Reducing poverty and hunger by improving fisheries and aquaculture

WorldFish
CENTER

Photo by: Randall Brummett

The WorldFish Center
ANNUAL REPORT
2007/08

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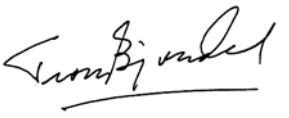
STATEMENT FROM THE BOARD OF TRUSTEES

Prof. Trond Bjorndal

The year 2007 saw progress on many of the issues we recognized as critical when the year began. In particular, service delivery to our regional offices continued to improve, along with support for their efforts to secure further investment in our work. These and other improvements are vital as we move forward with our ambitious growth plans. I believe we are positioning WorldFish well for revenue growth in the years ahead that is well above the present rate of 4%. Although core funding has been on a downward trend, the philanthropic community and traditional bilateral donors are responding favorably to the visionary messages and strong project proposals coming from our science program. We established a targeted increase in growth for 2008 of about 17%, and as of mid-year we were on track to achieve it.



Prof. Trond Bjorndal
Chairman, WorldFish Board of Trustees

Strengthening our organizational capacity and performance has continued to be a top priority, particularly since our comprehensive strategy review in 2005. The implementation of Key Performance Goals that establish strict criteria for success was very useful to help us identify areas for improvement and measure our progress. We have seen a steady increase, for example, in the rate of scientific publications among our scientists. In line with our goals of having a staff that is well balanced in gender and national diversity as well as areas of expertise, we recently expanded the number of women on our research staff. These are just a couple of examples of our continuous focus on improving our ability to deliver the outstanding work that partners and investors expect of us.

WorldFish also is subject to performance evaluation by our parent organization, the Consultative Group on International Agricultural Research. In the CGIAR's last assessment, we were rated "superior" both for our potential to perform and for our actual results.

In summary, I believe we are in a strong position from which to build. We have a clear picture of the challenges that are ahead of us as we aim to ensure that fisheries and aquaculture contribute substantially to achieving human development impacts, and we will continue working hard to make WorldFish as strong as it can be as it pursues those efforts. I look forward to seeing the fruits of these endeavors.

DIRECTOR-GENERAL'S STATEMENT

Stephen J. Hall
Director-General

Reviewing our science program and updating our plans for what we aim to accomplish in the medium term is something we do every year at WorldFish to make sure our work remains relevant and in line with our objectives. This past year I found that process to be one of the most personally satisfying activities I've been involved in since I joined WorldFish in 2004. The reason is that the Medium Term Plan 2009-2011 represents a culmination of the very thoughtful process we've been engaged in for some time to plan strategically for how we should go about our work to have the greatest impact in helping to tackle global hunger and poverty.

Stephen J. Hall
Director-General

Last year I described our vision of how we see small-scale fisheries and aquaculture making a huge difference in the quality of people's lives. We want to make small-scale fisheries more resilient and better managed so they continue delivering the many benefits poor people have come to count on, including food, income, environmental protection and long-term access to fish. We see sustainable aquaculture as having enormous potential to improve food and economic security, expand fish supply to help meet growing demand and help drive economic growth in many developing countries.

The latest Medium-Term Plan spells out very specifically how we'll work to achieve these results. In putting it together, we worked hard to further clarify our guiding vision and target our activities to make that vision a reality. We used a planning tool called road-mapping to help us ensure our science activities have the biggest possible impact. These road maps have enabled us to identify the main "Development Challenges" we face in improving small-scale fisheries and supporting the expansion of sustainable aquaculture in ways that enable them to better meet the needs of the world's poor.

The road-mapping process has given us a complete picture of the pathways that will help us reach our objectives, the actions and investments that are needed, and where our research can pay off the most. These road maps also allow us to see where we need to engage other organizations in our work, as partners and investors, so our development efforts have wide and lasting impact.

As we witness a rapid rise of food and energy prices around the world, our work has greater relevance than ever before. Our research shows just how powerfully effective fisheries and aquaculture can be in supporting more sustainable and efficient methods of food production.

