

A Center Perspective to 2020: Emerging Challenges and New Opportunities for addressing the CGIAR Goals of Alleviating Poverty, Hunger and Malnutrition through Aquaculture and Fisheries Related Activities

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Fish and other living aquatic resources are closely associated with poverty in many developing countries, particularly those in Asia and Africa. They are more important in the daily food of people and in the economies of many developing countries than in developed ones. Nevertheless, as a minority sector in most economies, fish (broadly defined which includes other living aquatic resources) is commonly overlooked in national poverty eradication strategy.

Current Realities and Major Issues

Fish are associated with many dimensions of the poverty alleviation strategy. The multiple and complex associations of fish and poverty alleviation, however, often create diffuse and difficult challenges which countries and development assistance agencies find difficult to address. The following list of four main associations highlights the complexity.

First, fish provide *food* for millions of the world's poorest people. Most of the world's fish is now produced in developing countries, where it provides nearly 20 percent of the animal protein, compared to 12% in developed countries¹. Indeed, the overall animal protein divide between the developed and developing world is starkly illustrated by fish consumption. In 2000, in absolute consumption per person, people in developing countries only consumed 3.7 grams of fish protein each per day compared to 6.6 grams for the people in developed countries – indicating both an animal protein divide and a divide in the relative importance of fish in the more meager diets of those in developing countries. The divide is important not only because fish is an important source of animal protein but also because the vitamins and micro-nutrients it supplies are vital for nutrition.

World production of fish, crustaceans and molluscs reached 129.3 million tonnes in 2000² of which capture fisheries in marine and inland waters were 94.8 million tons and fish from aquaculture 35.5 million tons. The value of world total fishery production is estimated at US\$ 125 billion.³ FAO has projected two outlooks for fish production to 2010, the optimistic being for an increase to 144 million tons and the pessimistic being 107 million tons, or 23 million tons less than the 2000 production. If the latter scenario were to come true, then the world, especially the developing world, will be in great difficulty.

¹ Source: From FAOSTAT nutrition database, <http://www.fao.org>

² FAO 2001. FISHSTAT+, <http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp>.

³ Unfortunately, fisheries statistical data are not very accurate as many countries grossly underreport the production, particularly from small-scale, family fishing. Over-reporting by some countries also is a problem. Discards of fish are not accounted for in the statistics but may amount to some 25-30 percent of the total marine catches.

More than 75 percent of global fish production is used for direct human consumption. In 1999, the average global fish consumption was 16.3 kg per person. Of this average capture fisheries supplied 2/3 and aquaculture, 1/3.

In absolute terms supplies from marine capture fisheries have remained fairly stable since the mid-eighties whereas supplies from inland capture fisheries have increased slightly. In relative per caput terms there has been a decline of more than 20 percent in the supplies from capture fisheries.

Second, Fish provide a *livelihood and income* to the vast majority of the world's poor. Fish play a particularly important role among disadvantaged sections of the population as the main or a supplementary source of employment, livelihood and therefore income. Perhaps because of this association with those at the margins of society, the fate of fish and fish dependent people are too often disregarded when coastal pollution increases, large scale mechanized fishing is introduced, dams are built, forests logged and health burdens such as HIV/AIDS and occupational dangers at sea take their toll. Many of the usual social safety nets are not accessible to the fishers and fishing communities. Economic development and international development assistance is directly responsible for some of these poverty deepening changes in the sector, e.g. water management schemes, new fishing technologies.

Third, fish generates *foreign exchange*. Trade in fish increased rapidly for the developing countries in the 1990s⁴. For many economically developing nations, fish are the first or second largest export commodity, and foreign exchange generated from fish exports often used to pay the cost of cereal and other food imports. However, the fish export markets are often made vulnerable to the market and trade demands of their customers from the developed-world.

The development of export markets has affected how traditional fishers view their vocation. Where once certain species were fished for food and to generate adequate income, those same species are now exported. The transition from a subsistence to a market economy usually places pressure on natural resources: chronic over-fishing and other consequences confuse the balance that once existed between aquatic life and human beings.

Changing trade regimes, under the World Trade Organization (WTO) and the General Agreement on Tariffs and Trade (GATT), have implications for poor countries. The traditional trade barriers such as tariffs and quota restrictions are being reduced or eliminated whilst, at the same time, more and more technical standards like Sanitary and Phytosanitary (SPS) measures, Hazard Analysis and Critical Control Point (HACCP) standards and eco-labeling are being put in place. Among poor, fish-exporting countries, there is widespread apprehension that these technical standards may act as a barrier to trade

Fourth, fish and other living aquatic resources are key components of the *natural capital (resources)* of developing countries because they provide large, unaccounted ecosystem services such as coastal protection, waste assimilation, carbon sequestration and medical drugs. The parlous state of capture fisheries resources has been highlighted in recent years as one of the greatest environmental crises. Many aquatic products are also becoming less and less safe

⁴ Delgado, C., M. W. Rosegrant, S. Meijer, N. Wada and M. Ahmed 2002. Fish as Food: Projections to 2020. Paper presented at the Biennial Meeting of the International Institute for Fisheries Economics and Trade (IIFET), Wellington, New Zealand, 19-23 August 2002.

because of hazardous environments in which some are produced. Red tides along the coasts, and heavy metal, industrial and pharmaceutical pollution of all waters are creating serious erosion of natural capital, and thereby reducing income and livelihood of the poor.

