

Preserving the integrity of the aquaculture environment while ensuring safe seafood products

Innovative technologies and management schemes for eco-friendly fish farm management and production of safe aquaculture foods

Protecting the integrity of existing ecosystems and responding to the growing demand among consumers for quality and safety, as well as for information on and accountability for what they are consuming, will spell the long-term viability of aquaculture development in the Asian region.

IN MANY ASIAN COUNTRIES, AQUACULTURE holds great promise for increasing the availability of affordable food, protein and nutrients for human consumption and a healthier future for the people. Meanwhile, in the more developed countries in the region, aquaculture has become one of the fastest growing food production sectors.

However, there is now an increasing demand among consumers for high-quality, eco-friendly, and safe aquaculture products. Hence, it has become more important than ever to adopt innovative technologies and management schemes that will ensure the preservation of the aqua-ecosystem and its surrounding environment, and which will guarantee food safety or the protection of aquaculture products from any form of contamination. Meeting safety requirements [e.g. Hazard Analysis and Critical Control Point (HACCP), Good Aquaculture Practice (GAP), etc.] in all stages of the production and handling process has now become an uncompromising condition in most countries. However, complying with these rigid safety requirements has been difficult for small-scale fish farmers, owing to their little knowledge about sustainable aquaculture management as well as some policy/regulation and structural constraints.

Eco-friendly aquaculture workshop

The development and expansion of aquaculture must be and can be balanced with the need to protect the integrity of existing ecosystems. That, and the growing demand among consumers for quality and safety, as well as knowledge of and accountability for what they are consuming, will spell the long-term viability of



Photos courtesy of S.C. Chen, Taiwan Fisheries Economic Development Association.

aquaculture development in the Asian region. Hence, this international workshop was organized to serve as a venue for the sharing of knowledge and experiences on improved aquaculture technologies and management system to address the need for eco-friendly production processes and food safety concerns. During the workshop, participants shared and exchanged information, knowledge and experiences on major issues and recent technological advancements in aquaculture such as environmentally sound poly-eco-aquaculture, organic aquaculture, integrated fish farming system, safety through monitoring for the presence of pathogenic bacteria, chemical contaminants, and drug residues in aquaculture products, all toward addressing the long-term viability and sustainability of aquaculture development, particularly in respect to commercial aquaculture by small-scale fish farmers.

Major issues and concerns

There is no doubt that aquaculture is now considered as a major player in the national economy of many developing Asian countries, specifically in terms of producing high nutritional value food for human consumption, and in contributing to rural income and employment through farming and related activities. However, the long-term viability and sustainability of both fresh water and marine aquaculture, particularly in respect to commercial small-scale fish farming, has now become a critical factor in aquaculture development, in view of the increasing environmental and social concerns associated with the industry.

Fresh prawn farming in rice fields in Vietnam.



Photos courtesy of N.V. Trong, Research Institute for Aquaculture, Vietnam.

Another major issue in aquaculture development is the increasing demand among consumers for high-quality and safe aquaculture products. In becoming an important contributor to the markets for seafood, the aquaculture industry has become increasingly subject to rigid food safety and eco-friendly production and processing requirements (e.g. HACCP, GAP). Hence, to meet such requirements, small-scale Asian fish farmers must be equipped with technological innovations, and guidelines and standards on food safety/traceability. Policy and support services has likewise become necessary to enable them to continue to participate in the network of fisheries and aquaculture production, marketing and trade.

Eco-friendly production practices.

Awareness of environmental conservation and responsible aquaculture production are the key factors shaping the development of aquaculture worldwide. To meet this trend, aquaculture development must be based on: socially acceptable and responsible practices; potentially competitive species; industry development through alliances among producers, suppliers, processors, and scientists/researchers; and extension/education and credit support to farmers.

In some developing countries in Asia, eco-friendly and good management practices have been implemented through such schemes as: improved management systems like environmentally sound poly-eco-aquaculture and organic aquaculture; genetic improvement for growth and resistance; improved water

(Below) Tilapia cage culture in Thailand. (Inset) Taiwan GAP guidelines for tilapia.



Photos courtesy of P. Tabthipworn, Department of Aquaculture, Kasetsart University, Thailand and S.C. Chen, Taiwan.

management system; development of environmentally sound and high quality feeds; practical use of fish disease vaccine; regulations and control for quality of seeds, rearing procedure, chemicals/antibiotics, etc.

Food safety and traceability. With the growing concern about food safety, increasing efforts must be undertaken to improve the quality of aquaculture food products that are placed in the market.

Some countries in the Asian region are more advanced in terms of implementing food safety protocols, while others are still in the level of consolidating a mix of best practices in aquaculture production aimed at sustainability of the aquaculture environment, and preventing/minimizing contamination and chemical hazards.

Process improvement must emphasize on good aquaculture practice (GAP), good manufacturing practice (GMP), and HACCP standards in all sectors of the food supply chain (hatchery and farm; feed, drug, and chemicals; harvesting and marketing; GMP and HACCP in processing plants; import and export control). GAP certification procedures must be developed, and improved traceability of fishery product must be implemented to satisfy the demand for information among consumers.