It's obvious from the summary of research accomplishments described in this report that WorldFish already has an outstanding foundation in place for the next stage of our work. Thanks to the clarity and vision of our latest Medium-Term Plan, I have no doubt that several years down the road we'll be able to cite a similarly impressive record of achievements. I know it will make me proud to be able to point out numerous examples of how our work has made a real difference in improving the lives of the millions of people who depend on us.

FISH, RICE AND ENERGY: MEETING HUMAN NEEDS THROUGH INTEGRATED METHODS OF FOOD PRODUCTION

Bina Roy is a wife, mother, farmer and fisher – and secretary of the Malihat Beel committee that oversees fishing practices in her village in Bangladesh. Like millions of poor people around the world, she relies on a combination of fishing and farming to feed her family and earn income.

Since 2002 she and her neighbors have implemented a number of measures to boost local fish production. Today, fish are 20% more plentiful. Adoption of these practices in 1,200 villages of Bangladesh's lowland floodplains has yielded more than 1,200 tons of fish a year and generated nearly US$1 million.

As in most parts of Asia and Africa, fish means a lot to the people of Bangladesh because it's a good complement to the dietary staple of rice. Fish provides high-quality protein and many micronutrients essential to good health. Bangladeshis have a saying that sums it up well: "We are made of rice and fish."

Escalating food and energy prices around the world are increasing the threat of hunger and malnutrition among poor people in developing countries. Access to fish gives them an important "safety net" that must be protected.

The challenge of doing that grows tougher every day because the world's poor get their fish mainly from coastal and inland waters close to home, but most wild stocks of fish have fallen steadily in recent decades. Aquaculture will have to play a pivotal role in meeting the demand for fish. It's already the fastest-growing method of food production, providing about half of all fish consumed worldwide.

Still there's room for considerable growth, if this is done through ecologically sound and energy-efficient approaches.

One region where such a strategy could bring enormous benefits is sub-Saharan Africa. According to the World Food Program, 22 African countries are experiencing food shortages. Fish is especially scarce. This is troubling because fish is a major source of animal protein for millions of Africans, but per capita consumption of fish has been decreasing for quite some time and is now only half of what it is in the rest of the world.

Today, less than 2% of Africa's total fish supply comes from aquaculture. Projections show that if fish-farming was adopted on only one percent of the 250 million hectares in Africa identified by the U.N. Food and Agriculture Organization as suitable for aquaculture, the continent could produce 3.75 million more tons of fish per year.

Adding to the argument for such an approach is the greater efficiency of this kind of aquaculture compared with industrial fish-farming. Several fish species developed by WorldFish and its partners for low-input methods of production thrive without the need for expensive outside feeds; farm byproducts such as kitchen waste, leaves and crop residue do the trick.

Moreover, counter-intuitive as it may seem, water use in small-scale fish-farming also is quite efficient, especially when farmers learn water-management strategies to optimize recycling of pond water to irrigate crops and vegetables. WorldFish research found that smallholder farms in southern Africa where fish-farming had been integrated into traditional farming operations were 18% more productive than regular farms during periods of drought.

In the next decade, low-income countries where food deficits are a reality and fish is a major foodstuff will undoubtedly have to expand their aquaculture sectors. For many, integrating aquaculture into traditional farming systems is an effective and efficient way to increase both the food supply and the economic security of poor families.

As the world faces the huge task of feeding a growing population through more cost-effective methods, much can be learned from the experience of Bina Roy and thousands of other fishers and farmers like her in Asia and Africa. Multiplying their success is vital if the world's poor are to continue having access to the fish they count on – so they can enjoy both fish and rice!

Photo by: Randall Brummett

HIGHLIGHTS

The WorldFish Center is one of 15 international research-for-development centers supported by the Consultative Group for International Agricultural Research (CGIAR). We work in partnership with numerous organizations and research institutions to reduce poverty and hunger through fisheries and aquaculture.

All of our activities are designed to help meet the objectives of the Millennium Development Goals (MDGs), aimed at measurably improving the lives of the world's poorest people. WorldFish works to support these internationally embraced goals primarily through two avenues: 1) making small-scale fisheries more productive and resilient, and 2) supporting the adoption of sustainable aquaculture that benefits the poor. Advances in these areas can pay huge dividends in reducing hunger and poverty because fish and other aquatic organisms are a major source of food and income for poor people in developing countries. Millions more can benefit from increased investment in fisheries and sustainable aquaculture to make this sector a more powerful engine for poverty reduction.

