eas Congress 2009

Theme 5

Food Secutity and Livelihood Management

WORKSHOP 1: ADDRESSING FOOD SECURITY THROUGH SUSTAINABLE AGRICULTURE

25 November 2009

Food and Agriculture Organization of the United Nations – Regional Office for Asia and the Pacific

Bureau of Fish and Aquatic Resources, Philippines

Southeast Asian Fisheries Development Crnter

Chair: **Prof. Mohammed Shariff**
Universiti Putra Malaysia

Co-Chair: **Dr. Sena de Silva**
Network of Aquaculture Centres in Asia-Pacific (NACA)

The East Asian Seas Congress 2009

"Partnerships at Work: Local Implementation and Good Practices"

Manila, Philippines
23–27 November 2009

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Workshop 1: Addressing Food Security through Sustainable Aquaculture

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Co-Convening Agencies:
Food and Agriculture Organization of the United Nations –
Regional Office for Asia and the Pacific;
Bureau of Fish and Aquatic Resources, Philippines; and
Southeast Asian Fisheries Development Center

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Prof. Mohamed Shariff,
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THEME KEYNOTE:
Prof. Michael Crawford, Director, Institute of Brain Chemistry and Human Nutrition, London

Prof. Crawford stressed the importance of seafood to the development of the brain, showing the structural make-up and needs (omega-3 and iodine which comes mainly from seafood) of the brain, as well as examples of the linkages of nutritional deficiency and mental capacity and health. He also showed the emerging leading illnesses of the times in terms of extent and value and stressed the direness of addressing the health and poverty issues. He provided two solutions: (1) inclusion of the mother in addressing the poverty and health inequality problem; and (2) looking at ocean agriculture to supply the world's nutritional brain needs, lest we become a "race of morons."

"The collapse of capture fisheries threatens the sustainability of human mental health and intelligence," he says. Fish is brain food.

ADDRESSING FOOD SECURITY THROUGH SUSTAINABLE AQUACULTURE

The Workshop on Addressing Food Security through Sustainable Aquaculture was co-convened by the Bureau of Fisheries and Aquatic Resources – Philippines, Food and Agricultural Organization of the United Nations – Regional Office for Asia and the Pacific (FAO-RAP), and the Southeast Asian Fisheries Development Center – Aquaculture Department (SEAFDEC/AQD). The Pusan National University/Asia-Pacific Phycology Association (APPA) and the University of the Philippines – Marine Science Institute (UP- MSI) also provided technical support to the workshop.

The workshop was chaired by Prof. Mohamed Shariff of Universiti Putra Malaysia and was co-chaired by Dr. Jose Ingles of the University of the Philippines in the Visayas. Dr. Rogelio Juliano of the Coastal Management Center, Mr. Mike Phillips of the WorldFish Center, Dr. Jobert Toledo of SEAFDEC, and Mr. Miao Weimin of FAO-RAP acted as panelists during the panel discussion on Ways Forward: Mainstreaming Aquaculture in a Sustainable Development Context.

This workshop, which had a total of 12 presentations, aimed to: (1) identify the contribution of aquaculture in food security and alleviation of poverty; (2) outline good practices in sustainable aquaculture production; (3) showcase small-scale aquaculture applications and practices and access to low-cost aquaculture technologies; (4) identify means to address emerging and potential issues and concerns (e.g., social, economic, political, environmental) related to the development of aquaculture; and (5) identify means of integrating aquaculture development into the ICM framework.

Overview

1. Aquaculture continues to grow and is making significant contributions to fish production, food security and livelihoods in the East Asian Seas Region.

2. Addressing various environmental, social, economic, market and governance challenges is important for future aquaculture development in the Region.

3. The EAS has shown good progress in development of better aquaculture farming technologies and planning practices. Highlighted during the workshop session were integrated multi-trophic farming systems, sea-ranching methods, new carrying capacity models and mariculture parks.

4. Integration of aquaculture into integrated coastal management (ICM) continues to show promise, but practical and wide-spread implementation is required. Participants from the Philippines, Thailand and Indonesia presented various valuable experiences and lessons on aquaculture and ICM.

