



Theme 5

Food Security and Livelihood Management

**WORKSHOP 2:
THE FUTURE ROLE OF FISHERIES
IN AN URBANIZED WORLD**

25 November 2009



World Fish Center



Food and Agriculture Organization of the
United Nations - Asia Pacific Fishery Commission

Chair: **Dr. Rogelio Juliano**
Coastal Management Center

Co-Chair: **Dr. Rafael D. Guerrero III**
National Academy of Science and Technology

The East Asian Seas Congress 2009

**“Partnerships at Work: Local Implementation
and Good Practices”**

**Manila, Philippines
23–27 November 2009**



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Co-Convening Agencies:

World Fish Center; and
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Coastal Management Center

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FOOD SECURITY: OF FISH AND MEN... AND CATS AND ELEPHANTS

What is food security? According to the 1996 World Food Summit Action Plan, “food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” Attaining this condition becomes even more difficult with the spiraling growth of world population and the need to secure enough food for the people for the present and future generations now becoming critical (Salayo and Perez).

Seafood (fish and shellfish from capture fisheries and aquaculture production in marine and freshwater environments) had long been known to play an important role in achieving food security, a fact that has been emphasized in 1995 during the Kyoto International Conference on the Sustainable Contribution of Fisheries to Food Security. Seafood contributes at least 15 percent of average animal protein consumed by about three billion people and as much as 50 percent by small-island and west African states (FAO, 2009). In [most countries in East and Southeast Asia](#), over a third of the animal protein intake comes from fish (Weeratunge).

The Kyoto Conference also noted the significant contribution of fisheries to income and wealth, livelihood and trade earnings. Seafood is the most highly traded commodity in the

world (FAO, 2009). While per capita fish consumption in the East Asian countries is quite high (at 27.8 kg/year) as compared with the rest of the world (at 16.3 kg/year) (Weeratunge) — these countries also drive the global fish trade that supplies both the intra-regional markets as well as those in Europe and North America. East Asia has the biggest yield, consumption and international trade of fishery products. Currently it has the strongest influence on market, employment and economy of the world's fisheries (Kim and Low).

However, it is very apparent that the role of fisheries in food security has up to now been often under-acknowledged (Smith, et al., 2010), particularly in East Asia (Weeratunge). Large commercial fishers as well as small-scale fishers continue to overfish our coasts and oceans, and we destroy and pollute our environments. Recently, it is generally recognized that most of the coastal/nearshore fisheries in Southeast Asia are overfished (Silvestre, et al. 2003, Stobutzki, et al., 2006). Silvestre, et al., (2003) estimate that overfishing in major fishing grounds in South and Southeast Asia has depleted coastal fish stocks by 5 to 30 percent of their unexploited levels.

Governments also continue to undermine our fishing communities' right to secured lives through wrong policies and corrupt practices. It is what Kurien (1998) refers to as "cruel paradox of Asian farmers and fishers, whose labor produces the rice and fish, but are among the millions who are deprived of even two square meals a day." In the same token, Salayo and Perez note that although global growth in aggregated economic performance indicators have improved considerably through the years, millions are still hungry and with no secure livelihood in fishing communities.

The Workshop on the Future Role of Fisheries in an Urbanized World held during the EAS Congress 2009 in November in Manila, Philippines revisited the issues that have been ailing the fisheries sector and how it is impacting the sustainability of fisheries resources in the context of ensuring food security.

Providing seafood for consumers, in a time when the resources have been severely depleted, and where ecosystems have been altered (in most places, irreparably), had remained a fisheries management's dilemma. Attempts to solve fish problems within the sector have proved difficult in most cases. With other problems arising external to the sector, but having a negative impact as well, fisheries management is anything but an easy walk in the park. It is in fact complex if not mind boggling.

This essay attempted to thread the information and several perspectives from the workshop (complemented by other published materials), distill some lessons and link fisheries management to PEMSEA's advocacy of an integrated approach to ocean and coastal governance.

THE FISH IS A HUMONGOUS ELEPHANT

The problem about food security is akin to a huge elephant. A Sufi tale illustrates this metaphor (Senge, 1994):

As three blind men encountered an elephant, each exclaimed aloud. "It is a large rough thing, wide and broad, like a rug," said the first, grasping an ear. The second, holding the trunk, said: "I have the real facts. It is a straight and hollow pipe." And the third, holding a front leg, said, "It is might and firm, like a pillar."

Here, the three definitions of the same elephant differ; the men's "blindness" prohibits them from seeing the whole elephant.

In the same token, because the issues on food security in the context of fisheries management are manifold and complex (Funge-Smith; Silvestre, et al.; Salayo and Perez; Williams; Weeratunge), we have tended to view it in a narrow way, one particular way at a time. As such, it has been framed in all sorts of directions:

- As a scientific methodological exercise (e.g., fisheries models, maximum sustainable yield, etc.);
- As a consumption issue per se (e.g., consumers' appetite for seafood, traceability of fish products, mislabeling, etc.);
- An environmental risk (e.g., open access nature of capture fisheries; overexploitation, the use of illegal/destructive methods, resource/habitat degradation, etc),
- An economic risk (e.g., reduced productivity/incomes, loss of livelihood, distributional inequity; increased competition and resource use conflicts between commercial and small-scale fishers as well as other uses for water and land),
- A practical policy question (e.g., expansion of aquaculture facilities; development vs. conservation; effective fisheries governance given a weak institutional system and poor capacity and resources, relevance of maintaining fisheries schools today, etc.),
- An international trade relations issue (e.g., product safety, IUU, etc.), and;
- A moral dilemma (e.g., fish for food vs. fish for feed; fish for poor vs. fish for pets).

In addition, the underlying trends in the larger, development and global change contexts pose security and vulnerability risks (e.g., increasing population and incomes, urbanization, globalization, poverty, resources and environmental degradation, climate change and ocean acidification, fiscal/debt challenges). These risks aggravate the fisheries sector's issues.

Seafood demand reigns supreme

FAO (2009) reports that 28 percent of the world's fish stocks are overexploited or depleted and 52 percent are fully exploited by 2008. It has been estimated that since the late 1980s, the world's marine fisheries landings have declined by about 0.7 million tonnes/year (Watson and Pauly, 2001). But these dismal projections of a continuing decline in capture fisheries production has not abetted the demand for seafood; Mora, et al., (2009) (cited by Muldoon) note that "projections suggest that demand for fishery products is likely to increase by approximately 35 million metric tonnes by 2030 (43 percent of the maximum reported catch in the late 1980s) and by approximately 73 percent for small-scale fisheries by 2025. This contrasts sharply with the 20 percent to 50 percent reduction in current fishing effort suggested for achieving sustainability."

A rapid population growth could rack up demand for seafood. In PR China, as its population grows, demand for seafood — relative to other food commodities, such as pork — is increasing among all income levels (Weeratunge). Halweil (2006) reports that seafood consumption per capita in China jumped from 4.8 kg/person in 1961 to almost 25.4 kg/person in 2005, increasing five times in about five decades.

In the region, the demand is highly underpinned by a socio-cultural preference. According to WorldFish (Dey, et al., 2008), fish is the second or third most important cost item in household food budgets of East and Southeast Asians given that human lives in the region are heavily influenced by coasts and oceans. The recent outbreaks in diseases in cows, pigs and chicken such as mad cow, foot and mouth disease and bird flu only served to further increase demand for fish.

This preference is also formed because fish, as a heterogeneous commodity — unlike chicken, pork or beef which doesn't come in too many different varieties — allows people to choose among many different species of fish available in the market (Weeratunge). This means that the consumption of fish by people varies considerably according to taste, income and prices. Differences in seafood preference are driven by East Asia's socio-cultural differences in values, incomes, as well as class and ethnicity (Weeratunge).

