



Are we ready for Ecosystem Approach to Fisheries Management

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There is a fatality about all good resolutions; they are invariably made too soon.

-Oscar Wilde.

1.0 Introduction

Fisheries management as a discipline has evolved with the ever increasing human engagement in fishing. The story could be told in different ways. The popular version is the anthropocentric one depicted as the story by a selfish invasive species which came to dominate the Earth. Unfortunately, there will be few takers if the narration is by fish, or any other aquatic species for that matter.

In the beginning the subsistence fishing formed only a fraction of the collective natural threat that any given population of fish faced. Therefore, managing such threats fell within the design of natural system. The taste of fish was so good and price comparatively low that most people wanted fish. Over the years the demand increased, so also the price. Thanks to omega-3 fatty acids and all, in later years the quantum of harvest became significant. Then the harvests became unnatural, the level went beyond the permissible limits of nature. So there appeared a real management problem.

Since *Homo sapiens* (Latin: "wise man") got addicted to fish, the human wellbeing became inextricably linked to fish in the diet. There was concerted effort to continue exploitation and find suitable theories and models which supported such action. The sacred solutions appeared in the form of surplus production models and mystical parameters such as MSY. The whole world went with faith, as expected in any successful scientific evangelism.

After long innings with surplus stock models, facilitating the collapse of several fisheries in the Atlantic, the referees called the game foul. Instead of finding who fixed the match in the first place, they ventured into inventing new game plans. Of course, the players needed livelihood support and new ideas to ensure it. Or putting the way Thomas Kuhn (2013)¹ would have it, the surplus production models have brought the fishery management paradigm to a 'crisis' situation and thus paved the way for a paradigm shift. It would be worthwhile to have a cursory analysis whether the shift (with EAFM) was in the right direction.

2.0 Thoughts on Ecosystem Approach

The need for incorporating environmental parameters in the fishery stock assessment management exercises was put forth by several authors. Milner B. Schaefer, the apostle of surplus production

¹ Kuhn, Thomas S. (2012). *The Structure of Scientific Revolutions: 50th Anniversary Edition*. University of Chicago Press. Kindle Edition.

model, himself had laid out three scenarios or levels of study for fisheries science in an elaborate matrix (Figure 1). **Level I**, the first and most practical, focused on studying the relationship between fish and fishing, how many fish were being taken, how large was the population, and how quickly the fish grew. **Level II** investigations focused on estimating the size of a fish population and calculating reproductive rates, growth rates, and natural mortality. At **Level III**, scientists would look at the environmental factors— both physical and biological— influencing the population (Finley, Carmel, 2011)². The focus, however, was on the first two levels though tremendous works have been done in the third level. However, integrating the results in practically applicable models was a daunting task not attempted by many.

Sverdrup (1952)³ had succinctly explained much earlier the practical aspects of fishery oceanography with respect to prediction of the availability and size of the stock of any exploited species of fish. Amplifying that message, Gary Sharp (1995)⁴ had voiced concern that fisheries studies have simply ignored climate signals or have buried these and other environmentally mediated signals in mystical parameters. He called for truly interdisciplinary approaches to aquatic ecology and marine fisheries research and reincorporating operational oceanography and climatology into fishery science. While observing that ‘for some obscure reason, fisheries management has become welded to biomass as the principal measure of resource status’, he pointed out that stock assessment tools need to be expanded to cope with ecosystem status. How far the Ecosystem Approach to Fisheries management (EAFM) currently being talked about has truly addressed the above concerns is a question.

No sooner than the idea of EAFM had become a conventional wisdom, the FAO had built an edifice on the idea, prescribing it as a cure for current maladies in fisheries management. It has been stated that (FAO, 2008)⁵ in recent years there has been a growing realization of:

“the importance of interactions among fishery resources, and between fishery resources and the ecosystems within which they exist; the wide range of goods and services provided by fishery resources and marine ecosystems, and the need to sustain those; the poor performance of fisheries management in many cases, leading to the poor state of many of the world’s fisheries; and increased knowledge of the functional value of ecosystems to humans, and awareness of the many uncertainties about ecosystem function and dynamics”.

It was also stated that this awareness had led to recognition of the need for fisheries management to consider the broader impact of fisheries on the ecosystem as a whole and also the impact of the ecosystem, and other users of the ecosystem, on fisheries. The overall goal of sustainable use of the whole system, not just of the targeted species, required the implementation of an ecosystem approach to fisheries (EAF), which FAO defined as:

“An ecosystem approach to fisheries (EAF) strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties of biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries”.

² Finley, Carmel (2011). *All the Fish in the Sea: Maximum Sustainable Yield and the Failure of Fisheries Management*. University of Chicago Press. Kindle Edition.