PART 1: THE STATE OF AQUACULTURE IN THE REGION

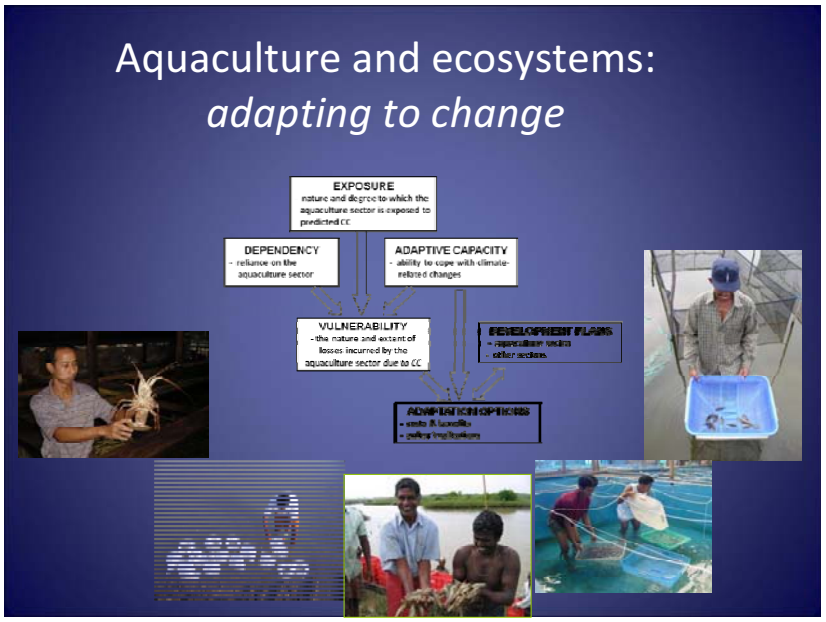
Aquaculture and ecosystems
Dr Michael Phillips, WorldFish Center, Malaysia

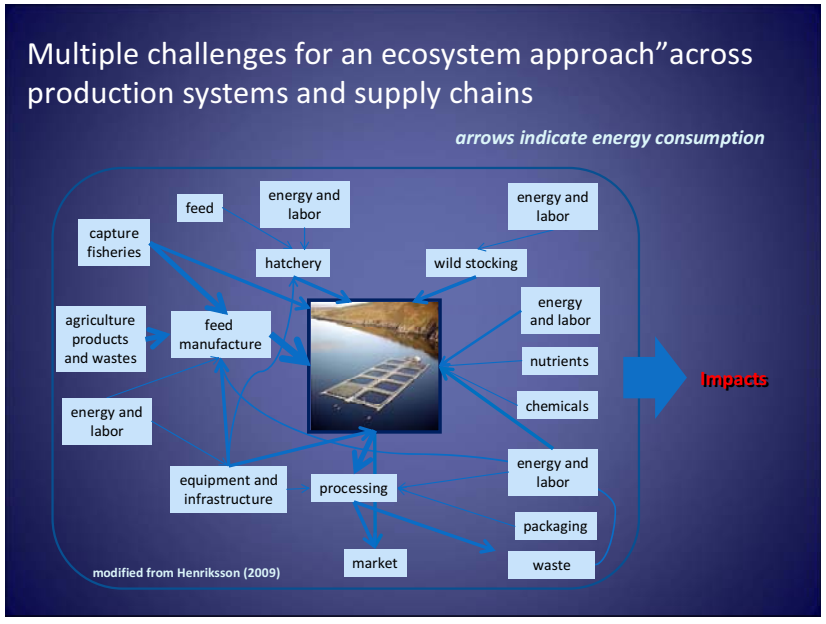
Dr. Phillips' presentation focused on the global drivers to aquaculture development and the need to adapt to environmental changes and challenges. He enumerated the drivers as: (1) growing need for fish for food; (2) food security and employment; (3) the state of the changing environment and the need for environmental awareness and better resource use and management; (4) the globalization of markets, standards and certification systems and competition within and across sectors; and (5) need for better governance and management in aquaculture and trade issues.

To adapt to the changes, he provided recommendations on improving management practices and systems from production to markets to institutional support arrangements. Examples of these are:

- Production: selection of appropriate sites, use of integrated farming systems, ecosystem rehabilitation, feeding, seed quality, health, water and wastes and food safety.
- Markets: 'sustainable seafood' labeling, standards and certification, access to markets and creation of partnerships.
- Institutional support arrangements: policy, legislation, institutions, investments in small-scale sector production).

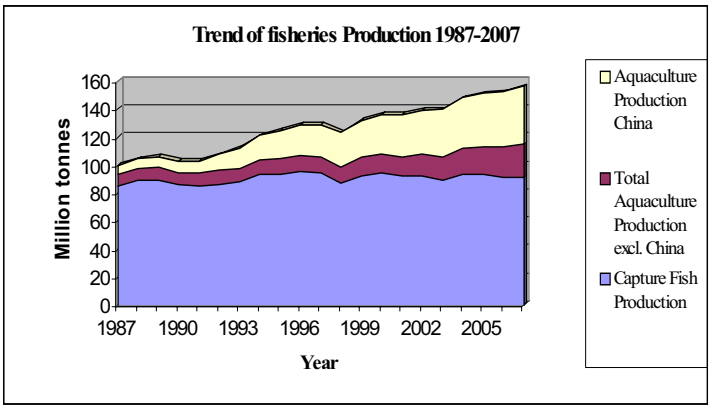
These need to be considered if aquaculture is to address the unprecedented demand on fish production, integrate aquaculture systems into surrounding ecosystems and respond to emerging challenges.