The four associations outlined above pose challenges for designing useful development strategies that will help alleviate poverty, hunger and malnutrition. The complex nature of the associations between fish and equitable development do not lend themselves to simple answers. Equitable and sustainable development plans affecting fish and aquatic resources must be served by well-targeted research, implemented in strategic partnerships. Such plans should include sound policy and technical solutions, information and methods to help resolve conflicts and identify emerging problems and basic knowledge on which to build solutions. Moreover, the requisite research must be multi-disciplinary, participatory and relevant to particular regions, countries and locations where the results will be applied to alleviate poverty.

Key Challenges and Research Opportunities

The WorldFish Center's view is that research can be focused to address the equitable and sustainable contribution of fish to alleviate poverty, hunger and malnutrition through the following overall goals: a) improved livelihoods through equitable and sustainable management of capture fisheries in marine and inland waters, b) equitable and sustainable increases in aquaculture production, c) improved access to fish by the poor, d) environmental sustainability, and e) improved knowledge and awareness of fish, poverty and environment links.

A. Improved livelihoods for the poor through equitable and sustainable management of capture fisheries

Research can contribute to improving the livelihoods of poor who use natural fish stocks through fostering the sustainability of the resource base for all, and through more equitable management measures so that the poor benefit. The critical issue here is to balance ecosystem maintenance with exploitation, as most of the world's wild fish stocks are at about 30% of the levels that existed a decade ago, while human demand has grown and fishing technology has improved. Some of the key research challenges to achieve this goal are:

- Policies and institutional arrangements for improved governance of natural fisheries resources: There is a need for study and pilot testing of improved fisheries ecosystem and wetlands governance arrangements, using multi-disciplinary approaches and working with community, government and non-government partners. The governance of floodplains and wetlands is of particular complexity because where overlapping sectoral uses, jurisdictions and international cooperation must be reconciled to achieve sustainable use of wetlands resources

A question central to fisheries management is to what extent equity is achieved in schemes to manage effort, entry to or exit from fisheries. To help address this question, the role of fishing rights needs to be examined in detailed. As more and more governments are realizing the need to reduce fishing effort and the dependence of more and more people on declining fisheries, we need to understand how the rights of the poor and small-scale operators can be recognized and protected

- Guidelines for sustained, equitable harvest of wild stocks from inland and marine ecosystem: This desired output presents the greatest challenge since many fish stocks are in serious decline due to inadequate fisheries management and because of habitat

degradation. For example, in a recent study of coastal fisheries in eight Asian countries⁵, the standing stocks of fishes are only between 10 and 30% of their original biomass, and dangerously below their more productive sustainable levels. Moreover, the fished stocks are now composed of smaller fish of generally less valuable and desirable species. Some species have disappeared altogether, suggesting that the complex biodiversity thought to be important for making such tropical ecosystems so productive is being eroded. These patterns are widespread across most of the world's coastal and inland fisheries, including the phenomena of 'fishing down the food web'⁶. Indeed, 75% of the world's marine fisheries are fully or over-exploited⁷ and a similar or worse pattern exists for inland fisheries. There is also need to explore the efficacy of marine protected areas in restoring some fish stocks

B. Improved livelihoods of the poor through equitable and sustainable increases in aquaculture production

In both absolute and relative per caput terms, aquaculture production has increased markedly, but unevenly, across countries and regions over the last twenty years. The trend is for an increase in production, but at a reduced rate due to environmental, technological and institutional constraints. As with capture fisheries, equity and livelihood considerations should govern the choices of species, production and technology transfer systems and aquaculture governance mechanisms. Specific research opportunities in this area include:

- Development of improved fish strains. Research should focus on species that are within the reach of the poor to grow or to purchase to eat, and environmentally friendly to produce.⁸. WorldFish Center and its research partners have mapped out projects to genetically improve, for better growth and disease resistance, low priced key species such as carps and tilapias.
- Development of portfolio of new and improved aquaculture technologies. Research in small-scale aquaculture can address the challenges of helping the poor through sustainably and safely increasing aquaculture production of the type in which they can engage or afford to buy the products.
- Aquaculture-based technology to increase the productivity of coastal fisheries: Development of sustainable methods of producing and growing low-input high value invertebrates can provide poor fishers of small island developing states with additional options to create alternative livelihoods through farming and restocking of severely depleted fisheries. The creation of alternative livelihoods through coastal aquaculture, especially associated with the reef fisheries of small islands in the Caribbean and the Pacific, can help ease the social dislocation involved in removing excess fishing capacities.