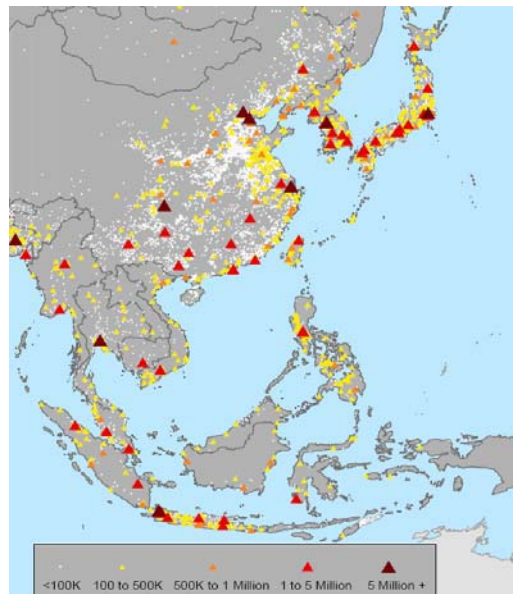
Particularly for poor people, and the rapidly expanding coastal populations, fishery products will remain their main source of protein. York and Gossard (2004) estimated that for each US\$1,000 increase in income, Asians will eat 2.31 additional kilos of fish/year.

An “urbanized fish”

The growth of population in East Asia shows a parallel demographic trend which sees migrations from rural to urban areas. The urbanization sprawl has become more intense in coastal areas (**Box 1**).

Box 1. The urbanization sprawl in East Asia (Weeratunge).

The majority of countries and population of the region will be urban by 2020, and in all urbanized countries, except China, the extent of urbanization will be higher than 60 percent. Most of these urban areas are coastal areas and were already urbanized by 2000; coastal urbanization proceeded faster than average urbanization.



Source: CIESIN, 2009.

Overall urbanization trends in the EAS countries

Country	1980	1990	2000	2010	2020
Singapore	100	100	100	100	100
Korea, Republic of	56.7	73.8	79.6	81.9	84.2
Malaysia	42.0	49.8	62.0	72.2	78.5
Japan	59.6	63.1	65.2	66.8	69.4
Philippines	37.5	48.8	58.5	66.4	72.3
Korea, DPR	56.9	58.4	60.2	63.4	67.8
Indonesia	22.1	30.6	42.0	53.7	62.6
China	19.6	27.4	35.8	44.9	53.2
Lao, PR	12.4	15.4	22.0	33.2	44.2
Thailand	26.8	29.4	31.1	34.0	38.9
Vietnam	19.2	20.3	24.3	28.8	34.7
Timor-Leste	16.5	20.8	24.3	28.1	33.2
Cambodia	9.0	12.6	16.9	22.8	29.6
East Asia	25.7	33.0	40.4	48.5	55.9
Southeast Asia	25.5	31.6	39.7	48.2	55.5

Source: UN 2009. World Urbanization Prospects: The 2008 Revision Population Database.

The urban coastal population (living contiguous to the coast up to 10m elevation) as percentage of total population does not appear to be large; however if we look at the urban coastal population as a percentage of the total coastal population, the magnitude of urbanization becomes evident.

Country	1990	2000	1990	2000
	Urban coastal population as percentage of total population		Urban coastal population as percentage of total coastal population	
Japan	22.91	22.93	94.96	95.23
Singapore	13.69	13.69	91.34	91.33
Thailand	17.92	19.92	73.26	75.69
Malaysia	16.95	16.63	73.27	70.74
Korea, Republic of	4.06	4.35	63.85	70.69
Indonesia	11.02	10.71	55.71	54.60
China	4.92	6.20	47.07	54.41
Philippines	9.64	9.04	52.80	51.07
Korea, DPR	3.70	3.40	37.06	39.12
Vietnam	15.87	16.46	28.37	29.88
Cambodia	1.92	2.15	7.27	9.03
Timor-Leste	0.18	0.19	5.22	5.31

(Based on CIESIN (2009) data for low elevation coastal zones up to 10m).

Urbanization could impact demand for fish. Urban populations are known to have a higher purchasing power which could result in increased demand for fish. In urban areas where healthy lifestyles are more pronounced, the demand for healthy options such as fisheries produce are often at level with those of chicken, beef, pork and vegetables.

Urban lifestyles also result in changes in patterns of consumption, taste and values, including preferences for safe fisheries produce, and, or developing a liking for a particular species of fish (e.g., “white meat” fish) and the way these fishes are caught, processed and marketed — a change that further commoditizes and adds value to seafood in an urbanizing world, some sort of an “urbanized fish”. (The “urbanized fish” is also into “fashion” these days. Giving in to — or more likely to entice — consumers who want more vibrant, “fresh-looking” fish, traders in wet markets and landing sites bathe the fish in iced water spiked with all sorts of chemicals and colors: from malachite green, asinine blue, fuchsia red, shocking pink, lemony orange, hypocritical brown to deranged black.toxic dyes, anyone? There should be a Lemon Law for seafood which prohibits a product which is beautiful outside but is wickedly rotten inside).

In affluent, highly urbanized countries like the United States, Japan, Hong Kong, and South Korea, a globalized trading and efficient supply chain allows easy access to highly in-demand seafood — be it frozen and processed, or live reef fish, and other high-value mollusks and crustaceans. With the integration of markets and globalization in the trade, the roles of commercial and small-scale fishers are likewise enhanced and thus are fiercely encouraged to satisfy consumer needs.

Salayo and Perez, in particular, zero in on small-scale fishers’ role in securing food and livelihoods in their own fishing communities in Southeast Asia, on the one hand, and a role that extends beyond the region and must be kept instep with the increasing segmentation and specialization of global markets, on the other. (*See further below on other roles of the small-scale sectors given changing and uncertain times.*)

In a highly globalized fish trading, the supply chain is seen to be skewed toward meeting the demand of affluent countries; providing for the poor may not be prioritized by national policies. In addition, the fishers-traders balance is often skewed favorably towards traders who provide the capital, at the expense of poor small-scale fishers.

Nutrition vs. foreign exchange earnings

Seafood is brain food and theorized to have contributed in the evolution of mankind (Crawford). Studies show that dietary aquatic fats and iodine contribute to brain development and better mental health (as well as contributes to heart wellness). Mental illness is already costing society and will likely increase in instance. These studies are implicated to further increase the demand for fish and thence to increasing its price (Jenkins, et al., 2009).

But the problem is that this could further contribute to overfishing in already overfished conditions. Particularly in developing countries where this demand means additional foreign exchange earnings, this may well be the reason to fish more and more, and instead, give up fish to meet personal/family food requirements to supply the demand of those who can afford it.

This raises certain issues. Weeratunge asks: To what extent can the poor substitute fish, their main source of animal protein with something else, as the well-off might be able to do so, if they have to? Probably they cannot, and, as a consequence, suffer malnutrition. The impact on the availability and nutritional quality for local consumption is already a problem in developing countries in the region (Perez and Salayo).

While Weeratunge asks: How important then is the cultural preference for fish in Asia? Could it dissipate given realities of a globalized trading? Salayo and Perez segue: How does one address an issue where high-valued species and high quality products are exported leaving only low-valued products for local consumption? (Even low-valued species are sold and processed as livestock feeds.) These are questions that need further research but the starting lesson here is that — as much as producing enough seafood — fish security is dependent on trade and purchasing power of consumers (Weeratunge).

Are our seafood safe to eat?

The advocacy for safe and sustainably caught fishes — to change consumer preference — has gained traction in recent years (Jacquet, 2009). But reliable consumer information on fish is still lacking (Williams); the traceability on the where's and how's fishes are caught, processed and supplied are largely kept secret (**Box 2**). Williams argues that reliable public information is an important step to assuring the consumer of fish safety along increasingly complex supply chains. This is also needed in creating greater demand for sustainable and fair fish production and trade.

Box 2. Consumer information on fish is a well kept secret in Asia-Pacific (Williams).

The AsiaPacific—FishWatch is a major web-based knowledge product to be developed collaboratively by national and international experts, and institutions led by the Asian Fisheries Society. The initiative aims to improve fish consumer information. It seeks: (1) to explain about Asia-Pacific fish products that are eaten locally and in major world markets; and (2) provide authoritative, accessible information for consumers, the general public, fish exporters and importers, fisheries managers and scientists).

