

# The future for fish in the food and livelihoods of the poor in Asia

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Asia is the world's leading fish producer. It accounts for over 63 percent of total fish production, and as much as 90 percent of all aquaculture output. Low value fisheries and aquaculture, which contribute significantly to the livelihoods of poor households, make up an important part of this production. Fish is, furthermore, an important part of Asian diets. In Bangladesh, Indonesia and the Philippines it comprises 50 percent of animal protein intake, while in Thailand and Vietnam its share is 40 percent. It is the major—and often the only—source of animal protein for the poor.

With rising population and demand, expansion of supplies to maintain food security has emerged as a priority concern for developing countries in Asia. However, looming on the horizon are threats to fish supplies and fishery livelihoods such as resource degradation, weak public support and investment, and worsening inequities in global trade. Key questions emerging from this scenario are: given existing trends in supply and demand, what are the prospects for the availability of fish in the future? Is there room for growth in fisheries production, in particular, aquaculture? Can the expansion of trade be sustained? What are the available options for meeting the rising demand and improving livelihoods from fish production? From this set of options, what are the appropriate strategies for increasing and sustaining benefits to poor households from fisheries and aquaculture?

To address these questions, the WorldFish Center and national research partners (both in government and the academic community) have engaged in a project

on “Fish Supply and Demand in Asia”. The project, supported by the Asian Development Bank, was initiated in 2000 following a request from a number of Asian countries (Bangladesh, China, India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand and Vietnam). These nine countries are active players in global fish markets; they account for over half of all fish production and consumption; furthermore, fish production has been increasing in these countries by double the global average since the 1990s. Fish exports from these countries have also expanded steadily, by 3.6 percent on average each year in the decade; for some growth has been very rapid—exports from China have exploded by more than 15 percent per year on average over this period. Due for completion by end-2004, the project is already emerging as a landmark study for the development of the fisheries and aquaculture sector, both regionally and globally.

The project is divided into five components. The first component profiles key technologies in aquaculture and fisheries. This profile identifies options for fish production as well as priority technologies and production practices for delivering benefits to the poor and to the environment. The second component analyzes policies, the institutional environment and the support-services system, to assess policy options for the development of fisheries and aquaculture. The third component draws a socioeconomic profile of major stakeholders in fisheries and aquaculture, covering producers, consumers and the marketing system. The fourth component analyzes projections for fish supply and demand in the nine Asian countries using

the AsiaFish model, a multi-product disaggregated model of the fish sector especially constructed for this project. The fifth component is to formulate National Action Plans based on the findings and recommendations of the study, for integration into the regular plans, policies and work programs of the participating countries.

The links between the research components of the project may be traced in Figure 1. Supply (for domestic use and for export) and demand (from domestic sources and for imports) interact in fish markets, which results in a price and quantity at which supply and demand are balanced. On one side, fish supply is determined according to the biological environment, the technology used, the policy and institutional environment, and the producer's profile. Likewise, the demand side is influenced by policy and the profile of consumers. Changes in any of these factors result in changes in supply, demand, trade and prices. Each of these factors is covered in the research components, providing a comprehensive analysis of strategies and options for the development of the fish sector.

Central to the analysis is the AsiaFish model, which is composed of country-specific fish-sector models designed for highly disaggregated analysis of fish types, i.e., at a level typically available in national fish sector statistics. Common fish types such as shrimp, tilapia and the carps, are reflected in the model, with 15 being the maximum number of fish types (found in the ‘Indonesia’ model). The model incorporates characteristics of production and consumption that set fish apart from other types of commodities.

It takes an approach, novel in food sector modeling, of incorporating imports and exports in terms of product differentiation within total domestic demand and supply, respectively (the “Armington approach”). Domestic markets can also be differentiated by region (e.g., urban-rural, urban-rural-central). The response parameters of the model are based on large-scale survey data on the demand side, combined with detailed cross-section and time series data on the supply side. The AsiaFish model can be used to evaluate the effect of rising population and income, technical progress, and changes in policy. Projections can be made for fish production in capture fisheries and aquaculture (by source, i.e., freshwater vs. marine or brackish); consumption of fish types by region; exports and import by fish types; as well as producer prices and retail prices by fish type.