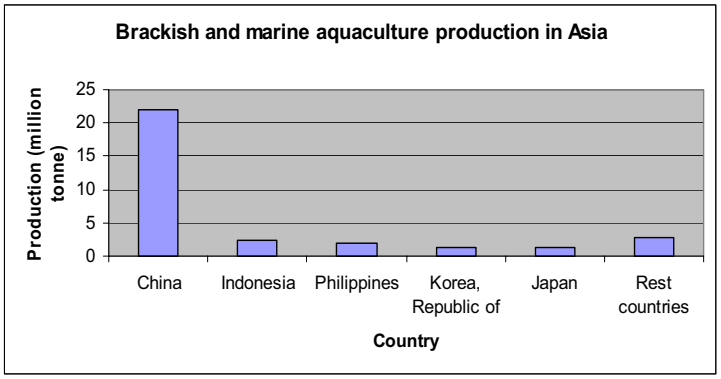


Contributions of the aquaculture industry to food security and poverty alleviation
Mr. Miao Weimin, FAORAP

Mr. Weimin's presentation highlighted the increasing contributions of the aquaculture industry to world food security and poverty alleviation. He stressed on the potential of the industry, especially in Asia, to contribute more given the imbalance in aquaculture development and contribution across countries. The necessity to contribute more to aquaculture production is driven by the need to increase production by 50% to support a fast-growing population and in view of the stagnant production from capture fisheries.



Potential of Aquaculture development in Asia

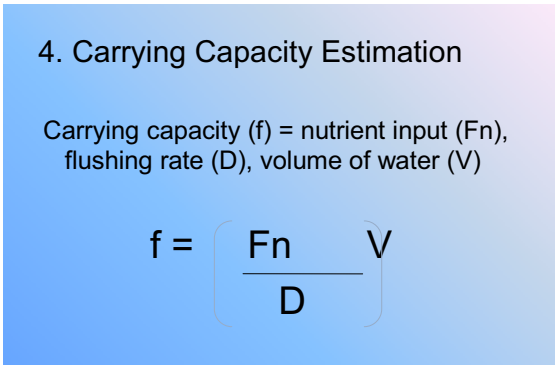


To overcome constraints to the industry's growth (e.g., competition for land and sea resources, restrictions to aquaculture production, effects of climate change, lack of support and access to markets for small farmers), Mr. Weimin recommends public and institutional/policy support for aquaculture development, better governance (ecosystem approach to aquaculture or EAA, integrated coastal management or ICM, good manufacturing practices or GMP, Code of Conduct), and technological progress which considers adaptation to a changing environment, improvement in efficiency and management that will ensure sustainability of the industry.

PART 2: INNOVATIVE TECHNOLOGIES IN ADVANCING SUSTAINABLE AQUACULTURE PRACTICES

Methodology for the Estimation of Safe Carrying Capacity for Small-scale Aquaculture in Enclosed Lakes and Bays
Ms. Jocelyn Hernandez-Palerud, AKVAPLAN-NIVA

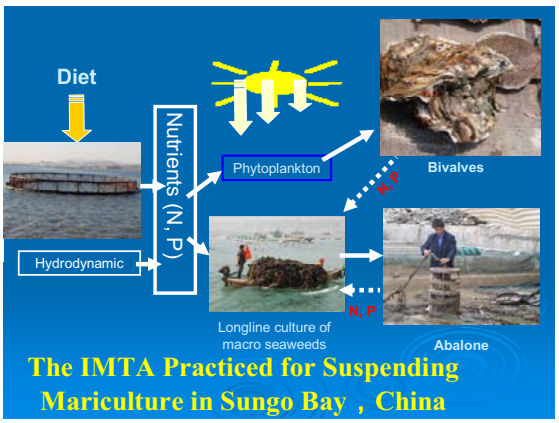
Ms. Palerud presented a process and methodology to estimate the carrying capacity of a site for aquaculture activities in lakes. The formula for carrying capacity estimation factors in nutrient input, flushing rate and volume of water. Based on the study conducted in Taal Lake, Philippines, the speaker also recommends the following for better aquaculture development: proper site selection; increased capacity by combining extractive species,



e.g., filter feeders, hydroponics, etc.; improved feed-conversion ration (FCR); and use of best management practices.