FishWatch is cognizant on the importance for consumers to have fish information that is accessible and reliable. Such exercise addresses their concerns on price, safety, sustainability and food security. It focuses on fishery products (at least the top three from producing countries) with more than 100,000 ton production. This project is hinged on using and sharing experiences (NOAA's FishWatch, NACA, and INFOFISH). This is also being linked with relevant fish information systems (NOAA's FishWatch, WorldFish Center's FishBase).

AsiaPacific-FishWatch

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Pangasius bocourti Sauvage, 1880


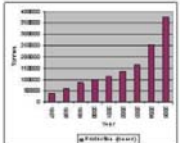


Photo: N.N. Phoung et al. 2006. CAAZ

THE FACTS

- Freshwater fish that inhabits large rivers
- Grow to about 120 cm in length and weigh up to 30 kg
- Well suited to culture in cages and ponds
- Production in aquaculture is increasing



HOW IS IT PRODUCED?

In freshwaters, caught from the wild and, increasingly, farmed in intensive aquaculture systems.

WHERE IS IT PRODUCED?

Basa is currently produced in the Mekong River basin, predominantly on small farms in Vietnam.




Photo: N.N. Phoung et al. 2006. CAAZ

WHO EATS IT?

SOCIAL AND ECONOMIC IMPORTANCE

Basa is one of the species among the very important fisheries resources of the Mekong River. Overall, the Mekong fisheries provide food, employment and income for up to 40 million people or 2/3rds of the region's population who are involved at least seasonally or part-time (MRC 2008).

NUTRITION FACTS

Amount per serving (85 g cooked serving size), <http://www.squidoo.com/basa/>

Calories: 150
Calories from fat: 50
Total fat: 9 g (2 g saturated fat)
Cholesterol: 20 mg
Sodium: 120 mg

However, a safe and sustainably caught produce entails additional costs (e.g., in the form of increased monitoring and certification) (Smith, et al., 2010). This could result in a higher fish price. Again, the cycle — of the poor unable to afford high valued products resorting to low-value fish thence contributing to overfishing — is very possible.

Fishing down the food web

Other changes in fish consumption and preference patterns are very apparent. They say that consumer preference had become sophisticated? In one case, it's more like a change to what is now available. This is because overfishing has led to fishing down the food web (Pauly, et al., 1998; Funge-Smith). Whereas fishes that were caught before were predominantly big, high-value predators, high on the apex of the web, now we see more and more landings replaced by small pelagics, invertebrates, and several species that were considered as bycatches (and thrown away) before. (Some fishing grounds are now havens for jellyfishes.)

Consumers have increasingly acquired new tastes — more likely forced — for such items like jellyfish and deep-sea fishes never been eaten before, and fish balls, fish sticks and “crab meat” made from low-value fish. It mirrors the “roving bandits” phenomenon (Berkes, et al., 2006) attributed to distant fishing fleets: fleets moving on to new fishing grounds once a ground has been destroyed and depleted of fish. We eat less and less of certain fish types because they are gone now, hence we must be happy with other types. This masks overfishing as it creates an image of un-diminishing supply. Governments still operate subsidies especially given to commercial fleets and we see tonnes upon tonnes of fish being landed year after year. Consumers, in turn, get the impression that there exists no problem in fish supply, but what we have done was to shift the historical and anecdotal baselines of abundance (and biodiversity) generation after generation.

Nerissa Salayo (SEAFDEC, *personal communication*) adds that “most government statistics currently measure fisheries growth or performance in terms of continuously increasing volume of production, as if fish is an unlimited resource. For example, the Bureau of Fisheries and Aquatic Resources (BFAR) of the Philippines equates growth with increasing tonnage year after year; and the Bureau sets annual production targets to motivate good institutional performance. Even to say that increase in production is expected from aquaculture also needs caution due to alleged environmental tradeoffs, if aquaculture practices are unsustainable. Productivity rather than production is a better option as the former accounts for efficiency of resource use.”

Cat got your fish?

In another case of changes in consumers' sophistication, when Peter Greenberg (2009) asks: Cat got your fish?, he actually asks: Have we extended consumers' sophistication to our own pets, our cats and dogs? We lovingly feed our pets with fish, and in recent years, trends have shown that big portions of landed fish have been ground to serve as raw material for pet food. (Dog lovers may argue that dog food is constituted largely with poultry products and by-products. But the counter argument is that dogs indirectly eat fish because chicken feeds have significant fish portions.) And when Murakami's main protagonist in his novel *The Wind-up Bird Chronicle* (1998) renamed his cat to *Mackerel* — because it feeds contentedly on canned mackerels — he might as well inadvertently upped the demand for fish.

So now, poor consumers will need to compete with highly pampered cats and dogs.

Who will do the fishing?

Seafood demand is on the rise, but are there more entrants to the sectors? On the one hand, Funge-Smith, et al., argues that small-scale fishers “enter open access fisheries when they are unable to make a living in other sectors.” On another, Salayo and Perez report that small-scale fishers temporarily “abandon” fishing in response to emergencies; and this could impact food security (**Box 3**); in some developing countries fishing is now becoming an alternative livelihood instead of a primary source of income.

Box 3. Rising consumer prices and production costs trigger livelihood adjustments and impact food security.

Salayo and Perez call it the paradox on the importance of fossil fuel in small-scale fisheries and aquaculture. Small-scale fisheries may prove to be less energy dependent, more environment-friendly and a cost-effective fish production system and livelihood in rural and peri-urban areas.

In the Philippines, 62 percent of fishing boats are without engines. But in highly volatile economic conditions, like during steep increases in fuel prices, fuel consumption of 5 to 10 liters costs US\$5-US\$10 per fishing day in 2008; this is too much of a burden to small-scale fishers. Small boat owners either reduce hours of fishing from 8-12 hours to 4-8 hours or just abandon 4 to 16 horse power vessels and look for other jobs, as motorcycle drivers, carpenters, welders, etc.



This type of vessel may reduce trips or stop to operate...



....as fishers opt to work on other jobs.

Generally, in more affluent countries in the region, entrants to the fisheries sector have actually declined. With less catch, more people today have opted to migrate in urban areas to do service-oriented jobs; the fisheries sector is now considered as an aging sector.

Republic of Korea is an example of rapid urbanization and declining catch leading to a decrease in fishing employment — fishing households reduced by over half in the last 30 years (Vizzone, 2006, cited by Weeratunge). About 45 percent of jobs related to fisheries are available in 1990 but this had decreased to 10 percent in 2008 (Koh).

The numbers of fishers have also declined in Japan, China and Indonesia (Weeratunge). (Although the number of aquaculture farmers in China and Indonesia is rising).

Japan would have loved to see more young people going into fishing as their main livelihood, but it seemed that the interest had been waning through the years (Seino).

With East Asia's meteoric economic rise and becoming more affluent, and as rural populations decline, we ask: Who will do the fishing, 20- or so years down the road? Funge-Smith reports increasing trends in migratory labor into fisheries. In a region that is seeing increasing wage costs, countries are tapping labor from lower paid areas and across borders from neighboring countries. It seems that there are a lot of takers as Funge-Smith cites that the foreign labor on vessels can range as much as 35-80 percent.

This is another case of subsidy that could contribute to overfishing, which unmasks yet another contribution of poverty to our fish problems. (The cycles of poor resorting to destructive fishing to provide food to the table and increase income, which contribute to unsustainable fisheries, thence to aggravating poverty, have run the blaming mill a lot of times already.) Other experts see this as a moral issue.

Fisheries education: Quo vadis?

Fisheries education has likewise deteriorated; either the fisheries schools are closing down or are transforming with less fisheries mandate. In RO Korea, there is a shrinking proportion of academicians engaged in agriculture and fisheries industries (Koh). Although the academe is now also engaged in aquaculture, professional aquaculture business cannot be accessed by graduates from high/technical school as there are limited opportunities. Because many aquaculture farms are located in the coasts and most farms are small-scale, it's not easy to get a job since most are family-run enterprises. Enhancing the contribution of the academe in the fisheries is a continuing challenge.

