notwithstanding, they would be very impressed with what they were taught at the various Western fisheries institution. Coming back home they'd quite naturally be inclined to introduce in their

They can also be impoverished due to coastal and upstream pollution or destruction of inshore habitats essential for their reproduction and growth. They can be collapsed by exotic pests, as it happened years ago in the Black Sea by blooms of the invading Atlantic comb-jelly indiscriminately feeding on all fish eggs and larvae, or by any combination of fishing and non-fishing factors. Still, the tunnel-vision science keeps being applied, only partly because of ignorance of such ecological processes and their effects on fish populations, but rather because of some more obscure reasons.

#### What science?

In the West, the ruling conception, often supported by law, is that fisheries management must be based on the best available science. This science, however, being inadequate, may lead to wrong management. For many years now I have written and lectured on that inadequacy, pointing to the absence of environmental parameters from the commonly employed models of the fish populations' dynamics. The fallacious contention that fishing is the only or the predominant factor responsible for

# A word of warning: West - not always the best

**Fishery ecosystems** 

basics. Fisheries management should allow

fishing people exploit in sustainable manner

fish-resources within fishery ecosystems.

are influenced by such external factors, as

logistics, fishery-independent natural, biotic

as anthropogenic changes in the water-

Fisheries, said once that management's

challenge is to find "a balance between

essential to their sustainability".

economic growth from sea-related activities

and the protection of the environment which is

quality and in other features of fish habitats.

Joe Borg, the EU's former Commissioner for

people's cultures, economics, technology, and

and non-biotic trends and fluctuations, as well

national or local fisheries the knowledge they had acquired, lock, stock and barrel. They should be warned however; to be very judicious about some of the western paradigms they've been taught. The main scientific paradigm of this science is: 1that it can assess the state of the stock of a single commercial species; 2-that it can predict the share of that stock that a fishery can remove, while maintaining optimum stock size; 3-that fishing is the predominant factor affecting the assessed fish population, and end every impoverishment or departure of the stock is a result of overfishing, and hence:4-fish stocks can be fully managed by controlling separately the fishing rate of singlespecies. What I'm going to write about here is that not only that uncritical copying of Western official fisheries science and management methodology is a bad thing to do, but also that those are often simply wrong even for their own fisheries.

As we'll see below, fish populations usually expand shrivel and even collapse, sporadically or in cyclic or semi-cyclic timeseries, also without the "help" of fishing.

The author opines that uncritical copying of Western official fisheries science and management methodology is not only a bad thing to do, but also that those are often simply wrong even for their own fisheries.



Menakhem Ben-Yami

changes in fish populations brings the Let's have first a good look on some of the management to regulate fishing and nothing else. Neither those models nor the management take into account the experience and the generations-old traditional knowledge Those three, bound together in every fishery,

> of the fishing people. When I was a young skipper and computers had yet to appear on our scene, fishery scientists used to sail on board research and commercial fishing boats, sample and identify fish, examine their food, take water, plankton and benthos samples, measure ambient temperatures, and listen to fishermen. Then, they were analysing their samples in labs and tried to synthesise the lot into a meaningful pattern, somehow in a way similar to physicians diagnosing diseases. All

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this took the largest part of their working time. Now, fishery scientists spend the bulk of their working time at their computers, while the jury is still out on the question if fisheries knowledge and management are now better off.

# Straight from the horse's mouth

Not that the western scientists are unaware of this inadequacy. In 1957, R J H Beverton and S J Holt published their seminal work on the dynamics of exploited fish populations. It dealt with several models describing population dynamics. The most famous model presented in their work was the simple *yield per recruit model* that has been since in a wide use in fishery science. But, in 1992, Ray Beverton, told the participants of the World Fisheries Congress in Athens, that *"it was well*  into the 1980s before fisheries science began appreciating the limitation of all the variants of the mathematical models of fishery dynamics, including the routinely applied VPA (Virtual Population Analysis) method, and their tendency to produce dubious though superficially plausible results". VPA - said Dr Beverton - should rather stand as an acronym for "Very Provisional Assessment".

"The early life history (ELH) of fishes is crucial to the recruitment. It's been now well proven that ELH dynamics are interwoven with basic productivity, physical oceanography and even atmospheric dynamics", hence, said Beverton, "the broad correlation between year-class strength and physical oceanic conditions over wide areas". And: "With the exception of the dramatic fishery collapses of the 1960s and 1970s, natural factors have had a greater influence on the long-term abundance of many fish species than fishing..." "The proportion of the total amounts of fish consumed that is eaten by other fish, sea mammals, and birds is as great as or greater than it is by man. This is true even in the heavily fished North Sea". – said Beverton.