The strong impact of WorldFish research has been demonstrated through analysis showing a high rate of return on investment. On average, every US$100 invested in WorldFish yields an annual return of $134 in benefits for those to whom our work is targeted.

WorldFish's dedication to improving livelihoods for poor families by better securing the benefits they obtain from fisheries and aquaculture is highlighted in the following achievements from the wide range of work we do in fulfilling that mission.

NEW TOOLS WILL IMPROVE PLANNING OF LOCALLY APPROPRIATE AQUACULTURE

Aquaculture has expanded rapidly in recent decades and now provides almost half of all fish consumed globally. Low-input methods of fish-farming in particular have been effective in giving millions of the world's poor a reliable new source of food and income. But the adoption of aquaculture has been patchy, and its success uneven. Now, a collaborative WorldFish project has produced decision-support tools to aid the planning of fish-farming activities for targeted areas.

In the three-year project, researchers systematically identified factors that influence the success of aquaculture in practice. These factors -- such as temperature, terrain and soil conditions, market opportunities, water availability and access to quality "seed" and feed – were integrated with GIS-based maps to show prevailing conditions and available resources in various areas. This information can be combined with additional modeling that addresses qualitative factors such as local farmers' receptiveness to new technologies. The results will help suggest what kinds of aquaculture approaches are likely to achieve optimal results at different locations. Scientists tested the applicability and utility of the approach at pilot sites in Bangladesh, Cameroon, China and Malawi. The sites were selected to represent a range of conditions and aquaculture approaches, from homestead-based fish-farming to large-scale commercial production.

Photo by: Fem Com

RICE-FISH CULTURE BOOSTS FARM PRODUCTION IN TIDAL AREAS

Diversified production can help poor farmers reduce risk and earn higher income. When successful, it leads to steadier livelihoods at the farm level, along with greater food security. Systems that combine small-scale aquaculture with rice cultivation hold considerable promise especially in Asia, where rice and fish are both important dietary staples. In a project supported by the CGIAR's Challenge Program on Water and Food, WorldFish has been working with the International Rice Research Institute (IRRI), the International Water Management Institute (IWMI) and other partners to find optimal strategies for integrated fish-rice production in areas where fresh and saline water conditions intersect.

In the three-year project, a range of model systems was tested in the southwest coast of Bangladesh and the Mekong Delta in Vietnam. The on-farm experiments focused on stocking options, water management practices and other techniques for growing high-yielding varieties of rice in association with aquatic organisms such as shrimp, freshwater prawns, fish (including GIFT-related strains of tilapia developed at WorldFish) and, in Vietnam, mud crabs. In the Mekong Delta net farm productivity increased from 21% to over 190% in studies that were developed to cater for a range of freshwater to brackish water salinities. In the Ganges Delta incorporating rice with GIFT tilapia and prawn followed by shrimp showed total farm net returns were 30 to 811% higher than farms that did not incorporate rice-fish.

PROJECT SEEKS BETTER VALUATION OF TROPICAL RIVER RESOURCES

Tropical rivers, and inland fisheries in general, provide food and a means of livelihood for millions of the world's poor. The importance of these benefits is seldom well represented in national policies, however, because of weaknesses in present valuation methods. Consequently, the need to protect river ecosystems may not be fully appreciated, especially in the face of infrastructure projects such as dams and irrigation schemes that can seriously affect water flow and fish habitats.

WorldFish researchers and their colleagues undertook a major study to help developing countries begin addressing this serious information gap. In five regional reviews, they examined the nature and use of current valuation methodologies and summarized related information on the status of tropical rivers and inland fisheries in Asia, Africa and Latin America. A synthesis report on the findings was published in 2008. Follow-up work is needed to find better ways of analyzing the value of river resources so this can be given due weight in development planning and policies. From the comprehensive information they obtained, the authors calculated that tropical fisheries production currently totals about 5.46 million tons, with an estimated value of US$5.58 billion (at gross market value); that amount is equivalent to 19% of the current value of annual fish exports from developing countries.