Juliano enumerated issues that ail fisheries education in the Philippines. Most fisheries schools in the Philippines do not have faculties trained in fisheries education. The curricular offerings are irrelevant to the present fisheries situation in the country, and physical facilities in laboratories and field studies are poor resulting in weak foundation of fisheries education. There is mismatch between the quality of fisheries graduates produced by academic institutions and the actual fisheries manpower needs and requirements in the field. Because the quality of fisheries education is not at par with other related courses, graduates of much better public and private universities present a stiff job competition for fisheries graduates; hence, enrolment in fisheries courses is declining forcing some fisheries programs to close down. With enrolment on the downward trend, there are no attractive incentives for fisheries schools to improve and upgrade.

Because Japan is an archipelagic country, it is nearly impossible to leave the fisheries; Japan still needs fisheries graduates. Although there are several young people who want to go to fishing, some parents stop their children from doing so (Seino). The fact is that fisheries enrolment is declining; but there is still a need to maintain a minimum number of fisheries schools which are strategically located in the country. Seino also emphasized that the fisheries education still needs to be contextualized within the broader economic sectors.

Participatory learning in the field (Seino)



While fisheries education has to be upgraded in response to the changing times, the classroom can also be brought to the communities through participatory learning in the field.

In Japan, local fishermen can also be engaged as teachers of students who are out in the “outdoor classrooms” (Seino). Part of this field education included seamanship training for pupils and parents. The Hand-made Octopus Pots Project for pupils initiated by local NGOs and Fisheries Cooperatives involved doing research studies, education campaigns, and preparation of proposals.

Aquaculture: Quo vadis?

Japan and RO Korea are net importers of seafood. Theirs is a case of demand that must be supplied from elsewhere. With the catch declining, their seafood-(life)-line is continuously being threatened. Are these countries ready to give up this cultural preference in exchange for pork? Or should they emulate China and start a massive expansion in aquaculture?

Aquaculture has grown tremendously which supplied a significant portion of the demand (Weeratunge, Funge-Smith). According to Asia Fish Model of WorldFish (Dey, et al., 2008), as cited by Weeratunge, loss in capture fisheries resources will be supplemented by aquaculture. The model projects that for the six East Asian Seas countries (China, Indonesia, Malaysia, Philippines, Thailand, and Vietnam), annual projected growth rates in fish output ranges from 0.1 percent in the Philippines to 3.29 percent in China.

Largely based on feeds, aquaculture had expanded in the last 20 years, generating significant export incomes and even eclipsing, in some cases, capture fisheries’ role in supplying the demand (Funge-Smith).

It seems logical to intensify the support to create more aquaculture facilities, but Funge-Smith admonishes caution. There are potential risks on resource use intensification and habitat destruction. Aquaculture (as well as livestock production) competes increasingly with catch from capture fisheries for feeds and fish oil. On a positive note, the poultry and pork industries are no longer the great users of fishmeal and fish oil they once were, mainly due to cost (Funge-Smith, APFIC, *personal communication*). It is a good indication that new innovations may have caused this, such as less dependence of piglets to fish oils — as piglets fed on fish oils wean from their mothers early — and possibly new “terrestrial” protein have

been sourced to fatten and increase growth in pigs and chicken. (Pray...that it's not melamine.)

Smith, et al., (2010) note that while there abound in different areas an expansion of aquaculture facilities, they are however without the necessary structures and institutions that can protect the environment. And unless aquaculture can find alternative feeds — experts recommend research and development on plant-based feeds (Delgado, et al., 2003) — we will continue to overfish.

A dilemma thus exists when Funge-Smith (*personal communication*) asserts that: “There remains a tension between using the seas as producers of fast recruiting small species to be used as feeds for conversion to food fish, versus managing the seas for diversity and direct production of fish. The tradeoffs remain socially and economically rather unclear, particularly because the management framework which would ensure one or the other approach [to be] effectively and rationally implemented does not exist. We therefore simply have a race for fish of all types.”

Protein for the poor: Shellfish and food safety

The shellfish industry's commercialization of production technologies is eased by relatively low capital requirements. In developing countries, shellfish is a cheap protein source for low-income families. And because it is not capital-intensive and culture operation is relatively easy, it is common to see shellfish cultured in large-scale, non-closed aquaculture systems (Fukuyo).

But in the context of ensuring food security for the poor, ensuring food safety cannot be overemphasized. In water conditions that have become more polluted, aquaculture produce warrants suspicion. The suitability of some fish for human consumption, particularly by the poorest sector, requires more and constant attention. For shellfish culture, food safety is a major concern since the products stand to be threatened by contaminations from biotoxins, heavy metals, and persistent organic pollutants (POP) (Fukuyo). Biotoxin poisoning generally manifests as Paralytic Shellfish Poisoning (PSP), Diarrhetic Shellfish Poisoning (DSP), Neurotoxic Shellfish Poisoning (NSP), Amnesic Shellfish Poisoning (ASP), and Ciguatera Fish Poisoning (CFP), of which PSP is the most potent.

Contamination by biotoxins cannot be detected in terms of physical appearance of the shellfish that is why installation of an effective monitoring system — planned and implemented simultaneously with aquaculture activity development — is critical to ensuring food safety (Fukuyo, Madrigal). This requires national investment (Madrigal).

Box 4. Shellfish and food safety.

In a 30-year study of PSP cases in Philippines, Thailand, Malaysia, Indonesia and Brunei, the Philippines posted the highest recorded cases of poisoning cases. The observation that toxic red tide blooms (*Pyrodinium bahamense*) is recurring and spreading is not only true to the Philippines but in the rest of East Asia as well.

Pyrodinium is widely distributed in tropical Asia. The cysts are spread not only by water movement but also by the transportation of shellfish and maritime activities. The cysts of *Pyrodinium* are very sturdy, able to resist in an adverse environmental condition and can exist for more than 100 years in sediment, thus favoring its widespread distribution.

In the Galician Coasts, in Spain, where the waters look clean and eutrophication is not evident, toxin contamination also occurs regularly. Since contamination can happen even in clean waters, it is apparent that putting in place an effective monitoring system is a key management intervention. Where management controls are strongly placed, adverse impacts are mitigated.

In Japan, PSP toxin contamination was observed to be spreading in the last 30 years and is causing serious economic losses but because of stringent controls, there are no poisoning cases reported.

The International Atomic Energy Agency (IAEA) established the Collaborating Center in the Philippines to encourage information networks and to provide capacity building notably the transfer and establishment of isotopic technologies, collaboration with appropriate experts and improvement of national harmful algal blooms (HABs) monitoring programs and coastal zone management (Jeffree). The challenge according to Madrigal is transform the available information in a format that is useful to decisionmaking, as well as to the grassroots level.

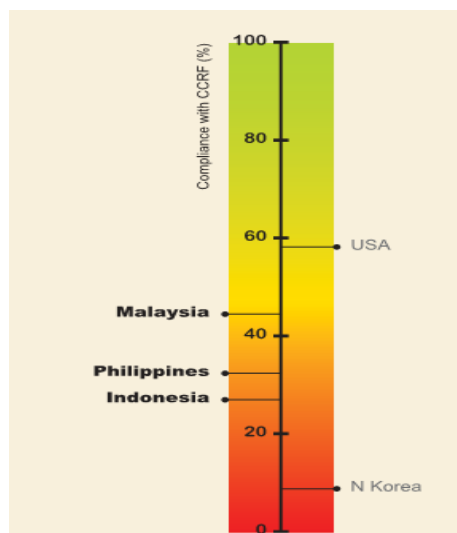
The dilemma to pit economic losses vis-à-vis deaths in the face of poisoning incidents should be a no brainer, but it is sad that we hear deaths when in fact these incidents can actually be prevented (**Box 4**).

Limits of governability

Most countries are cognizant about the FAO's Code of Conduct for Responsible Fisheries (CCRF) — a voluntary instrument since 1995 — on how to manage fisheries. The CCRF, crafted for equitable, sustainable and responsible marine resource use, also tries to galvanize an all-nation agreement (Muldoon). "Although the implementation is still voluntary, this code is highly influential in directing the course of national and international governance efforts" (Bavinck).