The findings from the technology profiling identified priority technologies based on criteria of equity, efficiency and sustainability. These are: the aquaculture of low-value species (carps, tilapia, milkfish, etc.); seed production of low-value species (tilapia, milkfish); community-based fish culture in flood plains; and small-scale fisheries (especially those using targeted gears, such as hook-and-line or gill-net). Polyculture is the preferred system for low-value aquaculture, though in some countries monoculture of tilapia or carp (e.g., in the Philippines or Indonesia) may be pro-poor. Further expansion of fish culture and culture-based fisheries is strongly indicated for farming areas and inland waters, including integrated aquaculture-agriculture (e.g., rice–fish) systems.

Meanwhile the income profiles of both fishers and fish farmers confirm the pervasiveness of poverty in these sectors. The poorest households tend to be engaged in inland fishing though even among marine fishers and freshwater fish farmers there is a wide variation in household incomes, with the lower end landing among the poorest of the poor. In fish farming there is evidence of

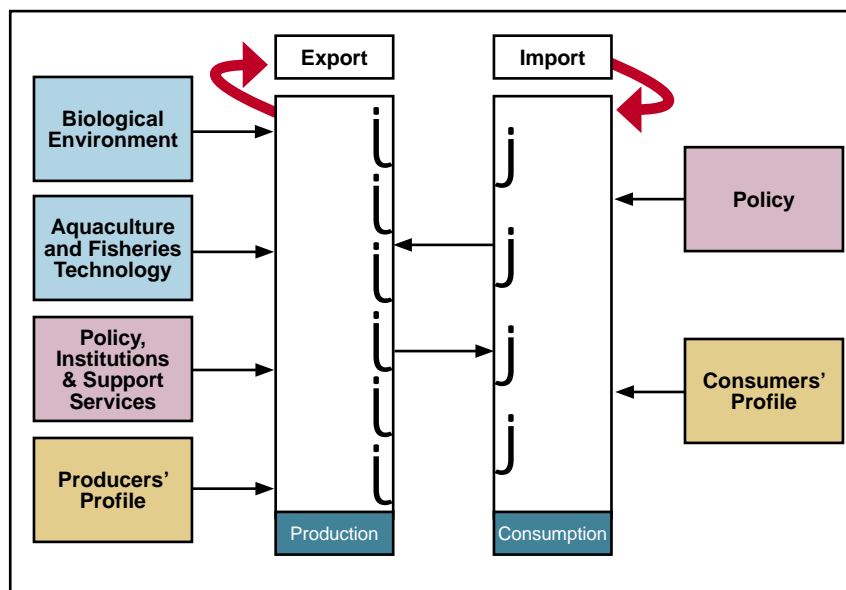


Figure 1. The 'Fish Supply and Demand' study.

considerable inefficiency in extensive and semi-intensive farms. Farmers working on intensive systems are generally more efficient. For poor fish farmers, a more appropriate system appears to be semi-intensive polyculture (or even monoculture in some areas). The twin approaches of developing and diffusing technology, along with the necessary extension work to make more efficient use of technology and resources at the farm level, form the elements of a balanced process of aquaculture development. Extension and education programs to reduce management inefficiency are best targeted to poorer farmers who tend to fall under extensive to semi-intensive systems. Meanwhile technology development and adoption programs are also needed to reach better-off farmers, who tend to culture fish under more intensive systems, as well as to increase overall aquaculture productivity in the long run.