Photo by: Stevie Mann

SHRIMP FARMERS IN BANGLADESH LEARN BIO-SAFE PRODUCTION METHODS

Shrimp export is the second-highest foreign income earner for Bangladesh, and the country's shrimp-growing industry supports 600,000 people. But the competitiveness of Bangladesh's shrimp industry has been undermined by a virus – called white-spot syndrome virus – that contaminates local shrimp larvae. WorldFish scientists and their colleagues in Bangladesh have been working to develop effective approaches for producing screened and disease-free post-larvae shrimp that can be supplied to the country's shrimp farmers for cultivation under bio-safety standards. Under the project, a diagnostic laboratory was established to screen brood stock for the presence of viral pathogens using PCR (polymerase chain reaction) analysis. Three enterprises were formed to supply the virus-screened seed to farmers, and several hundred small-scale producers were trained in techniques to prevent pond contamination by infected shrimp. The project distributed 45 million screened post-larvae shrimp to farmers participating in the pilot program, with an additional 205 million screened specimens sold to hatchery groups. Nearly 1,400 farmers adopted practices developed under the project, resulting in the production of 660 million tons of quality shrimp.

Gender awareness training has been an important part of this project, to expand the participation of women in the hatchery businesses. Efforts are underway to privatize components of the project, and to strengthen the entire chain of operations, from hatcheries to production, as a foundation for increasing the commercial value of the country's shrimp exports. Related research and trials have been done to develop optimal production and feeding technologies for shrimp farming in Bangladesh

FRAMEWORK OFFERS GUIDANCE IN REBUILDING AFTER COASTAL DISASTERS

When an earthquake struck off the Solomon Islands in April 2007, tsunamis washed inward as far as 200 meters on some islands. The disaster killed many people and left 4,000 homeless. As reconstruction planning got underway, WorldFish played a leading role in assessing damage to the area's fisheries and recommending ways that poor coastal communities could be rebuilt to make them more resilient over the long term. This guidance was based on a framework that emerged from research by WorldFish and a coalition of partners in Indonesia's devastated Aceh province after the December 2004 tsunami in Asia. More recently, the framework also was used to guide post-disaster interventions after a cyclone hit Bangladesh in November 2007.

The rehabilitation framework stresses the need to move away from relief efforts that focus largely on replacing lost boats and fishing gear. It calls instead for building a more diversified base of livelihoods so communities won't be so severely affected in the future by dramatic changes in circumstances. In Aceh, for example, coastal residents today are creating local enterprises for cage-based production of tilapia, clams, shrimp, lobsters and even octopus, in lieu of unsustainable harvesting practices of the past that promoted overfishing. How to manage excess fishing capacity is a major policy concern for many countries of Southeast Asia. WorldFish scientists have investigated possible solutions, based on research in Cambodia, the Philippines and Thailand as well as Aceh. Their findings were published in 2008 in two major scientific journals.

Photo by: Alexander Tewfik

RESEARCH AIMED AT REVIVING DWINDLING SEA CUCUMBER STOCKS

Sea cucumbers live in coastal waters all across Asia and the Pacific. Because of their strong commercial value in Asian markets – where they're sold in dried form as "beche-de-mer" – they have been harvested so heavily in some areas that remaining stocks could have trouble breeding. One possible restocking strategy that WorldFish scientists have been testing is the introduction of cultured juveniles into the wild. Qualified support for the approach comes from a study involving a species known as "sandfish" (*Holothuria scabra*); it concluded that 7 to 20% of sandfish released at a size of 3 to 10 grams in optimum habitat could be expected to survive to market size.

Another WorldFish project is giving fishery officials in New Caledonia information needed to help ensure sustainable sea cucumber populations. The incentive is high because of the commodity's export value to the country, which totaled about US$5.3 million in 2007. In a two-year study, scientists surveyed populations of sea cucumbers (as well as giant clams and large sea snails known as trochus) at 50 lagoon and barrier reef sites of La Grande Terre, the country's largest island. The abundance of 12 locally available species was found to vary from site to site, with a few species apparently depleted and several others sparse but not critically low. The researchers concluded that some stocks of sea cucumbers in New Caledonia waters could probably be fished at modest levels, but fishing restrictions and other measures were advised to protect species that have critically low populations.