A long-term study undertaken by the University of British Columbia Fisheries Centre in collaboration with WWF showed overall poor compliance with the CCRF among 53 countries while compliance with the Code was highly variable (Pitcher, et al., 2009a). The countries were rated against six parameters: balance between conservation and economic gains; stated management targets; use of precautionary approach (establishing MPAs); use of quantitative reference points; minimizing discards, bycatch and habitat impacts; and socioeconomic factors (small-scale fisheries). The scorecard for Coral Triangle countries was particularly poor (**Figure 1**). Similarly, an evaluation of how well a sub-set of 33 of these 53 were implementing ecosystem based fisheries management revealed that only Malaysia was implementing at an "acceptable" level (Pitcher et al., 2009b)

Figure 1. In the Coral Triangle countries, Malaysia best performed although below the "passable" 60 percent score. Indonesia and the Philippines were within a group of 28 countries (53 percent) with all "fail grades" of less than 40 percent.



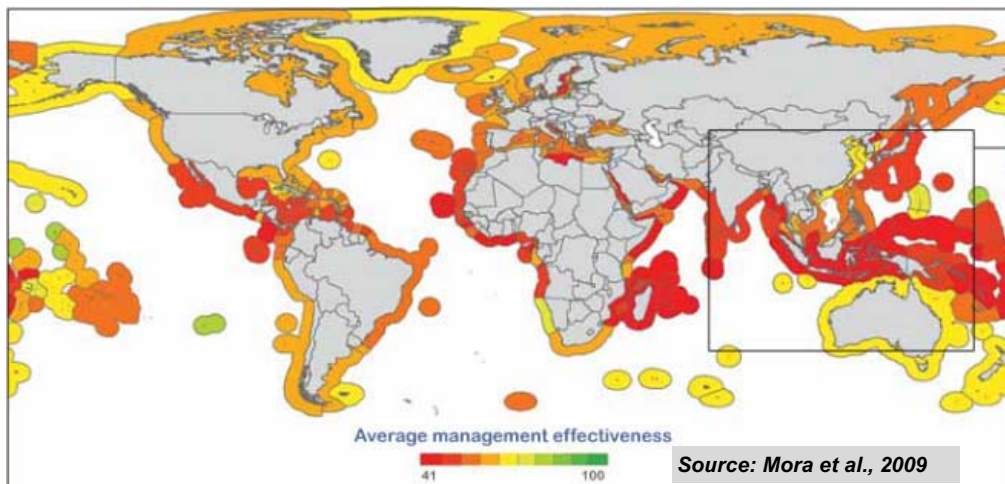
Source: Adapted from Pitcher et al. 2009a.

These studies also established a consensus position on ecological impacts of overfishing, food security threats and need to curtail IUU and foster ecosystem based management. In relation to the FAO CCRF, Muldoon reiterated the view of Pitcher, et al., (2009b) by asking: Is it time then for a new integrated legal instrument covering all fishery management aspects? Should it now be binding so that countries will strictly tow the (fishing)line?

Another similar global study on the effectiveness with which the fisheries are being managed also showed a dismal scorecard (Mora, et al., 2009; cited by Muldoon). For Coral Triangle countries, this study showed: (1) fisheries management lags behind international guidelines to minimize overfishing; (2) only a few have scientific information to underpin management recommendations; and (3) only a few are governed by participatory processes to convert recommendations to policy and ensuring compliance with regulations.

The study concluded by emphasizing “the benefits of participatory, transparent and science-based management while highlighting the great vulnerability of the world’s fisheries services under current management regimes.”

Figure 2. Management Effectiveness (Mora et al., 2009, cited by Muldoon).



In terms of management effectiveness, the countries studied generally posted average scores in management effectiveness which was measured in terms of fishing subsidies, policy transparency, capacity to implement, and fishing capacity.

It was observed, however, that these average scores was due to different mechanisms like excessive fishing capacity and subsidies in high-income EEZs and deficient scientific, political, and enforcement capacity in low income EEZs.

Relating management effectiveness to fisheries sustainability, the study revealed that variations in policymaking transparency led to the largest difference in fisheries sustainability. This simply means that transparency in policymaking, being central to the fisheries management process, significantly impacts fisheries sustainability.

Fisheries and climate change

On the one hand, the impacts of climate change on fisheries could be seriously detrimental, because warming rate is particularly very steep over East Asia (Kim and Low). Changes in storm events create destructive typhoons, which disrupt fishing patterns and seasons, damage fishing vessels and aquaculture facilities, and disrupt formation of fish schools and primary and secondary productions. Moreover, ocean acidification resulting from higher CO₂ levels in seawater is another future risk to shellfish and coral reef systems that support coastal marine biodiversity.

On another, the highly efficient global seafood trade is implicated to add to the problem of climate change. Jacquet (2009) notes the increasing carbon footprint of seafood once they begin to travel in the supply chain. For example, fish caught in South America, are brought to China or Vietnam for filleting and packaging, and goes all the way back to America to be sold; traveling thousands of miles, ships guzzling tons of fuel and emitting carbon gases, in turn.

How will the dynamics of seafood trade change in the face of very alarming climate change? How can food security be ensured?

A MULTIPLE PERSPECTIVE APPROACH WILL DO JUSTICE TO THE WHOLE ELEPHANT

As shown, the context of the fisheries management's contribution to food security is complex and multi-pronged. The drivers which impact the fisheries are tremendous and aplenty; and it's an amalgam of issues both coming from within the sector and external to it. They cut across biological, social, governance, and vulnerability concerns (Salayo and Perez).

The full range of potential solutions to fisheries management problems is thus, likewise, tremendous and aplenty, and these should be linked and integrated in a management framework. But gaining entry into these integrated prescriptions and interventions means managers must see the whole elephant across multiple perspectives.

“Today's problems come from yesterday's “solutions” (Senge, 1994)

Fisheries management is “caught in a bad romance.” Pauly (2006) cites that part of our continuing fish problems may be that solutions before where put forward overwhelmingly by economists and biologists — who are usually armed with their favorite technical fixes — lacking inputs from social sciences, from sociologists and anthropologists. The worst part is that we seem to be continually trapped in these “solutions.” For example, we can't seem to run away from policies on subsidies; fishers have found a way to get around quotas and MSYs; we are still reeling from the negative impacts of policies to convert large tracts of mangroves to fishponds; up until now national governments' mindset is focused on increasing production instead of management, etc.

Far from putting blame on particular perspectives — because generally, while experts offer prescriptions and managers make decisions with good intentions, these are, however based, unfortunately, on limited, highly specialized knowledge and narrow scope and there is lack of knowledge about the dynamics of how people relate to regulations, and other interventions. What we are beginning to learn is that diagnosing and putting up interventions for our fish problems require pluralism in perspectives.

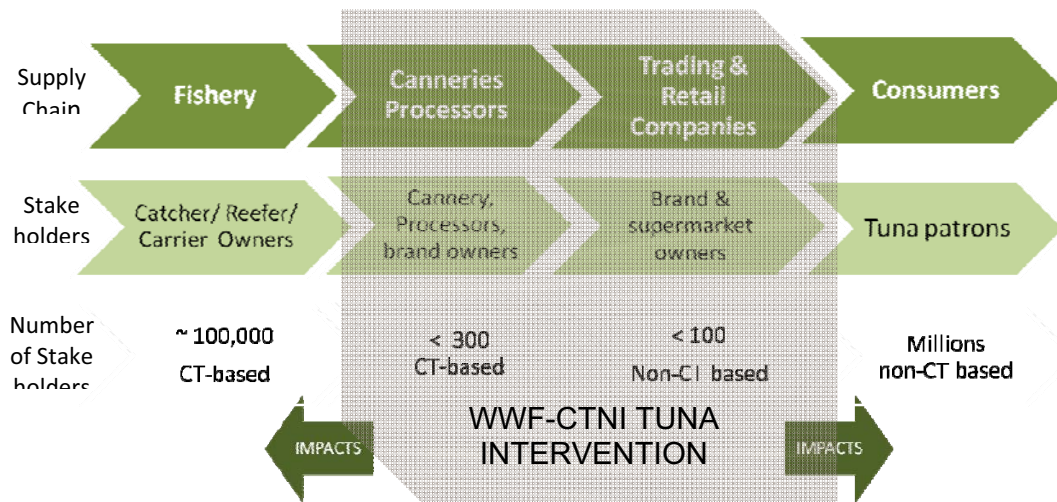
Several entry points and platforms are available to accommodate a multiple perspective approach. The examples from the EAS Congress are instructive. Several of these mechanisms were discussed: from looking at the supply chain, to revisiting strategic approaches (e.g., zoning and partnerships), as well as instituting broad, comprehensive frameworks for governance (the ecosystem approach to fisheries) to tie up cross-cutting issues.

