



# INSTITUTIONALIZING FISHERIES R&D IN THE PHILIPPINES: THE ESTABLISHMENT OF NFRDI

Westly R. Rosario

Recognizing the need to institutionalize the country's fisheries R&D and considering the important role that it plays in the management and conservation of fisheries and aquatic resources, the Philippine Government instituted into law by virtue of Sec. 82 of the Philippine Fisheries Code of 1998 (Republic Act 8550), the establishment of the National Fisheries Research and Development Institute (NFRDI). Pending the release of its own budgetary allocation from the government, the NFRDI remains as the R&D arm of the Philippine Bureau of Fisheries and Aquatic Resources (BFAR).

While responding to the Philippine fisheries agenda and in addressing the food security and poverty alleviation concerns of the Philippine Government, the NFRDI is committed to be "a prime institution that ensures the country of sustainable fisheries through continuing excellence in research and development." Thus, the NFRDI envisions to generate scientific information and knowledge as basis for sustainable fisheries management and policy formulation; and to develop and improve fisheries technologies pro-active and responsive to the needs of the industry and the fisherfolk.

## Goals of NFRDI

With food security and poverty alleviation as overriding considerations in the development and management of the country's fishery resource, and as mandated in Sec. 84 of the Philippine Fisheries Code of 1998, the NFRDI aspires:

- To conduct research to raise the income of the fisherfolk and to elevate the Philippines among the top five (5) in the world ranking in the fish production;
- To make the country's fishing industry in the high seas competitive;
- To conduct social research on fisherfolk families for a better understanding of their conditions and needs; and
- To establish linkages with state colleges and universities on upstream research and with training agencies, LGUs and private sector for the maximum promotion of fisheries technologies.

## Functions of NFRDI

As the primary research arm of BFAR, the NFRDI has the following core functions:

- Provide continuing assessment of the growth and performance of the fisheries sector and the factors contributing to its status;
- Develop through a highly participatory process a national research and development agenda as the framework for national R&D for the fisheries sector;
- Provide leadership in the development and operation of a network of institutions involved in fisheries research and development to promote synergy and effective partnership;
- Focus its R&D on upstream research in the generation of public goods in critical areas outside of the comparative advantage of the State Colleges and Universities (SCU's) as defined and approved by Philippine Agency for Research and Development in Agriculture and Fisheries (PARDAF);
- Provide the leadership in the development and operation of the National Fisheries Germplasm and Seed System in partnership with research institutions, Local Government Units (LGUs), the private sector, the small fisherfolk, and other stakeholders; and
- Provide technical assistance to BFAR in the development and operation of a sustainable National Fishery Health Advisory Services (NAFAS) closely linking with the LGUs and the fish farmers and in close partnership with other government agencies and other stakeholders.

## Challenges and Opportunities

Considering that the Philippines is rich in fishery resources and that its fisheries production has been consistently increasing (ave. of 24%) during the past 10 years, the NFRDI is therefore faced with the challenge of elevating the Philippines to among the top five fish producing countries in the world. Thus, the NFRDI considers it an opportunity to be able to attain this goal through the rational and sustainable management of the country's fishery resources. Since aquaculture contributed the most sustainable increase in production from 2005 to 2006 (about 13% annually), the

NFRDI is setting its priority towards increasing fish production from aquaculture. The NFRDI envisioned that this could be achieved by promoting nationwide the country's Code of Practice for Aquaculture as this outlines the general principles of environmentally-sound designs and operations for sustainable development. The NFRDI also endeavors to extend technical assistance to the commercial fisheries sector through technology development on the optimal use of offshore and deep sea resources. This is aimed at boosting the production from commercial fisheries, which showed a downward trend in 2005-2006. At the same time, NFRDI also continues to provide technical assistance to the municipal fisheries sector through its program on the development of sustainable fishing boats for marginal fisheries.

