

# SUSTAINABLE AQUACULTURE DEVELOPMENT



Aquaculture is supplying 40% of the world's food fish, and is playing a key role in national government plans to achieve food security, poverty alleviation and rural development. Aquaculture in Asia now accounts for over 90% of the world's total aquaculture production.

The challenge for the aquaculture sector is meeting the projected demand for fish in the next ten years while ensuring consumer protection, maintaining environmental integrity, and achieving social responsibility.

Toward these ends, AQD has worked on six thematic areas in the past ten years, from supplying good quality seeds to rural aquaculture.

## ***Supply of Good Quality Seed***

Research and development on broodstock management and seed production of various species are perhaps the best known of AQD's work and contribution to aquaculture development. Broodstock management and seed production technologies for abalone, mudcrab and shrimps, several marine and freshwater fishes have been effectively disseminated through training courses conducted annually for participants from SEAFDEC Member Countries. These technologies are continuously being refined to enable operators to optimize production and reduce costs. Generally, the AQD approach is to look at broodstock and larvae in terms of their genetics, disease risk, and nutrition. AQD continues its efforts in the domestication, selection and development of high health shrimp.

## ***Environment-friendly Aquaculture***

After successfully demonstrating mangrove-friendly shrimp farming practices in Thailand, Vietnam, Myanmar and the Philippines, AQD published an extension manual on best management practices in mangrove-friendly shrimp farming which was later translated to Bahasa Indonesia and Burmese in 2002. AQD has likewise completed trials on low intensive shrimp system that used low salinity-adapted seaweeds *Gracilariopsis* as bioremediator. AQD and partners also formulated a regional code of sustainable use of mangrove ecosystems for aquaculture in Southeast Asia in 2004-2005.

In 2006, AQD opened its Mariculture Park at its Igang Marine Station in Guimaras to the private sector. Commercial production was mostly for abalone and milkfish. At present, sediment and water quality around the mariculture area are regularly being monitored to ensure environmental integrity. AQD has developed a color chart for sediment that fish farmers can use as an early warning system of pollution. The visual chart which is still being refined is correlated with organic matter loads.





AQD initiated studies using multi-trophic culture techniques to be able to promote culture practices with less impact to the environment. AQD also attempts to document the impacts of aquaculture on aquatic biodiversity by comparing species composition in aquaculture sites, adjacent ecosystems and areas where there are few aquaculture activities.

#### ***Getting out of the Fish Meal Trap***

AQD has done research on nutritional requirements and developed feed formulations for a wide range of aquaculture species at various growth phases. Research on alternative feed ingredients and their digestibility were also undertaken and AQD has identified alternative protein sources which can partially replace fish meal in grouper, milkfish and shrimp diets. Verification studies of diets formulated to be less polluting for groupers and shrimps are ongoing in marine (cages) and brackishwater (ponds) culture systems. Trials to improve nutritional value of locally available plant sources by submerged fermentation and solid substrate fermentation using bacteria isolated from milkfish gut are also ongoing. New feed formulations using fermented plant products in lieu of fish meal is one avenue that AQD is looking at to get out of the fish meal trap.

#### ***Healthy and Wholesome Aquaculture***

Like broodstock management and hatchery operations, fish health management is another area that AQD's contributions are well recognized. From 2000 to present, AQD, in collaboration with established partners in the region, is implementing regional programs aimed to establish a disease control system in aquaculture and help ensure that only healthy and wholesome aquaculture products, including hatchery-bred seed, are traded in Southeast Asia. The current focus of the program is on health care in small-scale aquaculture and diagnosis at farm level. The regional programs are funded by the Government of Japan Trust Fund through the ASEAN-SEAFDEC FCG. In 2009, AQD was successful in developing a formalin-inactivated vaccine for viral nervous necrosis in fishes and in establishing a benchmark for the withdrawal period of oxytetracycline and oxolinic acid in shrimp.

AQD likewise conducts training program on fish health management in its main station in Iloilo and on-site in Member Countries, and through a biennial distance learning module in the internet (beginning 2002). AQD has also published a textbook and manuals on various aspects of fish health management.





### ***Biotechnology for Aquaculture***

Through the Government of Japan's fisheries grant-aid to the Philippines, a laboratory for advanced aquaculture technologies or the biotech lab was constructed at AQD and has been in operation in collaboration with DA-BFAR. PCR-based methods are now used routinely to diagnose viral pathogens in shrimp and fish. Biotech tools are also used in AQD studies on vaccine development against the viral nervous necrosis in fishes, genetic characterization of fish stocks used for domestication and stock enhancement programs (mudcrab, tiger shrimp, freshwater prawn and abalone); finding egg markers that can predict egg batch quality and successful run in the hatchery; feed development studies; and seaweed strain development studies. Cloning of growth hormone, growth factors and gonadotropins in rabbitfish, milkfish, grouper and snapper were also done in collaboration with scientists in Japan. These could find practical application in increasing growth rate of fish during culture, and not considered "harmful" substances because these are endogenous to the fishes studied.

### ***Aquaculture for Rural Development***

AQD was involved in two regional programs on rural aquaculture: the 5-year integrated regional aquaculture program under the ASEAN-SEAFDEC FCG in 2003 which focused on seed production and grow-out for the freshwater prawn *M. rosenbergii* technologies that are now disseminated through the training programs; and the Japan-ASEAN funded project on human resource development (HRD) on poverty alleviation and food security by fisheries intervention in the ASEAN region in 2008 where AQD's task was the conduct of the Trainers' training on rural aquaculture for ASEAN-SEAFDEC Member Countries representatives. A training handbook based on the course was published in 2009 and with AQD's assistance and support, seven onsite HRD trainings were facilitated by the country trainers in 2009 and 2010.

To ensure an integrated rural development approach, AQD institutionalized in 2006 a multi-stakeholder project called the institutional capacity development for sustainable aquaculture (ICDSA). This ICDSA taps into local government units and grassroots people's organizations, and offers science-based aquaculture technologies as alternative livelihood for food security and poverty alleviation in local communities. The project has three components, namely training, technology demonstration and research. Since inception of ICDSA, AQD has collaborated with the provinces of Capiz, Guimaras, Northern Samar, and Misamis Occidental.