Law of leverages

From water to the mouth; from resources, resource owners/harvesters, resource processors, and consumers (Adrianto) and the steps in-between (including women’s role) (Williams), the supply chain is complex. This fact underpins a multiple perspective approach. This plus the knowledge about the dynamics that drive the relationships between these stakeholders are important.

But this complexity offers leverages. Muldoon likens it to a numbers game. For instance, in WWF’s initiative to create traction in sustainable tuna fisheries in the countries around the Coral Triangle, WWF focuses on that part of the supply chain where there are fewer more influential stakeholders — essentially a “bottleneck” in the supply chain — who could provide the biggest impacts. (The tuna project is but one part of whole Coral Triangle Program).

Figure 3. The tuna market pull approach (Muldoon).



We know that transaction costs to accommodate large numbers of stakeholders with differing perspectives will be proportionately huge. Faced with such a constraint, WWF focuses on canneries processors and trading and retail companies as the primary agents of changing behavior toward more responsible practices. They envision a market pull by targeting these two groups with advocacies on best practices, promotion of fisheries certification, and sustainable sourcing policies (Figure 3); the impacts of which, could, at the same time, influence fishers’ buy-in to sustainable fisheries practices and how tuna patrons could be helped to choose sustainably caught tuna.

Through this initiative, WWF is initiating the process of implementing an ecosystem-based approach to fisheries management, and addressing issues of excess capacity, bycatch, IUU fishing and destructive fishing practices.

In addition, this approach could identify and strengthen the mandates and roles of different stakeholders involved in the fisheries sector and are capable in bringing to the debate. In the case of international NGO's, their role can greatly enhance outcomes by (Muldoon): (1) fostering and motivating the seafood sector; (2) facilitating private sector engagement; and (3) leading in the establishment of intergovernmental regional platforms. These in themselves will foster sharing of multiple perspectives.

Small time, big numbers; Small attention, big task

While international NGOs' strategy can focus on fewer stakeholders, other managers can place the lever on the biggest stakeholders: the small-scale fishers (both from capture fisheries and aquaculture).

Although they represent the biggest number in the supply chain, small-scale fisheries, to date, may prove to be its weakest link; because through the years they were given the least attention. Why? Some of the reasons are that there is lack of accurate and disaggregated data in small-scale fishing and aquaculture activities; and there is an absence of internationally agreed definitions (Salayo and Perez).

They are weak because they are marginalized. This is because they carry the burden of the impacts of urbanization and globalized trading, as well as the unfair competition between large, industrial, and small-scale fisheries in the face of depleted fish resources (Pauly, 2006).

With several countries having a large percentage of their population in coastal urban agglomerates, the industrial and service sectors in coastal areas are economically crowding out small-scale fishing communities resulting in decline in subsistence fishing and depletion of capture fisheries resources (Weeratunge).

But in a numbers game, there is strength in numbers. In Asia, small-scale fishers are approximately 37.3 million and they are mostly found in Southeast Asia (SEA) (Funge-Smith; Salayo and Perez). Small-scale fishers account for more than 30 percent of capture fisheries production and half of world fish consumption is produced by aquaculture, of which 29 percent comes from the SEA region (Salayo and Perez).

But why do we leverage on the side of the small-scale fisheries and aquaculture to address issues on fisheries management?

Small-scale fishers directly secure the basic food and nutritional sustenance of fishing families. While women, children and the elderly engage in gleaning (mostly low-value shellfish, edible seaweeds) for home consumption, men go to sea to catch tradable species for cash income (Salayo and Perez). Because a significant portion of their catch is used for immediate food consumption, they have a pivotal role in the food security of poor coastal communities (Pauly, 2006).

Salayo and Perez enumerate other reasons why: (1) because their big number is a big bet for creating social changes; (2) because when they are given the attention, a significant

leap in attaining MDG goals could be achieved; (3) because in SEA, fisheries is a self-sustaining sector; which helped increase awareness and improved local empowerment; and (4) because in 2020, small-scale fishers and aquaculture are in for a bigger task. SEA is projected to produce about 1 million tonnes of fish beyond consumption levels and feed people in deficit areas (Delgado, et al., 2003). Small-scale fishers are projected to provide the fish food needs of an increasing number (and diversity) of global fish consumers.



The small scale fishers are not just about economic activities for the coastal dwellers. They are part of the woof and warp of the fabric of many a coastal communities' social and cultural life as illustrated by "*panagbo*", a beautiful tradition of compassion and community unity (Salayo and Perez). The tradition still prevails in Ajuy, Iloilo, Philippines, where some men, women and children gather around a group of fishers who made a good catch, to ask for a few pieces of fish for them to bring home for their food. Recognizing the social and cultural role the small-

scale fishers play in the life of coastal communities, they can very well be harnessed as a driving force for development and for creating social changes.

On the one hand, it is true that small-scale fisheries can overexploit stocks, harm the environment, and may generate only marginal profit levels (Funge-Smith, et al.). **Salayo and Perez** report that the unselective gears of small-scale fishers — like fish corrals and fish aggregating devices (FADs), *dai* fishing in Mekong, traps, spears, noxious substance — and the capture of juvenile and use of trash fish in aquaculture, because of economic expediency, are unsustainable and have adverse effects on biodiversity conservation.

But, on the other hand, in some cases, small-scale fisheries seem more sustainable than industrial fisheries, in terms of (Pauly, 2006 [Table 1]; Funge-Smith, et al.; Salayo and Perez):

- less subsidies;
- create more employment;
- less energy consumption;
- greater economic efficiency (greater utilization, less waste and discards);
- greater involvement of women;
- fewer negative impacts on the environment (higher selectivity);
- greater ability to share economic and social benefits more widely since they are decentralized and geographically spread out;
- significant contribution to cultural heritage, including environmental knowledge; and
- particularly for small-scale aquaculture, complements fisheries conservation and management strategies through:
 - Off fishing season income from family-owned low-energy low intensity fish culture
 - Augment reduced catch due to conservation regulations (area and seasonal fishing closure, size regulation, stock enhancement and rebuilding); and
 - operators can obtain incomes from sale of juvenile for stock release projects

Table 1. Large, industrial-scale fisheries vs. small-scale fisheries (Pauly, 2006).

	Large scale	Small scale
Number of fishers employed	About ½ million	Over 12 millions
Annual catch for human consumption	About 30 million t	Same: about 30 million t
Capital cost of each job on fishing vessel	\$30,000 – 300,000	\$300 – 3,000
Annual catch reduced to meals and oils	20-30 million t	Almost none
Annual fuel consumption	About 37 million t	About 5 million t
Catch per tonne of fuel consumed	1-2 t	4-8 t
Fishers employed for each \$1 million invested in vessels	5-30	500 – 4,000
Fish and other sealife discarded at sea	8-20 million t	Very little

Yet despite these contributions, the small-scale sectors are characterized by perpetual poverty, fast-expanding population, poor access to financial resources, education and health services, unemployment, and high vulnerability to climate change (Salayo and Perez; Funge-Smith, et al.). In addition, alternative livelihoods are inadequate to accommodate the big number of fishers, and because alternative livelihood are seasonal and similarly insecure (Salayo and Perez).