## Five-year Program of NFRDI

Having been institutionalized only recently and complying its main function as the R&D arm of BFAR, the NFRDI formulated the following priority programs for the five-year period from 2006 to 2010:

1. Improvement of Aquaculture Systems
2. Development of Improved Strains and New Species for Aquaculture
3. Investigation of Pollution and Environmental Concerns
4. Formulation of Quality and Safety Criteria for Fish and Fishery Products
5. Reduction of Environmental Impacts and Development of Responsible Harvesting Technology
6. Assessment of Aquatic Biodiversity for Sustainable Use
7. Development of Sustainable Fishing Crafts for Marginal Fisheries

## Priority R&D Species

### 1. Seaweeds

Since seaweeds, which is abundant throughout the Philippines, has consistently been the first and major contributor to the Philippines' fisheries production, the NFRDI continues to develop this resource through an intensified R&D on seaweeds. Consistent with this, the NFRDI has established the National Seaweeds Development Program, which aims to among others, generate baseline information on the country's seaweed resources. The information collated would serve as basis for the formulation of management policies for the proper utilization, conservation and protection of the resource. The information would also provide basis for concerned institutions in the country as well as the LGUs in the formulation of their respective municipal development plans and ordinances on the proper management of the seaweed resource in their respective localities.



*NFRDI Executive Director Westly Rosario discussing the Philippine National Seaweeds Development Program with a visitor at the NIFTDC seaweeds culture tanks*

### 2. Milkfish

Considering that milkfish (bangus) is the second most important commodity in the Philippine economy based on the most recent Philippine Fisheries Production Data, R&D on bangus will be intensified by the NFRDI including the promotion of services for the industry, e.g., technology and innovations, human capacity development, marketing, credit assistance, licensing of ponds, pens and cages, etc. Moreover, with the problems constraining the sustainable development and management of the bangus resources in the country, especially bangus fry importation and unsustainable farming practices, the NFRDI will focus its efforts in addressing these concerns by improving the culture technology as well as through massive information dissemination.



### 3. Tilapia

Having contributed an average production of 8% to the country's fish production over the last five years, the NFRDI will continue to intensify its R&D on tilapia. Based on findings that tilapia aquaculture in the country is constrained with problems on fry quality, unsustainable farming practices, and other ecological concerns, the NFRDI envisions to carry

*NFRDI Researchers doing research on tilapia feeds at the DA-BFAR-NFRDI Biotechnology Laboratory at SEAFDEC Aquaculture Department in Iloilo, Philippines*



out an expanded tilapia R&D including production of high value tilapia species that are more resistant to diseases, etc.

#### 4. Penaeid Shrimps and Prawns

The Philippine fisheries trade data shows that shrimps and prawns are among the major commodities that contribute to the top fishery exports of the country. This trend will be boosted soon because of the recent lifting of the ban to culture the Pacific white shrimp, *Penaeus vannamei* in the country. The lifting of the ban was recognized by the private sector in the Philippines as a giant step towards the responsible development of this resource. Together with the intensified R&D on *P. vannamei* to be spearheaded by NFRDI, the export of this commodity is expected to leap in bounds.



The NFRDI, which has been assigned by the Philippine Government to establish the country's development program for *P. vannamei*, will carry out activities that include monitoring and surveillance of shrimp diseases in the country. With the culture technology of *P. vannamei* already developed in the Asian countries, the NFRDI will continue to improve such technology for adoption in Philippine conditions. The country's *P. vannamei* development program under the NFRDI will also include projects aimed at developing appropriate handling techniques, quality criteria and grades, and processing techniques.

The culture of the giant freshwater prawn is an emerging industry in the Philippines. Considering the abundance of the giant freshwater prawn throughout the country, the NFRDI has been tasked to carry out the R&D on the giant freshwater prawn, *Macrobrachium rosenbergii*. This is aimed at developing a hybrid and improved strain of *M. rosenbergii* that will have better growth performance and higher survival rate during culture. In order to conserve the country's giant freshwater prawn resource, the NFRDI has established a Gene Bank for *Macrobrachium* based at BFAR's National Integrated Fisheries Technology and Development Center (NIFTDC) in Dagupan City, Philippines.