³ Sverdrup, H. U. 1952. *Some remarks on the place of hydrography in fisheries research*. (Rapp. Intern. Conseil Expl. Mer. 131). pp. 152-154. In: Thomassen E. M. (Ed.) 1981. *Study of the Sea*. Fishing News Books. Osney Mead, Oxford.

⁴ Sharp, G. 1995. *It’s about time: new beginnings and old good ideas in fisheries science*. *Fisheries Oceanography*. 4: 324-341.

⁵ FAO, 2008. *Fisheries management. 2. The ecosystem approach to fisheries. 2.1 Best practices in ecosystem modelling for informing an ecosystem approach to fisheries*. *FAO Fisheries Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 2, Add. 1. Rome, FAO. 2008. 78.*

The definition is beautiful in the sense that it is comprehensive and echoes the anthropocentric prerogative. The range and scale of possibilities of interventions are immense. Like the definition on sustainable development, it could be interpreted in many ways and is being elevated to the status of a catch phrase in fisheries circle.

Apparently building capacity and understanding of ecosystem approaches does not hide the beastly implication of understanding the ecosystem. The knowledge about the ecosystem is taken for granted. The abundance of a species in a system is controlled by various environmental factors as well as the biological characteristics of the species itself. The issues haunting multispecies multi-gear environment of the tropics seems fading away.

There are principal processes and interactions in the marine ecosystem that are to be considered while developing models for fisheries management (Figure 2). The EAFM does not seem to specifically bother finding explanations to changes in the abundance of stocks or the ground realities of the fishery environment such as the market dynamics and political interventions. There is an overwhelming emphasis on community based management when EAFM puts the stakeholders at the heart of fisheries planning. However, there are several important factors beyond the reach of stakeholders.

3.0 Ground realities

Market had been considered as almighty in the globalized world. It is no doubt that the whole tragedy of the commons is mediated by the market. Common sense approach would prescribe market interventions to regulate the trade of species of interest. But the neoliberals would wage war on this proposition. When a single piece of bluefin tuna was sold for a record \$1.76 million in Tokyo last year⁶, no further explanation was needed why the species was on the verge of extinction. With the highly devaluated currencies, would any fisher from a third world developing country (or any developed country for that matter) be able to stop fishing such high value species? The need for consumer interventions in the market is very important as real market is insensitive to biological status of species.

The acceptance of Large Marine Ecosystems (LMEs) as convenient unit for marine management had synergistic effect on mooted the idea of EAFM. The LMEs are considered as suitable template in which the models of EAFM can be tested. However, the transactions so far had overlooked the ground realities. The political relations are the major determinants in pushing any successful agenda on transboundary platform. In the case of Bay of Bengal LME, the level of understanding of the processes of the Bay is very poor.

The fact that fisheries management is based on real science will not universally hold any water even in most developed countries. The decisions and tradeoffs are often made on political grounds. This is at least true in the case of developing countries where new ideas like EAFM are being vigorously propagated. Historically, the failure of many fisheries could be traced to the political slant of decisions taken at different times. Therefore the fate of EAFM will depend more on how the administrators put the EAFM dish in the plates for the consumption of their political masters (and ultimately of course, on the response of the masters' taste buds). Even then, it is not sinful dreaming of a situation where greater understanding of the marine ecosystems and application of science without mixing politics could be a reality.

⁶ *Bluefin tuna sells for record \$1.76 million in Tokyo* [Associated Press](#) : Tokyo, Sat Jan 05 2013, 22:00 hrs
A bluefin tuna sold for a record \$1.76 million at a Tokyo auction Saturday, nearly three times the previous high set last year. In the year's first auction at Tokyo's sprawling Tsukiji fish market, a 222-kilogram (489-pound) tuna caught off north-eastern Japan sold for 155.4 million yen, said Ryoji Yagi, a market official.

4.0 The way forward

It is not the intention of this author to criticise the EAFM in its current version. It is to prepare the recipients of the knowledge to ask questions whether the points of failures of earlier management models are adequately addressed by the new paradigm. There is also an intention to stimulate introspection on the existing capacity and structure of institutions in developing countries. Bridging the capacity gap is something which international support can sustain for a limited time. Parallel to such initiatives, there should be efforts within the country, which could catalyse large-scale spread of knowledge on EAFM. Ideally, these programmes should stimulate an intellectual process which would result in development of country-specific models.

The major challenge would be sustaining a system and generating necessary information on an ongoing basis, even in the absence of external support. Most often, the cost-benefit relations would bring the system to compromise on a level far from the desired. But that should also be a good argument in favour of shelving, if not discarding, an economically unfeasible idea.