Moreover, their vulnerability is heightened by the fisheries and government authorities' limited mechanisms for co-management of fisheries; loss of fish and aquatic product value due to poor handling, preservation and processing practices; limited alternative livelihood options; and poor access to microfinance for income diversification.

FAO's Regional Fisheries Livelihoods Programme has been started recently to address these issues taking a cue on a multiple perspective approach (**Box 5**). Theirs is a strategy that weds governance, vulnerability and food safety into one.

Despite their present problems, the small-scale fisheries of the world, "when suitably governed, is still our best hope for sustainable utilization of coastal resources." Pauly (2006). This is the case where your weakest could prove to be your strength.

Box 5. The Regional Fisheries Livelihoods Programme (Funge-Smith, et al.)

The Regional Fisheries Livelihoods Programme in Fisheries funded by the FAO in partnership with Spain, is an initiative designed to improve livelihoods and sustainable fisheries management and reduce vulnerability of participating small-scale fishing communities in Sri Lanka, Cambodia, Vietnam, Philippines, Timor-Leste, and Indonesia. A key strategy was institutionalizing co-management mechanisms for sustainable utilization of fishery resources through capacity building, legislation, and participatory mechanisms for planning and monitoring.



Few anchovy yield in off-season months, Songhkla, Thailand.



Smaller canals with few fish in dry month, An Giang, Vietnam.

Measures to improve safety at sea was also looked into through trainings and awareness campaigns on disaster preparedness, hazards and dangers at sea, guidelines and regulations for boat construction and safety equipment, use of communication systems to enhance disaster preparedness and response. International competitiveness of fish and aquatic products were also addressed by providing training on value-adding processes and improvement of quality of fishery products and market chains to reduce health hazards. Reduction of economic vulnerability also entailed increasing income diversity through provision of appropriate and viable supplementary or alternative

livelihood options. This was enhanced by facilitating access to microfinance services for fishers, processors, and vendors.

“There is a clamor for better governance”

And yet another way to emphasize a multiple perspective approach to provide for integrated interventions is through the ecosystem approach to fisheries (EAF).

Since 1995, The Code of Conduct for Responsible Fisheries had already enshrined EAF. Following FAO (2003), EAF is defined as: “managing fisheries in a manner that addresses multiple needs and desires of society without jeopardizing options for future generations, to benefit from the full range of goods and services provided by marine ecosystems”.

EAF is a robust framework because it “strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties about biotic, abiotic and human components of the ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries” (FAO, 2003). Here we see that EAF is underpinned by the multiple perspective approach.

Funge-Smith notes that EAF is scale-neutral; it is a scalable approach. Thus, it must be able to address concerns from local to baywide system, to high sea fishery, as well as the interactions among fisheries-related ecosystems.

But the traction to put EAF into place seemed inadequate, thus its implementation lagged behind. The reasons could be that: (1) through these past years, most efforts were concerned about optimizing fish production; (2) although EAF is also enshrined in global conventions (like Agenda 21, Rio Declaration and CBD), laws and policies have lagged behind conceptual advances (Andrew and Evans, 2009); and (3) the development of guidelines to implement EAF has also lagged behind given as Andrew, et al., (2007) note: “ecosystem-based management concepts in fisheries have proven difficult to operationalize.”

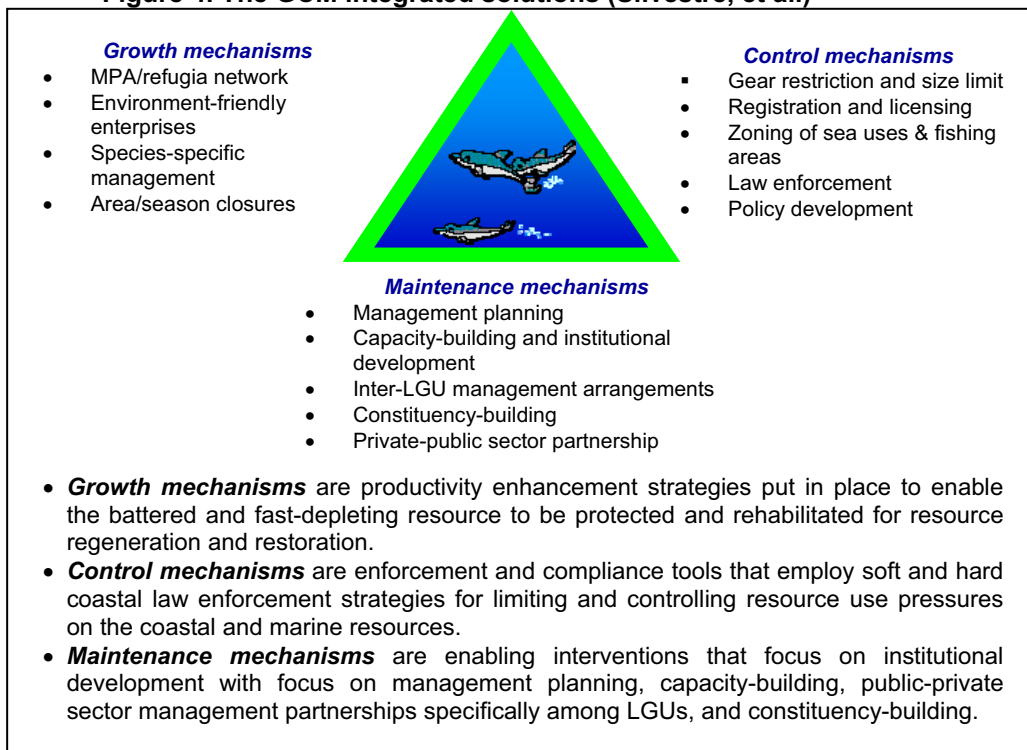
FAO has only recently published the EAF guidelines (Funge-Smith; FAO 2003; 2005) and we see more and more efforts are geared towards its implementation. The experts in the EAS Congress, in fact concluded that an ecosystem approach to fisheries management is needed to sustain Asian fisheries, principally because it is based on strengthening governance

and fisheries-related institutions. Several local case studies had so far demonstrated how this can be achieved.

One initiative undertaken in the Philippines is the Fisheries Improvement for Sustainable Harvests or (FISH) Project which localized EAF (Silvestre, et al.). The USAID-funded project was implemented in four local pilot/demonstration sites (Northern Bohol, Calamianes, Surigao Del Sur and Tawi-Tawi) and linked growth mechanisms, control mechanisms, and maintenance mechanisms in a triad of management interventions (Figure 4).

The process involved differential diagnostics (i.e., a nuanced and context-based diagnosis of problems affecting each site) which have driven the integrated prescriptions set by the growth-control-maintenance (GCM) solution package. The process is designed in an incremental manner, i.e., outputs and outcomes are targeted one step at a time, starting where the people are (and their priorities) and setting off catalytic actions for synergistic inflow of assistance and desired responses from target communities. The whole program is informed by science and governed by adaptive management.

Figure 4. The GCM integrated solutions (Silvestre, et al.)



The GCM solutions have resulted in improved local constituencies, policies/ordinances, plans and action programs, and capacities collectively leading to, among others, increased catches and mitigation of local capture fisheries issues. The seven-year project is aimed at meeting a 10 percent-increase in marine fish stocks (using 2004 as baseline) in the project areas.

In support of management efforts in the focal areas, and anticipating the replication challenges, the FISH Project also invested in national policy/institutional improvement and constituency-building efforts. Key contributions in the policy/institutional improvement area (e.g., support to development of the Comprehensive National Fisheries Industry Development Plan or CNFIDP, the Integrated Fisheries Management Unit or IFMU Scheme, the National Stock Assessment Program or NSAP) and in constituency-building (e.g., information/communication campaigns, support to the Movement for Responsible Fisheries or MoReFish, “champions-building”).

In another project, WorldFish’s four study sites in the Philippines, i.e., Babuyan Channel (Cagayan), San Miguel Bay (Bicol), Sogod Bay (Southern Leyte), and Lanuza Bay (Surigao del Sur) showed further how EAF can be implemented (Perez and Garces).