Development of Integrated Multi-trophic Aquaculture in Sanggou Bay, China
Fang Jiang-guang (Yellow Sea Fisheries Research Institute, PR China)

Mr. Fang promotes integrated multi-trophic aquaculture (IMTA) as a solution to the challenges faced by mariculture: how to eliminate eutrophication caused by feeds and how to convert unused nutrients to produce protein for human consumption. He says that "the contribution of IMTA is to recycle food and energy to increase sustainability and profitability of the aquaculture industry" by integrating the culture of fish, seaweed and shellfish in a given area. Their experience in Sanggou Bay, PR China, wherein the IMTA system of abalone, seaweeds, and sea cucumber production was practiced, showed increased economic benefits and decrease in inorganic wastes through the consumption of the same by the abalone and sea cucumber.



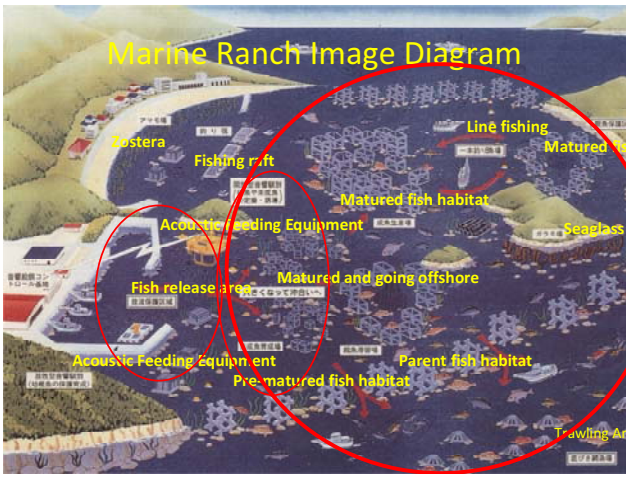
He sums up his presentation by recommending the following to increase sustainability and profitability of the industry: consideration of carrying capacity and environmental requirements for growth for each species; consideration of social and economic benefits and impact on the environment; and the application of better management practices (fouling control, predator removal, extending mariculture from inshore to offshore).

Introducing a successful Japanese Marine Ranching Project: Shiraishijima Island's Marine Ranching Project in Okayama
Mr. Takehiro Tanaka (Fisheries Division, Department of Agriculture, Forestry and Fisheries, Okayama Prefectural Government, Japan)

Mr. Tanaka's presentation focused on the success of the Japanese Marine Ranching Project in the Seto Inland Sea. The project's main objective is to increase fisheries resources for local fishing communities. The ranching project, which has successfully increased fish catch, is based on two principles: fish resource management based on an ecosystem approach and involvement of local fishers.

The project optimizes the potential of biological productivity of fish by creating marine habitats and utilizing different technologies (different types of artificial reef shelters, acoustic feeding equipment) in a well-designed marine ranch that takes into great consideration the

natural ecosystem structure and the entire life histories and niches of the fishery resources in the area.