PROJECT COMPILES BEST PRACTICES IN CORAL REEF MANAGEMENT

Coral reefs are sometimes called the "Rainforest of the seas" for the astounding array of marine life they harbor. Yet many of the world's coral reefs are under severe stress, suffering the effects of disease, pollution, overfishing and the growing threat of damage from climate change. For years, those working to manage and protect coral reefs have had a critically important online resource in ReefBase, which was developed by WorldFish and a coalition of partners. Its databases and interactive GIS-based mapping function aid study, monitoring and analysis by providing comprehensive information on 10,000 reef ecosystems in 40 countries.

Now, researchers and resource managers can get helpful tips about proven strategies – or mistakes to avoid – in coral reef management in a new "Lessons Learned and Best Practices Toolkit." It offers access to technical reports, project summaries and other practical information about coral reef management in eight key areas, such as program design, community participation, policy development, monitoring approaches and capacity building. The material is available through a website (at http://gefll.reefbase.org) or an interactive CD-ROM; a related weblog and e-mail listserv lets individuals who play a role in coral reef management share ideas and experiences. The project was sponsored in part by the Global Environment Facility as part of its efforts to help developing countries conserve their marine biodiversity and meet the needs of poor people living along the coastline in coral-rich areas.

Photo by: Tim Nugent

For more information on our work in 2007, list of publications and staff, please visit our website at www.worldfishcenter.org

TOUGHER SAFETY STANDARDS URGED TO BENEFIT ASIAN FISH EXPORTERS

In line with liberalized trade policies, global trade in fish and other seafood has grown substantially in recent decades. A third of all total fish output (by value) is now traded across international borders. This has been good news for developing countries, which increased fish exports by 350% in the two decades ending in 2001. Several countries in Asia are among the world's top fish exporters. Maintaining competitiveness, however, will require compliance with food safety standards that are growing more stringent to satisfy demands by consumers, particularly in developed countries. In a recent policy brief on this issue, WorldFish scientists and their co-authors urge fish-exporting nations in Asia to act as quickly as possible to implement food safety standards all across the supply chains, in line with international guidelines (known as HACCP, for "hazard and critical control point" practices). Recommended measures include strengthening regulatory frameworks, upgrading testing facilities and creating appropriate agencies to oversee HACCP implementation and enforcement. Given the large investment required to meet the tougher standards, fish-exporting nations in Asia also need to find ways of minimizing the burden on smaller producers and processors, the study concludes.

GENETICALLY IMPROVED TILAPIA SHOWS MAJOR WEIGHT GAIN

Through a selective breeding program conducted from 1988 to 1997, WorldFish and a host of collaborators developed a strain of Nile tilapia (*Oreochromis niloticus*) with superior growth and survival traits. The aim was to help small-scale fish farmers in developing countries improve productivity and profitability. In a newly published study, WorldFish scientists determined that this so-called GIFT fish (for "genetically improved farmed tilapia") has achieved a total genetic gain in live weight of at least 64% over nine generations since the base population was established, without any deterioration in survival rate. The results were obtained by comparing progeny produced from cryopreserved spermatozoa of males born in 1991 with that of freshly collected spermatozoa from males born in 2003. GIFT and GIFT-derived strains are now being grown widely across Asia, which today produces about 80% of all farmed tilapia. As many countries of sub-Saharan Africa look to build aquaculture industries, these findings suggest that the introduction of GIFT strains could lead to significant payoffs in productivity.

Photo by: Mark Prein

In a separate study, WorldFish researchers set out to assess the economic gains a country could expect to derive from undertaking a genetic improvement program involving this species. The economic benefits were studied in relation to a number of biological, economic and operational factors over a 10-year time horizon. The authors concluded that even under the most conservative assumptions, genetic improvement programs are highly beneficial from an economic viewpoint; in the case studied, the expected benefits ranged from more than US$4 million to as much as $32 million.

TRAINING FOR WORLD BANK STAFF IN FISHERIES AND AQUACULTURE

Early in 2008, WorldFish delivered a training program on fisheries and aquaculture for the Agricultural and Rural Development Department of the World Bank. Held in Nha Trang, Vietnam, the event was an opportunity for senior World Bank staff from headquarters and regional offices to get a picture of the impact on poverty and hunger that can result from helping countries invest in fisheries and aquaculture. Joined by development partners from FAO, IFAD, and national agencies, World Bank staff not only debated investment priorities but also put them into practice. Several of the project concepts evaluated in a "clinic" setting at the training are now being prepared as investments worth over $150 million. Each year, Bank staff examine a different development sector by participating in such training programs, which are often run by CGIAR Centers.