Just like in the FISH project, situational context-based diagnosis was conducted. Several issues stood out from this exercise. The main bio-physical problems noted were overfishing, land-based pollution and habitat destruction/degradation. Socioeconomics issues relate to lack of alternative livelihood; limited information, awareness and capacity; limited infrastructure and support services; and increasing population and poverty. Meanwhile, the governance problems relate to institutional/organizational constraints, policies and resource-use, weak law enforcement, inadequate LGU support, and limited coordination and participation. It should be noted that the governance issues need to be addressed first.

To help local governments from “drowning” in a sea of issues, the project used a prioritization method called PSA or Participatory Systems Appraisal (Perez and Garces; Figure 5). This exercise will help the local governments, in turn, to prioritize their interventions in the future. This is some sort of a value chain analysis of interventions which identifies where to invest money and effort given limited resources.

For example if a local government opts to use marine protected areas (MPAs) as an intervention to promote a change in governance, it may take heed from scientific studies done by Conservation International. Samonte-Tan reports statistically significant effects of MPAs, such as:

1. higher marine-related (i.e., fishing and tourism) income by US\$ 14-360 per month;
2. diversified livelihood with coastal communities engaged in fishing (70%), tourism business (20%), dive/tour boat operator (10%); and
3. enhanced environmental awareness and knowledge of biodiversity within a protected area (about 50% of respondents) and the associated rules and regulations of the MPAs (about 60% of respondents).

To win over champions for the cause of sustainable fisheries at the policymaking level of the government, it is important to package the scientific approaches and interventions in the wrappings of economic logic since at the end of the day, the costs of interventions and programs are weighed against the perceived priorities of the executive and legislative stakeholders.

Figure 5. The PSA or Participatory Systems Appraisal (Perez and Garces).

<p>SYMPTOM < 1 and $<$ Mid-point</p> <p>Element greatly influenced by other elements; May not have much power to change the system itself</p>	<p>CRITICAL > 1 and $<$ Mid-point</p> <p>Accelerator or catalyst; changes many things quickly, but may create many unexpected undesired side effects; interventions highly uncertain, and impacts may be unpredictable</p>
<p>BUFFER < 1 and $>$ Mid-point</p> <p>Low importance in the context; unremarkable because it neither influences other elements nor is it influenced much by others; Development activities expected to have little impact</p>	<p>MOTOR/LEVER > 1 and $>$ Mid-point</p> <p>Active element with predictable impacts; this is the most interesting sector for development activities</p>

As more areas and managers invest in EAF, the need for development in fisheries governance, institutions and managers is envisioned to be met as well. EAS Congress recognizes EAF as a good platform because it invests in people. As such, it:

- uses multiple management tools and actors, e.g., combining standard fisheries management measures (e.g. input controls, output controls, market-based incentives) and traditional/informal controls;
- sorts out roles and responsibilities of different government levels;
- sustains constituencies and champions and solicits more local government support; and
- provides resource management participation spaces for multisectoral partners.

“DIVIDING AN ELEPHANT IN HALF DOES NOT PRODUCE TWO SMALL ELEPHANTS.”

It dies because every part is integral to the whole elephant.

The EAS Congress recognizes that the highly sectoral approach to fisheries management cannot effectively resolve complex problems of food security. As an “inside looking in” approach, the highly sectoral approach takes its main points of reference (of threats and solutions) from within the domain of the fishery (the fish, the fishers and the costs and revenue) (Andrew and Evans, 2009).

With the current fisheries situation being further complicated by cross-cutting factors such as climate change, globalization, urbanization, poverty, etc., fisheries management must seek other solutions outside of the sector. This it can do through integrated coastal

management (ICM), where fisheries is part of the larger system in the sustainable development of an area, and where solutions coming from the other parts of the system can contribute in addressing fish problems.

The latest pronouncements by the UNEP that fish will be gone in 40 years unless we do something very drastically are grim. Crawford crows about a race of morons when this happens.

But the UNEP projection has been scientifically challenged and is now currently viewed as excessively alarmist (Funge-Smith). But it is a fact that the East Asian Seas fisheries have less fish than before. As APFIC will highlight in its incoming publication:

- the effort taken to catch that fish is possibly 4 times greater than 20-30 years ago (or more in some cases);
- the diversity has reduced;
- low value/trash species make up significant amounts of the catch (anywhere between 15-60 percent of trawl catches);
- surimi species are increasingly used (hiding the general rise in the lowest value proportion of catch); and
- fishing vessel capacity in the South China Sea area is in excess of 1.6 million vessels, the vast majority of which are small-scale/nearshore operators.

While ICM can provide the governance framework to stave off this bad scenario, Funge-Smith exhorts that the starting action to address the fish problem in the region should begin by taking the tough decision to restrict fishing effort and entry to the fishery. Salayo and Perez, in addition, said that: "To reverse the [possible] curse of a race of morons, and as a positive perspective, we may need to politicize fisheries problems by *"giving a political or governance character"* to the small-scale and aquaculture information for public dissemination, including educating neophyte policymakers about their crucial role in fisheries governance."

But on a personal, consumer level, the need to decrease our appetite for seafood is another practical solution. (But that extends also to curbing our appetite for pork and chicken and beef. Remember that we are indirectly eating fish when we do this. Think also how this can lessen our contribution to climate change and to better health. This is actually a consumption and a lifestyle change. And see also how inter-linked things are around us. John Muir (1838-1914), famous for: "When we try to pick out anything by itself, we find it hitched to everything else in the universe," could be saying now: I told you so.)

It thus should be a collective effort driven by states, communities and individual actions.

The real D-day/year might be 45, 60, 89.65 years from now, could be earlier than 40 years (or it might not happen). But the "Black Swan Events" have been turning up surreptitiously these days, catching us all in a tight bind and surprise and in agony. The possibilities are dire when the fishes are finally gone. We may turn our appetites to our own beloved cats...and dogs. Now that is pure revenge (at least for fishes against cats). Imagine a race of morons and cat-eating humans. And what happens when the cats are gone too? McCormack's *The Road* gives an indication to how inhumane humans can become in the face of hunger and survival.

Documenters:

Calpito, Marizel L.C., CMMD, DENR
Pido, Michael. Palawan State University

Presentations:

- Fukuyo, Y. and Ha, D.V.. "Safety of Aquaculture Products."
- Funge-Smith, S., Lentisco, A., Paruja, J. and D. Griffiths. "A Regional Fisheries Livelihood Programme for South and Southeast Asia – RFLP."
- Funge-Smith, S. "Current Status of Coastal Fisheries in Asia."
- Jeffrey, R. and F. Boisson. "Role of the IAEA-Marine Environment Laboratories in Supporting Regional Seafood Safety."
- Juliano, R. "A Future Scenario for Fisheries Education in the Philippines."
- Muldoon, G., Ingles, J. and K. Symington. "Compliance with the FAO Fisheries Code of Conduct within the Coral Triangle: Private Sector Engagement and a role for NGOs?"
- Perez, M. and L. Garces. "Strengthening Governance and Sustainability of Small-scale Fisheries in the Philippines: Potential Directions for the Practical Implementation of Ecosystem-based Fisheries Management."
- Salayo, N. and M. Perez. "Small Time, Big Numbers, Small Attention, Big Task: The Role of Small-scale Fisheries and Small-scale Aquaculture in Food Security and Livelihoods in Southeast Asia."
- Seino, S. "The Japanese Schools and Universities: Responding to the Challenges (and opportunities) brought about by the Fishing Industry in Recent Years."
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Panelists:

- Consuelo Baltazar (Bureau of Food and Aquatic Resources or BFAR, Philippines)
- Alex Madrigal (Department of Science and Technology or DOST, Philippines)
- Luky Adrianto (Bogor University in Indonesia)
- Cesar Pagdilao (Philippine Council for Aquatic and Marine Research and Development or PCAMRD)
- Giselle Samonte-Tan (Conservation International)
- Chul-Hwan Koh (Seoul National University)
- Suam Kim (Pukyong National University)

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