⁵ This study is coordinated by the World Fish Center and the collaborating countries are: India, Sri Lanka, Bangladesh, Malaysia, Thailand, Indonesia, Vietnam, Philippines (www.trawlbase.org)

⁶ Pauly, D., Christensen, V., Dalsgaard, J., Froese, R. and Torres Jr. F. (1998): Fishing down marine food webs. *Science* 279:860-863.

⁷ FAO reference

⁸ ICLARM 2000. *Farming fish the right way*. Focus for Research April 2000, Vol. 3 No. 2, 4pp.

C. Improved access to food, including fish, by the poor

About 1 billion consumers depend on fish as an important source of animal protein. For fish to be available to poor consumers, fish price and supply are paramount since the purchasing power of income is critical. The incomes of fish producers (fishers and fish farmers) and their dependent households will depend on adequate fish catches from natural stocks, or profitable fish farming, or their ability to supplement household fish related income with that from other sectors such as agriculture, manufacturing or services. Interdisciplinary research on the following areas can help improving the access to fish by the poor.

- Understanding of fish and food supply and demand outlook for the poor: Urgent economic, sociological and biological research is needed to better understand the fish and food supply and demand outlook for the poor. There is a need to examine the impact of various fisheries and aquaculture technologies and policy interventions on the economic well-being of the poor. Furthermore, fish sector should be integrated into world food models, so that fish is not treated in isolation from the other food sectors. These studies can help identifying strategies and options for increasing and sustaining fisheries and aquaculture production to benefit poor households.
- Sustainable systems and guidelines, for dissemination of information on aquaculture and fisheries technologies to fish farmers and fishers: Extension system to disseminate aquaculture and fisheries technology from research stations to fish farmers and fishers is very poor in the developing countries and in many cases even not in existence. Studies on the recommendation domains for pro-poor technologies and the adoption pathways for these in the developing countries would help disseminating technology to poor fish farmers and fishers and thereby improving their income and livelihood.

D. Environmental sustainability

Research work targeted at protecting and conserving ecosystem and environment can benefit the poor in developing countries by improving long-term fish productivity and by creating alternative livelihoods. Some of the specific research challenges and opportunities under this broad category are:

- Conservation of aquatic biodiversity: Structured resource information on fisheries, taxonomy, ecology, socio-economics and policy is essential for effective management and sustainable utilization of aquatic resources. Government agencies, NGOs and local communities can utilize this scientific knowledge for understanding, conserving and sustainably using aquatic biological diversity, and for developing countermeasures to threats of aquatic diversity. WorldFish Center can contribute significantly to this area by providing public goods like FishBase, ReefBase and TrawlBase. FishBase, the premier global biodiversity database on fishes has had over 2.5 million hits. ReefBase has gathered the available knowledge about coral reefs into one information repository to facilitate analyses and monitoring of coral reef health and the quality of life of reef-dependent people. TrawlBase has provided fisheries managers in Southeast Asia and Asia with information on the decline of fish stocks and biodiversity, and options for restoring production.
- Integrated fisheries and watershed management: Fish, being at the downstream end of all activities that take place within a watershed, are particularly vulnerable to changes

such as deforestation, soil erosion, use of agricultural chemicals, urban sprawl and pollution. Modelling of nutrient cycles and resource flows within a watershed context can develop a range of tactical options for the mitigation of the frequently negative consequences of changes in watershed management. These cover the range of systems from lakes and other types of stagnant water bodies, over floodplains to river deltas.

- Restoration and protection of coastal habitats: In addition to overfishing and destructive fishing, many of the factors impacting the sustainability of coastal aquatic resources are driven by actions outside the fisheries and aquaculture sectors such as competing uses of the environment, climate and pollution. Identification of risks to the integrity of the coastal zone and development of effective systems for restoration and protection can create additional livelihoods for coastal people based on inshore resources in coastal areas.

E. Improving knowledge and awareness of fish, poverty and environment links

There is a need to use the scientific knowledge on the above issues to inform national governments, non-government agencies, development assistance partners, other aquatic research agencies and the wider public of the complex place of fish in poverty alleviation.

In summary, research targeted to several of the multiple roles of fish in development can make contributions to poverty eradication, food security and environmental conservation. Activities should focus on improving equity benefits from fisheries catches and aquaculture, enhancing the livelihoods of fishing and farming households, improving access to fish at affordable prices for consumers, reducing the impact of fishers on overstressed resources, increasing the number of fish farmers where resources permit, and protecting the aquatic environment and biodiversity. Increasingly too, partnership modes between various sectors (public, private, non-formal) at different levels, will have to be fully tapped to ensure that local needs are met through the global public goods generated. Capacity building in many aspects of fisheries and natural resource management science will also have to underpin many of the Center's programs, in which the Center acts as catalyst and facilitator of south-south exchanges.