# Our friend marine mammals

This brings me to estimates of the share of fish taken by some 9 million of various protected marine mammals counted in aerial surveys off the US West Coast. According to Andrew Trites, Professor and Director of the Marine Mammal Research Unit, University of British Columbia: *"consumption of marine organisms, expressed as a percentage of an individual's body weight per day, ranges from about 4–15 percent for zooplankton, 1–4 percent for cephalopods, 1–2 percent for* 



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fish, 3–5 percent for marine mammals and 15–20 percent for sea birds". My guesstimate is that between 12 and 20 million mt are consumed by marine mammals around the coasts of the USA.

The total commercial landings for all species (finfish and shellfish) from the US East Coast and Atlantic Canada are 680 000 and 870 000 mt respectively, according to the Canadian Division of Fisheries and Oceans and the US National Marine Fisheries Service. In perspective, in the Northwest Atlantic in 2006, marine mammals alone must have eaten many times as much fish and shellfish as commercial fishermen have landed. On the whole, they're eating what the fishermen are catching. If a fisherman wants to catch a fish, there's an excellent chance that a whale or a dolphin or a seal wants to catch it as well. According to Dr de Brooke, Curator of Birds at the University of Cambridge, seabirds alone consume 70 mt of food as against the 80 million mt of global fish landings. Kristin Kaschner, a marine biologist at the University of British Columbia, estimated some years ago that the amount of fish eaten by marine mammals worldwide is estimated at roughly 10 times the worldwide ocean fish harvest.

### **Environmental factors**

In its 2003 Yearbook, UNEP said that the 150 dead zones in bays and semi-enclosed seas worldwide are a greater peril than overfishing, and scientists at the Virginia Institute of Marine Science wrote: "...oxygen depletion is likely to become the keystone impact for the 21<sup>st</sup> Century, replacing the 20<sup>th</sup> Century keystone of overfishing." Some of such dead zones extend up to 27 000 square miles. And a study of krill-salmon relationship in British Columbia carried out by Dr Tanasichuk shows that it is the abundance of krill that's critical for salmon abundance.

Unfortunately, none of the routinely applied in the West stock assessment methodologies are able to adequately, if at all, express such and other environmental factors. In most of them the only variable is the fishing mortality, while natural mortality that among others should comprise the predation by birds and mammals is routinely and fallaciously assumed a constant (0.18-0.2). Mathematical models are fed with catch and effort data of often-questionable accuracy, and only sometimes with results of fish sampling and acoustic monitoring. Consequently, such models churn out "precise" values that are results of calculations involving approximate, speculated, guesstimated, and assumed figures.

Why then? We've got here a double problem: the validity of the models themselves and the quality of the data that's fed into them. Unfortunately, the figures obtained on such shaky basis are presented as "*the best available science*". Thus, no wonder that official management recommendations, such as, for example TAC (total allowable catch), are often questioned by fishing people and those scientists, who use to spend time on board fishing vessels, talk to experienced fishing people and read scientific reports times when models and their operators haven't yet taken over the western fisheries management systems.

Why then the official western fishery science so stubbornly sticks to a methodology, although its scientists themselves must know better? In my view, the motives behind this behaviour should be sought in the economicalpolitical character of the management system. The logic is, as follows:

The choice of the, technical, and administrative methods of the management system, however, and the manner in which they're applied through legislation, regulation, enforcement, quotas allocation or limits set on effort, is the product of the political attitude of the powers in charge. The political moment behind the 'best available science' slogan consists in the need to satisfy the prevailing governmental policy. For example, whatever is the prescribed TAC, allocating fishing rights to a large number of small-scale fishermen would call for a different management mechanism than allocating them to large-scale businesses.

### The holy market

The prevailing trend in the West measures economic success and efficiency in terms of profits while preaching an all-out privatisation.

For this purpose it claims that fish stocks can only be sustainably exploited if they become a subject to free market forces through individual tradable guotas (ITQ) or other privatisation options. As a rule, marketable quota systems favour the financially stronger and invariably lead to a gradual displacement of small-scale individually or family-owned fishing enterprises, and sooner or later to the concentration of fishing rights in the hands of a few, either specialised fishing companies, or large holding corporations for whom fishing may be only one branch of a multifarious business. It goes, usually, as follows: initially, fishing quotas are assigned to all participants in the fishery at such rates that when fishing is good they can make their living. As soon as TAC is reduced, not necessarily for the right reasons, the individual quotas become insufficient for the smaller operators. This forces them to sell or rent out their quotas or their vessels to the financially stronger owners or big companies. Regulatory attempts to stipulate acquisition of quota by some maximum values, as a rule, fail to stop fishing rights accumulation. ITQ may present a suitable solution for distantwater fisheries accessible to only large fishing vessels involving major investments. But, introducing this system into small-scale or mixed fisheries carries socio-economic and political ramifications, such as the displacement of fishing people and impoverishment in fishing communities witnessed in several western countries.

To sum up the above, I think that the western fisheries scientific and management system serves as an instrument for accumulation of fishing rights in the hands of a few powerful ones, at the expense of smaller-scale, private operators, mostly through the introduction of TACs and ITQ. In another article, I'll suggest some alternatives to the present system.

M 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 to training of specialists.

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