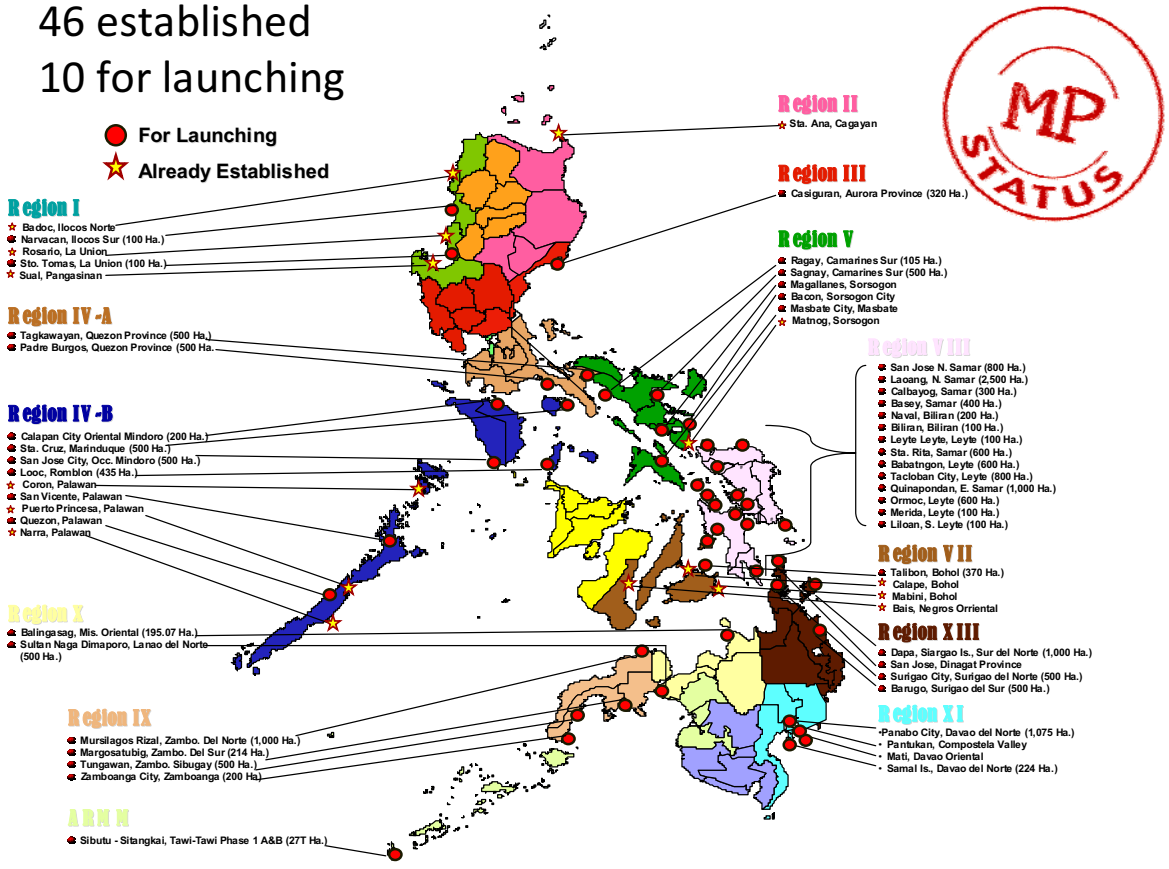


Mr. Tanaka concludes his presentation by stressing the importance of two components: consideration of the whole marine ecological system, not just the fish, and involvement of the local fishers throughout the process.

Food Security through Sustainable Mariculture Park Projects in the Philippines
Mr. Gil Adora (Bureau of Fisheries and Aquatic Resources, Philippines)

Mr. Adora's presentation focused on the national programme of the Bureau of Fisheries and Aquatic Resources of the Philippines in ensuring food security and economic growth. Mr. Adora introduced the mariculture park concept as a sustainable strategy which is being implemented in numerous sites across the Philippines.

The presentation showed the positive impacts (increase in fish recruitment, decrease in destructive fishing methods, increase in income) as well as challenges to the programme (water pollution due to organic enrichment) and provided solutions. He recommends skills training on proper farm management, environmental assessment, zoning and development planning, estimation of carrying capacity, environmental compliance, and monitoring of parks to mitigate negative impacts and to sustainably manage fish production in the Philippines.



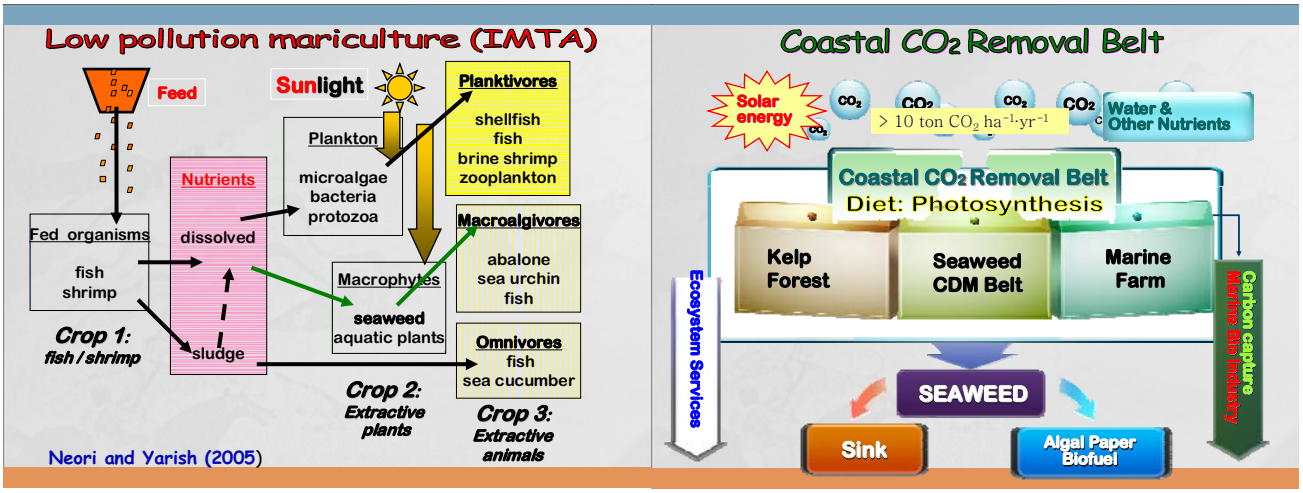
Institutional Capacity Development for Sustainable Aquaculture: Its Role in Integrated Coastal Zone Management
Mr. Renato Agbayani (SEAFDEC/AQD)