WORLDFISH INVESTORS - 2007

African Wildlife Foundation
Asian Development Bank
Aquaculture without Frontiers
Australian Center for International Agricultural Research
Canadian International Development Agency
Conservation International
Consultative Group on International Agricultural Research
- Challenge Program on Water and Food
- Collective Action and Property Rights
- Information & Communications-Technology-Knowledge Management
- Science Council Standing Panel on Impact Assessment

Danish Royal Ministry of Foreign Affairs
Egyptian Ministry of Agriculture and Land Reclamation
European Commission
France
- Institute of Research for Development
- National Scientific Research Center

FishBase Information and Research Group, Inc
Gates Foundation
German Federal Ministry for Economic Development Cooperation
Indian Council of Agricultural Research
International Fund for Agricultural Development
Israeli Ministry of Agriculture and Rural Development
IUCN-The World Conservation Union
Japan
- Japan International Research Center for Agricultural Sciences
- Ministry of Environment
- Ministry of Foreign Affairs

Lao People's Democratic Republic Heritage House
Malaysian Agricultural Research and Development Institute
MacArthur Foundation
National Geographic Society
New Caledonia
- New Caledonia Economic Development Agency
- Southern Province of New Caledonia

New Zealand Agency for International Development
Norwegian Royal Ministry of Foreign Affairs
Philippine Department of Agriculture
Species 2000
Sri Lanka National Aquaculture Development Authority
Swedish International Development Cooperation Agency
The Force of Nature Aid Foundation
The OPEC Fund for International Development
United Kingdom Department for International Development
United Nations
- Food and Agriculture Organization
- United Nations Development Program
- United Nations Environment Program

United States of America
- National Oceanic and Atmospheric Administration
- United States of America Agency for International Development

Western Pacific Regional Fishery Management Council
World Bank
Worldwide Fund for Nature

STATEMENT OF FINANCIAL POSITION

December 31, 2007
(US Dollar '000)

	As at 31 Dec 2007	As at 31 Dec 2006
ASSETS		
CURRENT ASSETS		
Cash and cash equivalents	9,601	9,627
Investments	325	291
Accounts receivable		
Donors	2,171	2,357
Employees	123	164
Other CGIAR Centers	3	4
Others	887	1,219
Other current assets	160	96
Total current assets	13,270	13,758
NON-CURRENT ASSETS		
Property and equipment, net	362	486
Other assets	182	151
TOTAL ASSETS	13,814	14,395
LIABILITIES AND NET ASSETS		
CURRENT LIABILITIES		
Accounts payable		
Donors	2,623	2,653
Other CGIAR Centers	313	7
Others	1,345	1,779
Accruals and provisions	1,038	822
Total current liabilities	5,319	5,261
NON-CURRENT LIABILITIES		
Accounts payable - Employees	813	552
TOTAL LIABILITIES	6,132	5,813
UNRESTRICTED NET ASSETS		
Designated	3,046	2,455
Undesignated	4,636	6,127
TOTAL NET ASSETS	7,682	8,582
TOTAL LIABILITIES AND NET ASSETS	13,814	14,395

STATEMENT OF ACTIVITIES

For the Year Ended December 31, 2007
(US Dollar '000)

	For the Years Ended December 31 2007	2006
REVENUES, GAINS AND OTHER SUPPORT		
Grants	15,171	14,817
Other revenues	1,222	405
Total revenues, gains and other support	16,393	15,222
EXPENSES AND LOSSES		
Program related expenses	15,189	13,927
Management and general expenses	2,871	2,698
Sub total expenses and losses	18,060	16,625
Indirect cost recovery	(767)	(1,085)
Total expenses and losses	17,293	15,540
NET DEFICIT	(900)	(318)
Net assets beginning of year	8,582	8,900
Net assets end of year	7,682	8,582

BOARD OF TRUSTEES - 2007

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