



The WorldFish Center  
**MEDIUM TERM PLAN**  
**2008 - 2010**

# INTRODUCTION

The Medium-Term Plan for 2008-2010 describes the WorldFish Center's research plans for the next three years. It builds on organizational changes and programmatic directions that have been underway since a comprehensive strategy review in 2005. These developments are designed to sharpen the focus of the Center's work, strengthen partnerships, and increase our impact.

The MTP focuses the Center's work on two globally important issues:

1. Managing small-scale fisheries to improve resilience and strengthen their contribution to rural development.
2. Expanding sustainable aquaculture.

These research areas will remain the chief focus of the Center's work for the next 5-10 years.

To make small-scale fisheries resilient and expand aquaculture sustainably, action is required across the entire research-to-development spectrum. The MTP therefore identifies not only those areas of work where WorldFish will lead, but also the partnerships needed at multiple levels to achieve development impact.

Using impact pathway analysis for both small-scale fisheries and sustainable aquaculture, the Center has assessed:

- problems and issues that must be addressed to increase the benefits of small-scale fisheries and sustainable aquaculture for the world's poor
- pathways of action and logical points for intervention
- different roles that various institutions can play, based on their respective capabilities and strengths
- research that is needed to support various interventions

This process has identified the research that the Center can best provide by virtue of its particular expertise and resources. These activities chiefly involve the generation, synthesis and sharing of knowledge, while further strengthening and expanding partnerships with national fisheries and agriculture institutes, national research systems, advanced research institutes, development and funding agencies, regional and national NGOs, producer groups and others, to improve technology dissemination.

Separate analyses have been carried out for small-scale fisheries and sustainable aquaculture because they entail different problems, challenges and intervention strategies. The research focus includes problems specific to the two sub-sectors as well as relevant global and cross-over issues, such as trade trends and policies, impacts of climate change, the generation of new kinds of livelihoods and the need for better management approaches.

## GEOGRAPHICAL AREAS OF FOCUS

WorldFish concentrates its research activities in three regions: Africa, where the need for assistance is the greatest; Asia, where there is the largest number of people dependent on aquaculture and small-scale fisheries, and the South Pacific, where island nations have high rates of poverty and a heavy dependence on coastal-based livelihoods.

Within this regional framework the Center is seeking to engage comprehensively in fisheries and aquaculture research and management in countries where a concerted program of research can provide lessons with wider application in similar economic, social, cultural and political contexts. In this way research programmes seek both significant local impact and wider global value through sharing and synthesis of knowledge. Activities will not proceed at the same pace in all countries given the different conditions in each, nor will each require the same level of investment. During the period 2008-2010 particular attention will be given to activities in Bangladesh, Cambodia, Democratic Republic of the Congo, Egypt, Malawi, Mozambique and Zambia. In addition, through regional level research projects sectorally focused activities will continue to be developed and undertaken in other countries. The balance between work in focal countries and that pursued through these regional research projects will be kept under regular review.

Complementing this approach the Center is developing joint research programmes with both China and India, which have emerged as global leaders in aquaculture, to address issues of regional and global significance. In China this is focusing on the development of improved fish strains for farm production and increasing the sustainability and socioeconomic benefits of aquaculture. In India, joint research is focusing on the development of improved strains.

# RESEARCH PRIORITIES

## A. SMALL-SCALE FISHERIES

One billion people rely on fish as their primary protein source and several hundred million are dependent on fish as their main source of income. Fish are also an important trade commodity; roughly 33% of global fish production by value was traded across international borders in 2001. Building upon and enhancing these benefits, small-scale fisheries offer a means to increase income and employment and reduce hunger through the sustainable supply of fish and fish products. Unfortunately, despite the potential of these fisheries, many regions and countries fail to realize the benefits that could be harnessed. In turn, because small scale fisheries are not seen as an important contributor to local, national and regional economies, they receive little attention from national development programs and are vulnerable to overfishing and destruction as a result of environmental degradation and change. In recognition of these challenges WorldFish is working to make small-scale fisheries more resilient in the face of social, economic and environmental pressures and to improve the livelihoods and nutrition of the people who depend upon them. To achieve this the Center's research on SSF will have four areas of focus, each of which is summarized below:

### A.1 INCREASING INTEGRATION OF SMALL-SCALE FISHERIES INTO NATIONAL AND REGIONAL DEVELOPMENT POLICY

Supporting development objectives by improving benefits from small-scale fisheries requires more complete knowledge of how they increase food security, generate livelihoods and deliver economic returns. Better methods of valuation will aid analysis of trade-offs in different development options. Projected outputs in this area of research for 2008-2010 include:

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Information and tools to improve representation of small-scale fisheries in national and regional policies

- studies of regional fish trade in targeted areas to identify ways poor people can increase market access and income
- valuation methods for inland small-scale fisheries
- review of fisheries policies to identify needed changes
- analysis of how river-based fisheries contribute to rural and urban livelihoods
- analysis of how better marketing and fish processing affects income and livelihoods

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Information and tools on the relation of fish and water productivity to food security and economic development

- studies of water productivity in relation to river and floodplain fisheries
- analysis of social, economic and ecological trade-offs in water and wetlands use at local and basin scales
- participatory decision-making tools that integrate water, agriculture and fisheries issues
- assessment tools for ecosystem-wide valuation of fishery goods and services
- tools for determining water requirements of river fisheries

### A.2 INTEGRATING ASSESSMENT AND ADVISORY SYSTEMS FOR SMALL-SCALE FISHERIES MANAGEMENT

Major social, economic and environmental changes can have a destabilizing influence on small-scale fisheries, undermining their ability to deliver benefits to local communities. Policy-makers and stakeholders need information and decision-making tools to guide adaptive responses to new circumstances and opportunities arising from forces such as climate change, declines in fish catches, globalization of trade and the spread of HIV/AIDS. Projected outputs in this research area for 2008-2010 include:

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Improved methods for integrated assessment of small-scale fisheries

- Indicators for assessing socio-ecological sustainability of small-scale fisheries
- methods for quick assessment of fish consumption and potential yields
- improved FishBase and ReefBase tools for fisheries and coral reef management
- geospatial analysis methods for aquatic resource assessment
- decision-making tools that clarify trade-offs in development options
- tools to assess risks of introducing species, such as those imported for aquarium trade
- typology of small-scale fisheries to guide institutional and ecological management interventions

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Information and policy options to lessen vulnerabilities of communities dependent on small-scale fisheries

- policies and guidelines for rehabilitation of tsunami-affected fisheries in Asia
- identification of small-scale fisheries investment options in sub-Saharan Africa to reduce effects of HIV/AIDS
- tools for managing fisheries in relation to environmental protection and climate change impacts
- analysis of environmental and market change effects on fish production, consumption and income
- analysis of coral bleaching effects on reef fisheries
- economic vulnerability indices and metrics for comparative analyses of fisheries
- local-scale analysis of how climate change and large infrastructure projects affect fisheries and dependent communities

### A.3 IMPROVING MANAGEMENT AND GOVERNANCE OF SMALL-SCALE FISHERIES

New management approaches aimed at making small-scale fisheries in developing countries more resilient to setbacks from social, economic and environmental changes have to be developed mainly on a case-by-case basis, through “learning by doing.” But the resulting lessons from this and other experience in natural resource management can be synthesized and adapted for application in other settings and at larger scales. Projected outputs of research in this area for 2008-2010 include:

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Small-scale fisheries management lessons to guide policies and implement effective approaches more widely

- participatory methods to develop sustainability indicators
- management options for better governance, incorporating stakeholder assessment
- testing of global database on ecological, social and economic attributes of small-scale fisheries
- participatory trans-boundary management plans for targeted river systems
- identification of measures for restoration of indigenous stock
- analysis of effectiveness of marine-protected areas

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Testing of management interventions for a range of socio-ecological settings in targeted countries

- options for enhancing economic opportunities for small-scale fishers
- assessment of livelihood diversification aimed at reducing pressure on wild fisheries
- co-management approaches that improve the distribution of fisheries benefits
- assessment of management approaches for fisheries and wetlands
- assessment of sanctuaries and restocking as measures to improve fisheries
- incorporation of guidelines for adaptive management of small-scale fisheries into national and regional fisheries policies

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Improved analysis of rights and livelihood interests of fishing households in non-sectoral development policy

- analysis and advice on incorporating inland fisheries into national and regional policies for greater food security in targeted countries
- review of human rights in relation to management of small-scale fisheries
- analysis of how benefits from improved floodplain fisheries are distributed
- assessment of policy-based decisions for upstream development of water resources