The SEAFDEC/AQD program on Institutional Capacity Development for Sustainable Aquaculture is premised on their conviction that fisheries governance is most effective at the local level. Mr. Agbayani stressed on the importance of the roles of the local government and nongovernmental and community-based organizations to create a strong institutional mechanism and in setting policies for integrated coastal management. Building and enhancing capacities at the local level not only to address the problems in and of aquaculture but also to address socioeconomic needs of local communities is an important component in the program. Their approaches and strategies in local communities in the provinces such as Northern Samar, Misamis Occidental, Guimaras and Capiz resulted to a number of benefits such as capacitated communities, economic gains and fish production. They attribute the program's success and sustainability to policy support (e.g., territorial use rights for peoples' organizations), capacitated organizations (e.g., on technology adaptation, enterprise planning and management), good financial and market systems, and local environmental monitoring system.

PART 3: GOOD PRACTICES IN SEAWEED-BASED AQUACULTURE

Developing a Seaweed Species-selection Index for Successful Culture in a Seaweed-based Integrated Aquaculture System
Dr. Ik-kyo Chung, Pusan National University/ Asia Pacific Phycology Association (APPA)

Low pollution mariculture through integrated multi-trophic aquaculture (IMTA) employs the culture of multi-species to reduce excess nutrients in a given area by combining culture of fed species (e.g., finfish/shrimp) with extractive species (e.g., shellfish/seaweed). IMTA recognizes the ability of seaweeds to rapidly take up nutrients for growth and its role as biofilters. Dr. Ik-kyo Chung's presentation focused on the seaweed species-selection index they developed to select optimal species for IMTA. Among the presentation's conclusions include the use of a species selection model to reduce the cost and effort needed for sustainable aquaculture.



Mighty Seaweeds in Integrated Multi-trophic Aquaculture (IMTA): A Biofiltration System for Mitigating Inorganic Wastes and Carbon Dioxide in the Philippine Context

Dr. Danilo Largo, University of San Carlos/APPA

Dr. Largo expounds on the important role of seaweeds as biofilters in IMTA and in carbon sequestration. Existing technology using seaweeds, specifically carageenan-producing seaweeds, offers sufficient means to address pollution as well as create additional economic opportunities. He stresses on the potential use of IMTA system in the Philippines for sustainable aquaculture and identifies at least four Philippine seaweeds (*Caulerpa, Kappaphycus/Eucheuma, Ulva* and *Sargassum*) that have potential for IMTA system based on their uptake capacity and abundance in the Philippines.

Component	Global Respiration Tgy^{-1}	Global Gross Primary Production, Tgy^{-1}	Global Net Primary Production,Tgy^{-1}
Mangroves	373	417	44
Salt Marsh	804	1438	634
Seagrass	228	628	400
Macroalgae (seaweed)	2962	5183	2221
Coral reefs	943	1032	89
Total vegetated habitats	5310	8698	3388
Unvegetated sediments	1992	1622	-370
Global benthic coastal ocean	7302	10320	3018
% vegetated habitats	73	84.3	

[CM Duarte et al. 2005]

Comparison between CO_2 emissions of selected countries, their current seaweed harvest and potential for carbon sequestration with improved utilization of coastline for seaweed cultivation (Zemke-White and Ohno 1999)

Country	Algal harvest (tons dry matter yr^{-1}	Carbon in harvest (tons yr^{-1} (tons yr^{-1})	Annual CO_2 emissions (thousand tons)	Carbon in annual emissions (thousand tons)	C in harvest / C in emissions (%)
China	698,529	209,559	5,010,169	1,366,410	0.0153
Korea	137,461	41,238	465,643	126,994	0.0325
Japan	123,074	36,922	1,257,962	343,081	0.0108
Philippines	46,218	13,865	80,511	21,958	0.0631
India	3,003	901	1,342,962	366,262	0.0002
France	616,762	185,029	373,692	101,916	0.1816
Chile	109,308	32,792	62,418	17,023	0.1926
Thailand	200	60	268,082	73,113	0.0001
Indonesia	26,894	8,068	378,250	103,159	0.0078