Government/policy and support services.

Different types of organizations must have a good interplay in the development and sustainability of

the aquaculture industry in each country. These include: policy-making institutions, scientific and technological/research and development agencies, extension and promotion/technology dissemination services, fish-farmer cooperatives/associations, and service-providing institutions (financing, processing, marketing, peer-group associations related to the fisheries sector and others). Regulations in the form of legislation directed towards the implementation of aquaculture development management must also be in place in each country.

Toward a sustainable aquaculture development

Environmental and social concerns can influence markets for consumer goods, and that includes aquaculture products. In responding to these concerns, national and international guidelines for responsible and eco-friendly aquaculture through codes of conduct and fisheries policies must be fully observed and implemented to ensure the preservation of the aquaculture environments, as well as the quality and safety of aquaculture foods and other products.

With sustainability and food quality/safety as the core components, there is also a critical need for countries within the region to harmonize standards and mechanisms for HACCP and/or GAP/GHP/GMP implementation. These standards must not only be accessible to large commercial/industrial

Environmentally sound poly-eco-aquaculture in fish farms in Japan.



Photo courtesy of S. Kadowaki, Kagoshima University, Japan.



Participants of the workshop visit the R&D facilities of the Gondol Research Institute for Mariculture (GRIM) in northern Bali, Indonesia.



production, but must also be beneficial to small-scale fish farmers, and unique to the region's aquaculture environments and conditions.

Given the importance of attaining sustainable aquaculture with no or limited negative externalities, exporting countries must adopt more sustainable production practices, such as eco-labeling schemes and safety assessments. Risk assessment and other precautionary approaches must be observed, especially before entry into production of new or exotic species, including the potential use of products from modern biotechnology.

Each country must likewise advocate strong government support, political will and legislation in support of food safety and eco-friendly technologies, particularly in terms of standardization/certification, fish farmers' education and training, research and development on quality management systems, credit and other financial support, and marketing management strategies. Lastly, exchange and sharing of information and technology among researchers and scientists within the region must be sustained and enhanced.

International Workshop on Innovative Technologies for Eco-friendly Fish Farm Management and Production of Safe Aquaculture Foods

Held in Denpasar, Bali, Indonesia on December 4-8
No. of countries participating: 8 (Indonesia, Japan, Korea, Malaysia, Philippines, Taiwan ROC, Thailand, and Vietnam)

No. of papers presented: 14

No. of participants: 40

Co-sponsor: Research Center for Aquaculture (RCA), Indonesia

List of papers

Resource papers

1. Approach to the safety of aquaculture products in Japan
 - Masashi Maita, Tokyo University of Marine Science and Technology, Japan
2. Strategy for strengthening the competitiveness of Korean aquaculture
 - Mi-Seon Park, National Fisheries Research and Development Institute (NFRDI), Korea
3. Eco-friendly technologies for fish farm management and production of safe aquaculture foods in the Philippines
 - Rafael D. Guerrero III, The Water and Fish R&D Center (PCAMRD), Philippines
4. The experience and development of responsible and ecofriendly aquaculture production

practices to aquaculture food's safety and traceability in Taiwan

- Fu-Sung Chiang, National Taiwan Ocean University, Taiwan ROC

Country papers

5. Vietnam: working toward producing safe and high quality aquaculture foods
 - Mr. Nguyen Van Trong, Research Institute for Aquaculture No. 2, Vietnam
6. Development on the aquaculture management practices in Thailand
 - Prathak Tabthipwon, Department of Aquaculture, Kasetsart University, Thailand
7. Aquaculture development in Indonesia
 - Made L. Nurdjana, Ministry of Marine Affairs and Fisheries, Indonesia
8. Issues and future directions for eco-friendly fish farm management and production of safe aquaculture foods
 - Indroyono Soesilo, Agency for Marine and Fisheries Research, Indonesia
9. Sustainability of aquaculture in Indonesia
 - Fatuchri Sukadi, RCA, Indonesia
10. a. Competitiveness and supply chain management study on Taiwan grouper industry
 - Shin-Chang Chen, Taiwan Fisheries Economic Development Association
- b. Traceability supply chain management for cage culture: case of Cobia
11. Sustainable development and trends in the Philippines aquaculture
 - Nelson Lopez, Bureau of Fisheries and Aquatic Resources, Philippines
12. Current status and action plans towards implementation of best aquaculture practices in Malaysia
 - Mohd. Fariduddin bin Othman, Brackishwater Culture Research Center, Malaysia
13. Korean aquaculture: status and future directions
 - Han-Kyu Lim, NFRDI, Korea
14. Advantages of environmentally sound poly-eco aquaculture in fish farms
 - Shusaku Kadowaki, Kagoshima University, Japan

For further information, contact:

Mr. Sing-Hwa Hu, FFTC Director

Mr. In-Woo Lee, FFTC Agricultural Economist