In such eventuality, the onus of evolving an appropriate version EAFM (or some other name) falls squarely on the fishery managers and scientists of the developing countries. This requires bold attempt unshackling from the conventional wisdom and conceiving a country-specific feasible approach with total allegiance to the basic scientific concepts and premises, and above all the people.

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Call a thing immoral or ugly, soul-destroying or degradation of man, a peril to the peace of the world or the wellbeing of future generations; as long as you have not shown it to be "uneconomic" you have not really questioned its right to exist, grow and prosper.

-E. F. Schumacher

Disclaimer: The ideas expressed here are the author's personal views.

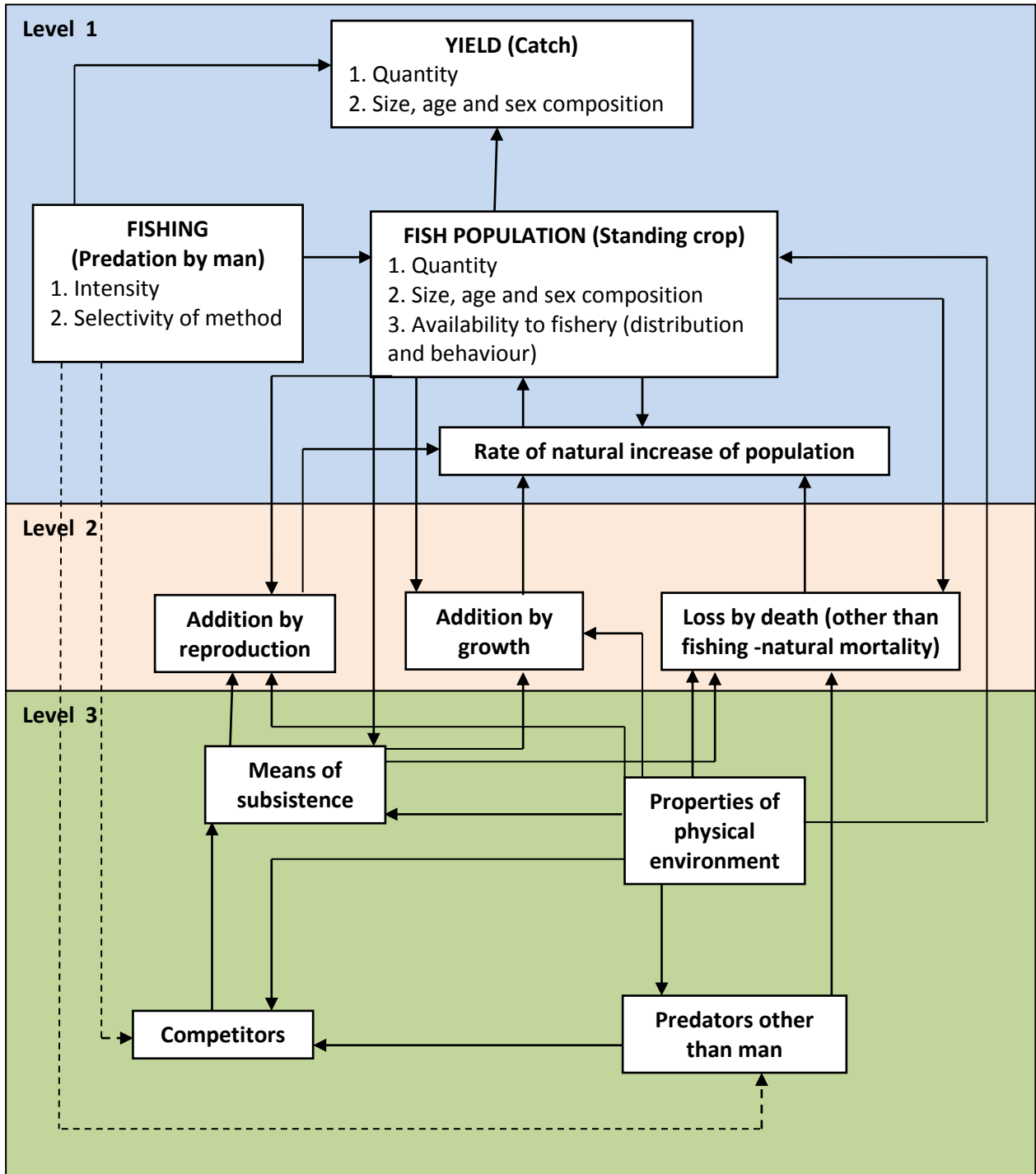


Figure 1. Interrelationships of factors determining standing crop and yield
(Arrows indicate direction of cause-effect relationships)

[Redrawn from: Finley, Carmel (2011-08-22). *All the Fish in the Sea: Maximum Sustainable Yield and the Failure of Fisheries Management*. University of Chicago Press. Kindle Edition]