PART 4 : LOCAL IMPLEMENTATION OF GOOD PRACTICES: SUCCESSES AND CHALLENGES

Bolinao Fishkill: A Case Study on the Need for Sustainable Mariculture

Dr. Malou McGlone, UP-MSI

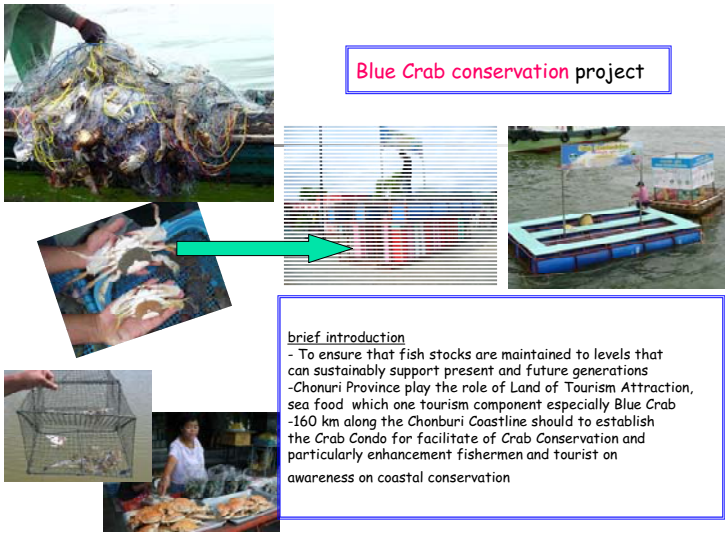
Through a well-studied case on the aquaculture practices in Bolinao, Pangasinan, Philippines, the presentation analyzed the link between coastal environmental changes due to the uncontrolled growth of *Chanos chanos* mariculture in the area and the fish kills.

The presentation on the Bolinao fishkill illustrates that mariculture should not be pursued at the expense of the marine environment. Dr. McGlone presented measures that can be taken to mitigate the problem and prevent similar occurrences in other parts of the country, which include proper siting of fishpens and cages through modelling, estimating carrying capacity, regular monitoring of water quality conditions and microalgal species, compliance with allowable limits and following proper fish farming practices. The establishment of an emergency response system (MERSys) for mariculture areas would enable local governments to anticipate and respond to marine-related emergencies such as fishkills, HABs, and human poisoning from fish and seaweeds.

Sustainable Coastal Aquaculture to Improve Food Security and Livelihood of Communities in ICM Project, Chonburi Province, Thailand

Mr. Vitaya Khunplome (Chonburi ICM Project, Thailand)

Mr. Khunplome shared their experience in implementing sustainable mariculture of blue crabs through their crab condominium project and floating mussel farms, as part of their Chonburi coastal strategy. The province's coastal strategy, which integrates programs and activities to address food security, livelihood development and poverty alleviation, also includes programs on habitat protection and sustainable tourism development. As a result of their mariculture activities, crab and fish catch

