



# Priority technologies and national strategies to develop and manage fisheries and aquaculture

## RECOMMENDATIONS

- Develop appropriate aquaculture technologies by improving productivity through investment in research, extension and technical support.
- Rationalize capture fisheries by reducing capacity in inshore fisheries, establishing community organizations to manage inland fisheries, and promoting the sustainable expansion of offshore fisheries.
- Enhance the fish supply and value chain by making high-quality fish seed and financial services available to poor farmers and fishers, building up postharvest processing enterprises to higher quality standards, and reforming tariff and price policies.
- Build the necessary institutions to expand extension and research; rationalize policies on land and water use; organize poor fishers, farmers and processors; and engender regional collaboration in natural resource management and trade.

## INTRODUCTION

Fish is a major source of nutrition for the poor in Asia. Demand for fish will continue to grow in domestic and foreign markets as populations and per capita incomes rise. If rising demand is not met by equally fast supply growth, shortages of fish will cause lower fish consumption, especially among the poor, and threaten food security. Supply and demand projections confirm that per capita consumption of fish may fall over the next 15 years in Bangladesh, Philippines and other markets.

To meet growing needs with limited resources, national governments must, in collaboration with their development partners, identify priority technologies for improving fishery

productivity and develop national strategies to deploy these technologies to maximum effect. On these efforts hinge the future of the poor who depend on fish. To catalyze the process, The WorldFish Center led a multicountry study that has, for the first time, identified needs and responses through stakeholder analysis and consultation, backed up with systematic, quantitative analysis of the prospects for fish supply, demand and trade. Stakeholders in the nine participating countries — Bangladesh, China, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam — and their development partners can consider the findings and strategies for each country as planks of a defensible platform for change.

## METHODOLOGY

The methodology for ranking and selecting technologies was developed in a workshop where research partners from all the nine participating countries agreed to adopt five criteria for prioritizing pro-poor aquaculture and fishing technologies. These criteria and their corresponding indicators were applied using a systematic procedure. Each criterion was assigned a weight according to its relevance in a particular country, and scores were obtained for each criterion indicator. The technology score was computed as a weighted average of indicator and criterion scores, and then used to rank the technologies.

### THE PRIORITIZING CRITERIA ARE AS FOLLOWS:

- **Production Efficiency.** Applying technology generally increases production yield and returns. New fishing gear technology should increase the catch made with the same effort, and postharvest technology should reduce losses during processing. The adopted technology should increase profitability and post adequate rates of return for any additional investments.
- **Food and Nutrition Security.** This is defined as all household groups having access to adequate food, including fish. An important goal is to provide cheap protein to a growing population. The desired technology should make fish and fisheries products more widely available and affordable for the poor. The corresponding indicators are the retail price and consumption share (by value) of fish species produced under the given technology.
- **Employment Generation.** In designing aquaculture and fisheries technologies, an important consideration is the generation of employment opportunities for the rural poor. Inefficient labor markets keep the poor chronically underemployed, and self-employment is stymied by lack of capital. Women suffer discrimination despite being the breadwinners in many poor communities and great assets to the fishery industry, especially in seafood processing. The corresponding indicators for this criterion are labor factor shares in the total cost, the number of

jobs generated per unit, and women's employment as a percentage of the total labor requirement.

- **Environmental Impact.** The effect of technologies on the environment must be taken into account when prioritizing them. Technologies must be environmentally friendly for the industry to be sustainable in the long run. Aquaculture must be incorporated into planning at appropriate geographical scales – watershed and coastal zone – and have adequate provision for efficient waste treatment before wastewater is discharged into the surrounding crop fields or river system. Use of alien aquaculture species should be avoided and translocation of such species must follow both national legislation and emerging global guidance in order to protect aquatic biodiversity. In capture fisheries, new gear should not cause biomass destruction or unduly stress aquatic ecosystems. Likewise, processing technologies should not generate excessive or toxic discharges. The indicators under this criterion are the degree of waste discharges, risk of contagious diseases, and impact of technology on biodiversity.
- **Acceptability by the Poor.** A fishery technology must gain wide acceptance and support from the general community to succeed. Inequitable access to capital means the poor typically cannot afford technologies requiring costly investment. To ease adoption, technology should be simple and compatible with local natural resource endowments. The indicators under this criterion are the technology's investment requirements and simplicity or ease of adoption; the natural resource endowment of the area; and the social, cultural and legal acceptability of the technology as perceived by poor fish farmers, fishers and processors.

In each of the nine participating countries, participants in national workshops were presented with research findings that included profiles of fishing and aquaculture technologies, policy and institutional perspectives, socioeconomic profiles of fisher and fish-farmer communities, and projections of fish demand-supply. The workshops then devised national action plans. The value of each plan, aside from its actual content, is its initiation of a national constituency and its provision of a blueprint for effective planning and policymaking.