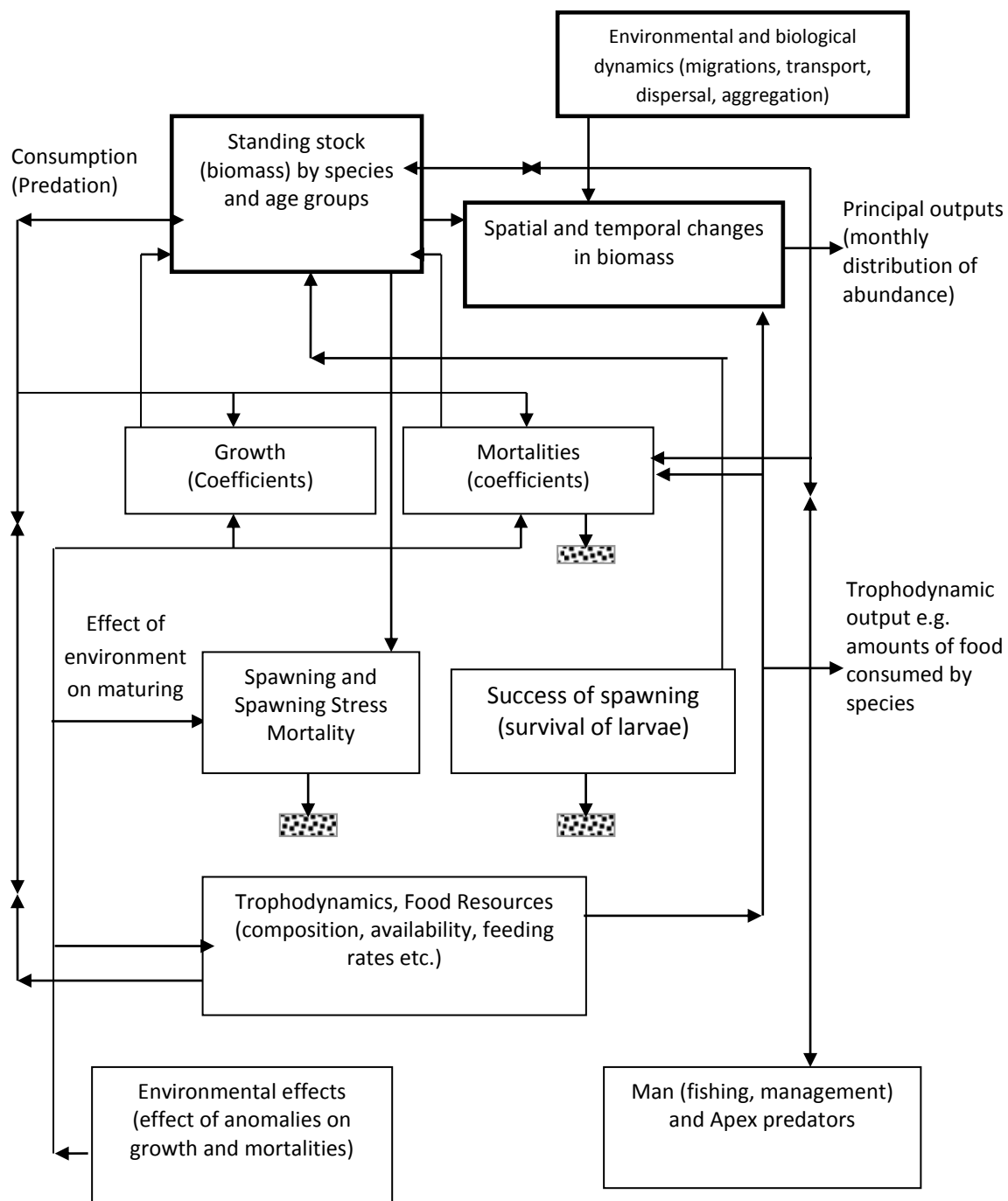


Figure-2. Scheme of principal processes and interactions in the marine ecosystem (Heavily lined boxes indicate the main processes and conditions to be quantified)

[Copied from Vijayakumaran, (2005)⁷, adapted from Laevastu and Larkins, (1981)⁸.]

⁷ Vijayakumaran, K., 2005. Fisheries Oceanography: Processes, Patterns and Variability. Lecture Notes: *The Winter School on Towards Ecosystem Based management of Marine Fisheries: Building Mass balance Trophic and Simulation Models* organized by CMFRI, Cochin.

⁸ Taivo Laevastu and Herbert A Larkins, 1981. *Marine Fisheries Ecosystem- Its quantitative evaluation and management*, Fishing News Books Ltd. Farnham, Surrey.