#### 5. Tuna

Tuna remains as the Philippines' top export commodity hence, the Philippines deemed it necessary for NFRDI to conduct continuing R&D on sustainable harvesting of tuna as well as on the reduction of post-harvest losses in the handling chain of sashimi-grade tuna. As a general consequence, through the post-harvest and processing activities of NFRDI, the country will be able to establish standards for fish and fishery products for sustainable increase in the country's foreign exchange earnings.

#### 6. Sea Cucumber

Another fast emerging commodity in the Philippines, due to its considerable contribution to the country's fisheries export, is sea cucumber. Since a number of commercially-important species of sea cucumber is abundant in the Philippines, this has prompted the Philippine Government to promote the culture of sea cucumber with NFRDI spearheading the R&D. As an initial step towards the development of the sea cucumber industry, NFRDI is carrying out investigations on the biology of the various commercially important species of sea cucumber. In addition, a study is also being conducted by NFRDI, on the

*About-to-be completed Philippine Gene Bank for Macrobrachium to be operated by NFRDI at NIFTDC in Dagupan City, Philippines (left)*

molecular application for the conservation, management and development of the country's sea cucumber species.

### 7. Freshwater Ornamental Fishes

Freshwater ornamental fishes have emerged as new commodities contributing considerably to the country's economy. In the latest Philippine fisheries export data, the ornamental fish industry has contributed largely to the fish trade of the country. Thus, the Philippine Government has assigned the NFRDI to establish an Ornamental Fish Development Program in order to promote the technology on the breeding and culture of freshwater ornamental fishes as an alternative form of livelihood. The program also intends to conduct training and transfer of technology on the breeding and culture of freshwater ornamental fishes to fisherfolk and other interested cooperators.

### 8. Ludong

“Ludong”, *Cestraeus* spp. is an endemic, rare and indigenous migratory fish species and commands very high price in the local market of the country. At present, there is very little information available on the fisheries and biology of this commercially valuable fish. Research on the habitat and spawning requirements of this fish has setbacks due to fragility of its survival in captivity. With increasing threat of overexploitation and environmental degradation, NFRDI was tasked to conduct biological studies and assessment of this indigenous species for conservation purposes and sustainability; and to establish the Ludong Fisheries Development Program.

## Other Related R&D Activities

### 1. Trap Development Program

The NFRDI has also been tasked to also carry out R&D activities for the refinement and improvement of fishing gears for local environment. This is being pursued through the establishment of the Trap Development Program, which aims to ensure the sustainable development, management and conservation of the fishery resource of the Philippines including the country's Exclusive Economic Zone (EEZ). The specific activities include improving the methods of harvesting, collecting, and handling of the fishes in accordance with approved technologies consistent with the objective of maintaining a sound ecological balance, and in protecting and enhancing the quality of the environment.

### 2. Post-harvest Technology

In order to make fish and fisheries products from the Philippines more competitive in the fish trading arena, the NFRDI was tasked to also conduct R&D on post-harvest technology aimed at formulating quality and safety criteria for fish and fishery products. These activities are expected to lead to the reduction of fish harvest losses and preserving the good quality of fish being exported by the country.

### 3. Human Capacity Building

The NFRDI has been mandated to continue disseminating technologies developed and or refined, to the fishworkers and investors through training, extension and information dissemination activities.



## Organization Structure of NFRDI

NFRDI is headed by the Executive Director, and is assisted by the Deputy Executive Director for Research and the Deputy Executive Director for Technical Support. Directly under the Executive Director are four divisions, namely: Administration and Services, Financial Management, Planning and Budget Programming, and Program Monitoring and Evaluation.