## POLICY RECOMMENDATION 1: Develop appropriate aquaculture technologies

Growth in the supply of fish from aquaculture is sought through improving productivity, to be achieved through research investment, and — to close the efficiency gaps that plague small-scale, low-intensity fish farms — extension services and technical support. To prevent unacceptable consumption of environmental services, with consequences for the poor who depend on them most, and to ensure sustainability, aquaculture must be mainstreamed into watershed and coastal zone planning. Delivering the benefits of aquaculture growth to the poor requires prioritizing commodities consumed by them and technologies adopted by enterprises operated by or employing the poor. At the same time, these commodities should have a bright market outlook to ensure economic viability and return on investment. Carp aquaculture and systems of integrated aquaculture and agriculture rate highly in both regards. Depending on the country, other species may also be on the list of priorities.

Maintaining sustainability and minimizing environmental damage from fisheries growth is a key concern. On this score, low-value freshwater aquaculture rates well relative to other capture and culture systems. While brackish-water and marine aquaculture systems offer high economic returns, particularly in foreign exchange earnings, they pose significant environmental challenges and, as currently practiced, are beyond the reach of many of the poor, who can rarely afford the investment required. In most countries, these systems are therefore rated beneath low-value aquaculture as pro-poor and sustainable technologies. They nevertheless have their place in development strategies, and participating countries strive to reorganize them to encourage greater participation by small entrepreneurs, poor rural workers and organizations of poor fish farmers.

## POLICY RECOMMENDATION 2: Rationalize capture fisheries

Offshore capture fisheries are the only ones targeted for significant increases in fishing effort, investment and production. This reflects the expectation that the poor will benefit through jobs on offshore vessels and in linked

activities onshore, such as handling fish at landing sites and in processing. Inshore, or coastal, capture fisheries require capacity and employment reduction with better resource management and conservation. Aquaculture, processing and tourism can absorb some exiting fishers, but many will find their best options outside of fisheries altogether and will need micro-financial services, training programs and other support to successfully change careers.

For the remaining fishers, stronger and more effective management measures are required. Management options vary from decentralization and co-management to centralized, command-and-control administration, but the bottom line is to improve the formulation and enforcement of fishing rules. Promoting the use of such small-scale gear as gill nets and hook-and-line tackle benefits poor fishers.

Inland fisheries are important for their significant contribution to the subsistence and livelihoods of the rural poor. Establishing community organizations for managing common areas, as well as investments in appropriate systems to enhance and enrich stocks, are promising means of delivering benefits to the poor, particularly in countries with large inland fisheries, reservoir areas and seasonally flooded lands.

## POLICY RECOMMENDATION 3: Enhance the fish supply and value chain

Fish production exists in the wider economic context of a supply and value chain beginning with input supply and extending through postharvest services, processing and marketing. As constraints to growth lie at both ends of this chain, focusing only on fish production would likely yield low or even negative returns on investment. On the input side, a major constraint is the limited availability of high-quality fish seed, which calls for hatchery and broodstock programs. The lack of affordable credit for poor farmers and fishers warrants the establishment of credit schemes and other microfinancial services, such as savings and insurance. At the other end of the chain, traditional postharvest practices are wasteful and result in finished products of poor quality. Investment is needed in postharvest facilities, training fishers and processors, and building up processing enterprises to meet higher quality standards. Inefficiencies and limited competition in marketing need to be addressed.

Price policies, particularly on tariffs for imports, may require reconsideration. Tariff reforms may harm some fish subsectors but be beneficial on the whole to food security and sector growth.

## POLICY RECOMMENDATION 4: Build the necessary institutions

Government agencies are advised to improve coordination, policy consistency and the quality of human resources, especially in research and extension services. Cooperation across agencies is critical to addressing the natural resource aspects of capture and culture fisheries, which require rationalized policies on land and water use. Organizing poor fishers, farmers and processors is the preferred way to address global trade and technological developments that tend to favor large operations. Greater regional collaboration, particularly regarding trade negotiation, can counter the arbitrary imposition of non-tariff barriers and protectionist measures in developed countries, as well as harmonize procedures and standards in South-South and North-South trade.

## CONCLUSION: From capture fisheries to aquaculture

All nine participating countries recognize that capture fisheries have reached or are approaching their production limits. Significant expansion in production to meet growing demand and widen livelihood opportunities can be sought only in aquaculture, but this can only be achieved through mainstreaming aquaculture into watershed and coastal zone plans. For capture fisheries, especially in marine inshore areas, the emphasis is on sustaining the productivity of natural stocks through prudent management.

The WorldFish Center is a leader and innovator in developing and refining aquaculture technologies, first in South and Southeast Asia and the Pacific, and increasingly in Sub-Saharan Africa. WorldFish combines its expertise in aquaculture with continuing research on capture fisheries — offshore, inshore and inland — to help stakeholders benefit from an optimal balance of aquaculture and capture fisheries.

WorldFish policy briefs present current issues on fisheries and aquaculture with a course for action outlined. These briefs serve as an impetus for action and update of WorldFish research.

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