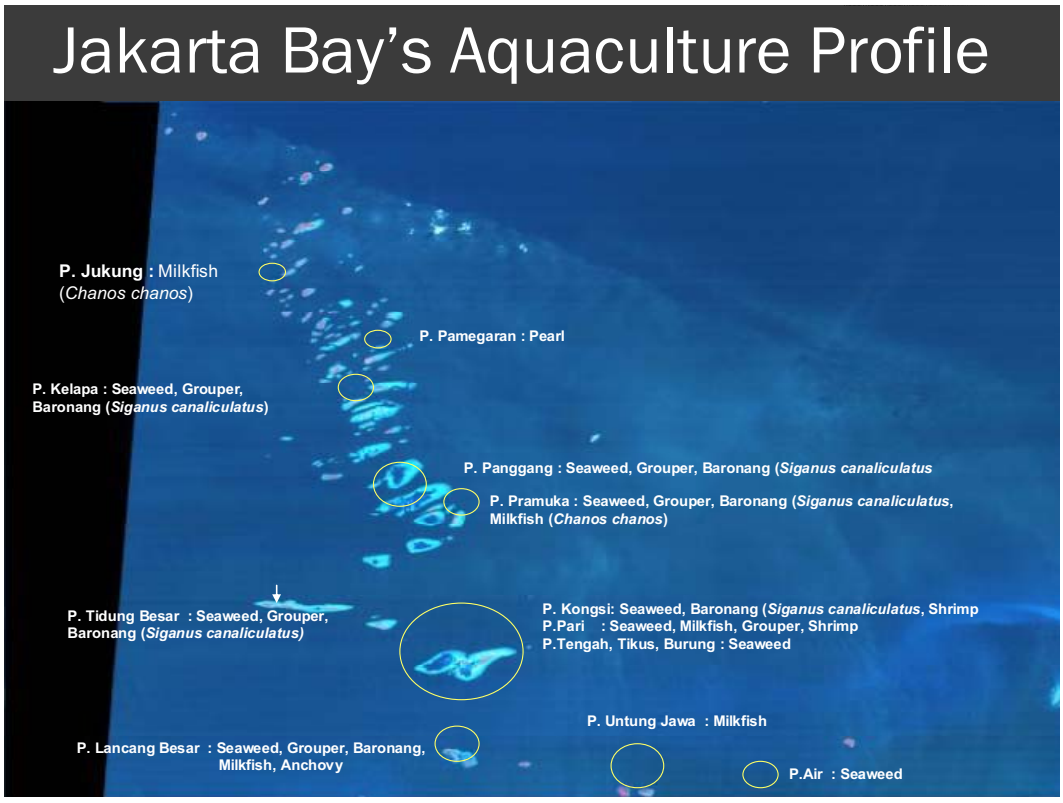


have increased and livelihood has been provided for families and local communities involved.

Alternative habitat and mussel floating farming

Mainstreaming Aquaculture in ICM Development
Dr. Neviaty Zamani (Bogor Agricultural University, Indonesia)

Dr. Zamani spoke of the drive in aquaculture development in Jakarta Bay, which currently covers almost 80% of the areas surrounding the islands. While it provides benefits to the local communities, aquaculture poses threats to the ecosystem (e.g., coral bleaching) and creates competition with other area uses (e.g., tourism, transportation, fisheries). Dr. Zamani calls for the development of eco-friendly marine culture through integrated management to harmonize the uses of the area. She proposes mainstreaming aquaculture in Jakarta Bay in ICM development, following the hierarchy plan based on Indonesian Republic Act No. 27/2007 combined with implementing the six-stage ICM cycle, strong national/regional/international standard for monitoring and evaluation of ICM development and implementation process.



HIGHLIGHTS OF PANEL DISCUSSIONS

Each of the panelists provided feedback on the presentations and highlighted the following recommendations:

- Reduce the costs of aquaculture. At present, the cost of aquaculture is still beyond the reach of communities.
- Research is needed on the diseases in aquaculture.
- More research is needed on capture fishing vs. aquaculture.
- We tend to look into aquaculture per se. We should also look into the post harvest side, agencies involved in post-harvest, study the whole process — revenues, job opportunities, income for communities. Study not only for increasing the production but rather the quality of post-harvest production.
- Look into the post harvest side of aquaculture — standards, good manufacturing processes.
- Look into food safety, not only for toxins but also sanitation, handling of products.
- Look into aquaculture globally — how to scale up the industry; there are a lot of new technologies for aquaculture, how these can be tapped; look into institutions that can help the industry.
- Look for support for local governments — enhance their capacities and capabilities.
- For marine ranching, look into effects on the ecosystems; find out what can be done to supplement the loss of habitat; also look into how this can be done at minimum cost so local communities can put up their own, without necessarily seeking 'loans' or investors.
- Develop good relations with the scientific community and the politicians, as well as the communities. Balance the science and business in aquaculture.

MAJOR CONCLUSIONS

- Aquaculture has an important future role in the East Asian Seas region, and future growth can contribute to food security, poverty reduction and improved nutrition.
- However, the various concerns about the sustainability of the sector need to be addressed through improved practices and governance.

- There are an increasing number of experiences in better management of the aquaculture sector but the challenge is in implementation and scaling up of these experiences.
- At the same time, further improvements in technologies and farming systems, environmental management and sector governance are also required.
- There is a particular need for cooperation and partnerships at various levels to improve governance arrangements for the sector at all levels.

WORKSHOP RECOMMENDATIONS AND OUTPUT

1. Continue to strengthen sharing experiences in good practices and create better awareness of the benefits of aquaculture, and of ways of doing things better
2. Conduct cost-benefit analysis to determine the best approaches for the integration of aquaculture into coastal management and use the information to put together arguments for governments.
3. Develop better understanding and awareness around some key issues: (a) improving social benefits of aquaculture; (b) nutritional quality of aquaculture products; and (c) ecosystem approaches in practice.
4. Improve indicators for monitoring growth and performance of aquaculture, also incorporating evaluation parameters for evaluating impacts of climate change to aquaculture and fish food production.
5. Better understand the impact of climate change on aquaculture and role of aquaculture in mitigation response to climate change.