Under the Deputy Executive Director for Research are six divisions, namely: Socio-economics, Fish Health, Biology, Ecology, Genetics and Biotechnology, and Biochemistry. Under the Deputy Executive Director for Technical Support are three divisions, namely: Knowledge Management, Laboratory Services, and Germplasm Conservation.

Also directly under the Executive Director are five centers, namely: Central Fisheries Research Center (Dagupan City, La Union), Center for Freshwater Research (Science City of Muñoz, Nueva Ecija), Center for Lake Resources Research (Taal, Batangas), Center for Brackishwater Research (Lala, Lanao del Norte), and Center for Marine Research (Guiuan, Eastern Samar).

## Progress of Activities in 2006

The 34 studies conducted by NFRDI in 2006 were grouped into: Aquaculture (5), Fishing Technology (5), Post-Harvest Technology (4), Marine Fisheries (5), and studies carried out at the four NFRDI Centers in Taal, Batangas (4), Dagupan City (4), Lala, Lanao del Norte (3), and Guiuan, Eastern, Samar (4).

## Plans for 2007

1. Aquaculture
  - 1.1 Philippine Seaweeds Development Program
    - *Kappaphycus* spp.
    - *Euचेuma* spp.
    - *Gracilaria* spp.
  - 1.2 *P. vannamei* Development Program
    - Disease surveillance and monitoring
  - 1.3 Ludong and Other Commercially Important Indigenous Fishes Development Program
    - Biology
    - Population genetics
    - Broodstock development and seed production
  - 1.4 Improvement of aquaculture systems
2. Fishing Technology
  - 2.1 Trap Development Program
    - Floating trap gear
    - Mid-water and surface trap nets
    - Gear modification on portable traps

- Small-scale set net
  - Tuna drift gill net
  - Square mesh windows
  - Gear for harvesting live indigenous fish species
3. Post-harvest Technology
    - 3.1 *P. vannamei*
      - Development of quality standards for handling, grading, transport, and processing of *Penaeus vannamei*
    - 3.2 Tilapia
      - Quality assessment and storage life in ice of selected tilapia species from different culture environments
    - 3.3 Tuna
      - Quality assessment of filtered/tasteless smoke and CO gas-treated tuna meat products
      - Reduction of post-harvest losses in the handling chain of sashimi grade yellowfin tuna (*Thunnus albacares*)
  4. Marine Fisheries
    - 4.1 GIS Application on capture fisheries
    - 4.2 Identification of indicators for the management of Philippine capture fisheries (with SEAFDEC)
  5. Center for Lake Resources Research (Butong, Taal, Batangas)
    - 5.1 Lake conservation and management
    - 5.2 Breeding of *Caranx ignobilis*
    - 5.3 Breeding of freshwater ornamental fishes
  6. Central Fisheries Research Center (Dagupan City)
    - 6.1 Breeding of *Molobicus SaltUno* tilapia
    - 6.2 Gene Bank for *Macrobrachium rosenbergii*
    - 6.3 Oyster culture
  7. Center for Brackishwater Research (Lala, Lanao del Norte)
    - 7.1 Culture of *Molobicus* saline tilapia
    - 7.2 *P. vannamei* culture
    - 7.3 Polyculture of fishes and clams
  8. Center for Marine Research (Guiuan, Eastern Samar)
    - 8.1 Soft-shell blue crab production
    - 8.2 Abalone culture
    - 8.3 Sea cucumber culture
    - 8.4 Pearl oyster culture

### About The Author

*Dr. Westly R. Rosario* is the Executive Director of the National Fisheries Research and Development Institute of the Philippines. He is also concurrently the Chief of BFAR's National Integrated Fisheries Technology Development Center in Dagupan City, Philippines. He can be reached at: National Fisheries Research and Development Institute, Kayumanggi Building, 940 Quezon Ave., Quezon City, Philippines