### A.4 BUILDING INSTITUTIONAL CAPACITY FOR ADAPTIVE LEARNING AMONG SMALL-SCALE FISHERS

Better information and analysis alone aren't sufficient to change policies, reorient priorities and improve decision-making aimed at strengthening small-scale fisheries. Previous research suggests institutional support is a strong determinant of success, by offering knowledge and technical assistance, guidance in implementing new approaches to management and governance, and increased communication and advocacy. Projected outputs in this area of research for 2008-2010 include:

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Improving national capacity to capitalize on indigenous skills for adaptation

- assessment of institutional coping mechanisms, reciprocal access arrangements and local knowledge on long-term changes and fluctuations
- training for fisheries agency staff in targeted countries
- international symposium on small-scale fisheries
- curricula and training materials on water productivity and integrated assessment and management of fisheries

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Strengthening policy and advisory bodies in targeted countries and regions

- Increased engagement of regional networks and advisory bodies in fisheries management
- support to civil society groups for stronger involvement in planning approaches to resource management
- joint initiatives to promote the implementation of country-specific policies

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Formalization of learning networks and processes to quantify impacts

- workshop to analyze impact pathways for basin-wide fisheries interventions
- assessment of effectiveness of community-based fisheries management approaches in reducing fishing pressures in coastal areas
- scaling up and out of basin-wide interventions identified as effective

## B. SUSTAINABLE AQUACULTURE

While many wild fisheries are thought to be at or near their productive capacity, aquaculture production – now increasing by 6.6 percent a year – is expected to continue growing. Analysis suggests that aquaculture is already producing more than half of all the fish consumed worldwide. Technological advances have been a dominant driver in the aquaculture sector, but rapid expansion and international trade raises major concerns about environmental and social impacts that need to be addressed when planning for further growth.



Photo by: Dominyk Lever

*Cambodia's inland fishery is the most intensive in the world and the source of 65-75% of animal protein in the rural population's diet.*

WorldFish's work supports the growth of aquaculture through sustainable methods of production that deliver a number of social, economic and environmental benefits simultaneously – by increasing fish production to help meet rising demand, improving family income and nutrition, stimulating rural economic growth and easing pressure on wild-fish stocks and other aquatic resources. To achieve this the Center's research on sustainable aquaculture has four areas of focus, each of which is summarized below:

## B.1 IMPROVING THE TECHNOLOGICAL FOUNDATION FOR SUSTAINABLE AQUACULTURE

To expand small-scale aquaculture as an engine for poverty reduction and rural development, the methods must be appropriate to local conditions and should not require scarce or costly inputs. WorldFish's simple, efficient and environmentally benign fish-farming methods are being integrated into a range of agro-ecological systems, such as rice culture in Asia and subsistence farming in Africa, leading to higher farm productivity, profitability and resilience, and lower environmental costs. Adoption of these technologies has been supported by the development of improved strains of native fish for use in small-scale freshwater aquaculture, though much more remains to be learned about feeding systems in pond cultivation to increase economic returns. Projected outputs in this area of research for 2008-2010 include:

Technologies to increase water productivity and use of on-farm wastes and to foster livelihoods resilient to external shocks

- methodology for water productivity measures in relation to aquaculture
- tools for assessment of risk associated with dissemination of improved fish "seed"
- testing of tools for assessment of on-farm waste recycling
- development of technologies that improve resilience in relation to impacts of climate change

Strengthening policy and advisory technologies to produce quality "seed" for key aquaculture species and conserve genetic resources in anticipation of future needs in targeted countries and regions

- support for development of breeding programs for genetic improvement of fish in targeted Asian and African countries
- development of improved carp strains in China, along with conservation strategies for economically important carp and guidelines for application in other countries
- methodology for genetic improvement of giant freshwater prawn in India
- creation of partnerships for genetic improvement of African catfish

Methodologies for local production of aqua-feeds in Asia and Africa

- impact study of how aquaculture industry's demand for fish feed affects availability of affordable fish for human consumption in Vietnam
- methodologies for local production of aqua-feeds in Malaysia
- study of human-nutrition impacts from use of plant-based aqua-feeds

## B.2 EXPANDING MARKET ACCESS FOR INPUTS AND OUTPUTS

If sustainable small-scale aquaculture is to gain increased favor from investors and small farmers, it must be both productive and profitable. This requires the presence of markets for products that people want and can afford. At the same time, there must be reliable markets for the resources that small-scale fish producers need to operate successfully and grow their businesses, including credit, water supply, quality “seed” and fish feed. Projected outputs in this area of research for 2008-2010 include:

Analysis and development of markets	<ul style="list-style-type: none"><li>determination of value-chain structure and competitiveness of small-scale farmers and SMEs in Egypt</li><li>incorporation of information about input and output markets into “recommendation domains” decision-support tool</li><li>options to increase women’s access to higher-value activities in cultivation of shrimp in Bangladesh and catfish in Cameroon</li><li>more knowledge of costs required to support aquaculture development in Cameroon</li><li>international markets for small-scale aquaculture producers in Bangladesh</li></ul>
Description of enabling market environments that support aquaculture investment to benefit the poor	<ul style="list-style-type: none"><li>determination of economic returns on investment in development of genetically improved “seed”</li><li>mechanisms to link marginalized aquaculture producers in Bangladesh with markets for inputs and outputs and with guidance on business development</li><li>use of market preferences to guide aquaculture production and processing in Bangladesh</li></ul>
Better knowledge of public-private partnership roles in tackling constraints to aquaculture development	<ul style="list-style-type: none"><li>policy brief on use of public-private partnerships in aquaculture development</li><li>assessment of small-scale shrimp producers’ participation in quality assurance programs in Bangladesh</li><li>development of a public-private partnership to increase provision of fish feed or “seed”</li></ul>

## B.3 DEVELOPING IMPROVED POLICY ENVIRONMENTS

Even when people have the skills and basic resources needed to engage in small-scale fish production, their success may be limited without policies that support or stimulate this activity. Aquaculture development must also be integrated with other economic activities and with conservation objectives at watershed and coastal-zone levels, and must consider possible risks associated with intensified fish production, such as loss of biodiversity in translocation of species and genetic improvement of fish strains. Projected outputs in this area of research for 2008-2010 include:

Identification of development constraints, potential and risks at national and regional levels	<ul style="list-style-type: none"><li>methodology for planning national aquaculture development</li><li>dissemination of improved strains of fish “seed” in Malawi</li><li>identification of barriers to adoption of cage aquaculture by the poor in Bangladesh</li><li>determination of how poverty affects adoption of technologies for marine fish hatcheries in Philippines</li></ul>
Policy and institutional contexts to facilitate sustainable aquaculture development and communicate results at national, regional and international policy levels	<ul style="list-style-type: none"><li>better understanding of institutional role in the dissemination of improved fish strains and “seed”</li><li>community-based approaches to aquaculture in common-property areas</li><li>mechanisms for community management of rice-fish culture in seasonal floodplains of targeted countries</li></ul>
Integrated watershed and coastal zone management approaches to aquaculture development for key policy arenas	<ul style="list-style-type: none"><li>use of “recommendation domains” tool to identify constraints to aquaculture</li><li>assessment of RESTORE software as tool for on-farm water use</li><li>use of integrated watershed and coastal zone management approaches to aquaculture development in Southeast Asia</li><li>knowledge of how cage aquaculture affects water bodies in Africa</li></ul>

## B.4 INCREASING INSTITUTIONAL AND HUMAN CAPACITY

In fostering the development of sustainable aquaculture as a strategy for poverty reduction and greater food security, the public and private sectors have complementary roles to play. Cooperative planning and implementation is needed to ensure that measures are tailored to local conditions and changing circumstances. Capacity-building must include



Photo by: Stevie Mann

*FAO projections show that if just 5% of the area suitable for aquaculture in Africa were put to use, enough extra fish could be produced to meet the needs of the growing population to 2020, at current per capita consumption rates.*

initiatives that provide a strong foundation for training and technical support, linkages between producers and markets, and avenues for dissemination and ongoing development. Projected outputs in this area of research for 2008-2010 include:

Better understanding of public- and private-sector roles in promoting “best technologies”

- plan for aquaculture development in at least one country
- clarification of roles in “seed” provision
- understanding of national and regional institutions’ roles in developing wetland-based aquaculture in China

Advanced-research partnerships to increase institutional and individual capacity

- website to support INGA members
- new joint research by NAREs and ARIs in Asia and Africa

Networks for research and training and links between regions and countries

- International Symposium on Tilapias in Aquaculture
- new networks for joint research on aquaculture in Africa

Curricula and courses on aquaculture and on management of water and other environmental resources

- training of Asian scientists in genetic improvement of aquatic animals
- pilot course on water management for inland fisheries and aquaculture
- curriculum and training materials on water productivity

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