Fish consumption analysis also confirms the high dependence of the poor on fish. In the Philippines, India, and Vietnam there is an unmistakable rise in the percentage of fish in animal protein intake as household income drops; the pattern is less evident but still present in Bangladesh. Examinations of demand response, stated

in terms of “elasticities” (a measure of the strength of the response to price and income changes) find the following: the disaggregation of “fish” into its various types matters; price and income elasticities vary for different types of fish and across income classes; demand is price elastic for most fish categories, but is less elastic for low value species like carp; income elasticities (even for the rich) are positive and quite high. It is likely, therefore, that when per capita income increases, the demand for fish in Asia will increase substantially, but the species mix will change.

The AsiaFish model generates a number of projections on production, consumption and trade from the current period to 2020. Highlights of the analysis include the following:

- All countries are likely to produce more fish between 2005 and 2020, but the rate of increase will slow down. Gains may range from a low of just 0.2 percent annually in the Philippines to 3.5 percent in Sri Lanka.
- The gains will continue to be dominated by aquaculture with China, Malaysia and Thailand likely to experience the largest increases in output.

- With few exceptions, fish imports and exports are likely to increase. China will likely be the dominant exporter among the nine countries in 2020, accounting for about 52 percent of total exports, while Southeast Asia's share is likely to decline. However, market access restrictions in fish trade, such as the imposition of food safety standards, may noticeably affect exports. Secondary information suggests that the negative impact will be more severe for poor fishers, fish farmers, and processors (particularly those still working with traditional technologies).
- Trends in capture fisheries (usually zero growth or modest declines) will not unduly endanger overall fish supplies; however, the decline of fisheries in Bangladesh and the Philippines is a cause for concern given the potential repercussions for fish consumption.
- Per capita consumption in some of the high-consumption countries (Bangladesh, Indonesia, and the Philippines) will likely decline, as demand growth outpaces the growth of supply and imports. Averting this will probably entail faster productivity growth in aquaculture.
- adoption of community-based or collective action approaches in the management of fishery resources, both inland and marine, as well as in other commercial aspects of fishing, i.e., in fish trade and marketing;
- rigorous implementation of other management measures in capture fisheries such as protection and restoration of critical habitats, removal of excess fishing capacity, restrictions on potentially destructive gears, and provision of alternative livelihoods for small fishers;
- rural infrastructure development for improved marketing of fish; promotion of investments in hatchery and input distribution systems for the sustained and widespread dissemination of quality fingerlings;
- increased investments in the extent and quality of extension to reduce technical inefficiencies in fish culture; and
- more research to increase productivity of priority species, e.g., selective breeding of carp, as well as the development of technologies to reduce costs of fish farming (e.g., low-input systems, alternative feeds).

Given all these findings, new national action plans have supported a number of priority policy responses, including:

- increased support to poor processors and producers of exportable fish, particularly with respect to compliance with international product standards;

The abovementioned research findings and action statements are already a valuable set of outputs from the project. One should not, however, underestimate the intangible benefits from the entire process: first, the national workshops and the final regional workshop have served to elevate fish and the poor to prominence in development discussions and debates, both nationally and regionally. Second, the study has

generated a storehouse of information useful for policymakers and researchers, systematically documented in terms of profiles for production, consumption, trade and the policy environment. Third, there has been a considerable build-up of research capacity among the participating countries. This includes the capacity to undertake systematic, quantitative approaches to sectoral planning at the national level, with the appropriate tools, such as the AsiaFish models, to aid in the process. No doubt the lasting impact of the project will lie in injecting greater rigor, at the national and regional level, to goal-setting and strategic planning activities for the fish sector.

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This article is based on the study, "Strategies and Options for Increasing and Sustaining Benefits from Fisheries and Aquaculture Production to Benefit Poor Households in Asia", carried out under ADB-RETA 5945, and implemented by the WorldFish Center in partnership with nine participating Asian countries. The project is led by Madan Mohan Dey and Mahfuzuddin Ahmed from the WorldFish Center. More project details are available at: [www.worldfishcenter.org/demandsupply](http://www.worldfishcenter.org/demandsupply).