Maximizing the contribution of fish to human nutrition

By James David, Food and Agriculture Organization of the UN

A paper on maximizing the contribution of fish to human nutrition is being prepared for the Preparatory Technical Meeting in November 2013. Participants in the web discussion in July are invited to contribute ideas, suggestions and references to amplify the outline presented below.

Background

Hunger and malnutrition are the world's most devastating problems and are inextricably linked to poverty. In 2010-12, almost 870 million people were chronically undernourished. The challenges governments and international development communities need to address, given a global population that is projected to exceed 9 billion by 2050, much of it in developing countries prone to hunger, is to ensure adequate food and nutrition security for all. It is widely acknowledged that fisheries has the capacity – if supported and developed in a regulated and sensitive manner that is both environmentally, socially responsible - to address the challenges and further contribute positively towards eradication of hunger, food insecurity and malnutrition. While the role of fisheries is increasingly recognized by national and global development policy makers, there is a clear need for a more proactive and concerted effort by the fisheries sector. At the global level, the ongoing work on the Post-2015 Development Agenda, provides an excellent opportunity to reiterate and establish the importance of fisheries

In considering how the contribution of fish to diets, particularly those of the poor, can be maximized, this document first provides some general background information on fisheries production and fish[1] consumption, then analyses constraints to increasing consumption and concludes by suggesting possible interventions.

Fish production and consumption

In recent years although capture fishery production has been flat, at around 90 million tonnes per year, aquaculture has continued to show sustained growth, amounting to 63.6 million tonnes in 2011. A total of 154 million tonnes of fish was produced from all sources in 2011, of which 126 million tonnes was available

[1] For the purposes of this document the term "fish" embraces all living aquatic resources[1] that are used as food and derived from both capture fisheries and aquaculture in marine, brackish and fresh waters.

for direct human consumption. If equally distributed over the world's population the annual per capita availability would be 18.6 kg (a strong increase from the 9.9 kg available in the 1960's). However, consumption varies widely between regions: being 9.1 kg per capita in Africa, 9.9 kg in Latin America/Caribbean, 20.7 kg in Asia, 22.0 kg in Europe, 24.1 kg in North America and 24.6 kg in Oceania. The strongest difference is between industrialized countries, 28.7 kg, and low income food deficient developing countries (LIFDC's), 10.1 kg, although this latter figure has more than doubled since 1961. Also within countries there is considerable variation, in most cases with the rich consuming significantly more. Whether a community eats fish is strongly ingrained in its traditional food habits. It is difficult to make fish consumers out of those with no diet-linked cultural association. The pursuit of fisheries for food has obvious nutritional benefits but also, with at least 45 million people employed worldwide, the majority of them in developing countries, (including a large number of women employed mostly in processing activities); the income from fisheries contributes significantly to sustainable rural livelihoods and through them to improved nutrition.

Fishery resources are an important source of both macro- and micro-nutrients for humans. Globally fish accounts for about 17 percent of animal protein intake. This share, however, exceeds 50 percent in many countries. In West African coastal countries the proportion of dietary protein that comes from fish is very high: 63 percent in Sierra Leone and Ghana, 62 percent in Gambia and 47 percent in Senegal. Also in Asia and some small island states the contribution is high: 71 percent in the Maldives, 59 percent in Cambodia, 57 percent in Bangladesh, 54 percent in Indonesia, 53 percent in Sri Lanka. An adequate animal protein supply can be obtained from other sources (eg meat from terrestrial animals) and there has been a tendency, as incomes rise, for the more affluent to increase their purchases from these sources. However, as they are generally more expensive than the cheapest fish the poor cannot make such life style choices and remain critically dependent on fish.

Foods from the aquatic environment are a unique source of the essential long-chain omega-3 fatty acids, important for optimal brain and neurodevelopment in children (DHA) and vascular health (EPA)[2]. Although many vegetable oils contain omega-3 fatty acids this is in the form of alpha-linolenic acid (ALA), which must be converted metabolically by chain length extension to EPA and DHA. However, the conversion from ALA into EPA and DHA is not very efficient in humans, making it difficult to rely only on vegetable oil during the most critical periods of life. Omega-3 fatty acids in the form of DHA rather than ALA are needed to secure an optimal brain and neural system development in neonates and infants. This is particularly important during pregnancy and the first two years of life (the 1000 day window).

Fish consumption also provides health benefits to the adult population. There is strong evidence that fish, in particular oily fish, lowers the risk of coronary heart disease (CHD) mortality by up to 36 percent due to a combination of EPA and DHA.

In addition to the health benefits of these macro-nutrients fish is also an important provider of a range of micro-nutrients not widely available from other sources in the diets of the poor. More and more attention is being given to fish products as a source of vitamins and minerals. This is in particularly true for small sized species consumed whole, with heads and bones, which can be an excellent source of many essential minerals such as iodine, selenium, zinc, iron, calcium, phosphorus and potassium, but also vitamins such as A and D, and several vitamins from the B-group. There are significant variations between species and between different parts of the fish.

[2] DHA: docosahexaenoic acid. EPA: eicosapentaenoic acid

Constraints to increasing consumption

The most obvious constraint to increasing consumption is availability at affordable prices to the poor. Scarcity as a result of population growth and demand has driven up prices and although aquaculture has contributed to closing the gap, the price of species from aquaculture tends to be higher than that of the small low-value species traditionally consumed by the poor. However, it is widely recognized that consumption of even small quantities of fish makes a significant contribution to the nutritional quality of the diets of poor people.

There is a persistently high volume of post-harvest loss that removes significant quantities of fish from the market – up to 25 percent in many developing countries. The reasons are varied and complicated but include: economics (lack of infrastructure, lack of access to credit) and lack of knowledge (limited education and no access to technology). There are physical losses because fish cannot be stored, loss when processing waste is not converted to byproducts and reduction of nutritional quality caused by damage during storage and processing. Bycatches and discards of non-commercial species by capture fisheries also represent a very substantial loss both in developed and developing countries. Additionally the large volumes of small pelagic species that are converted to fish meal and oil for animal feeding potentially removes up to 25 percent of capture fisheries production from the human food supply. While at present their use in fish feed for aquaculture, which supplies 50 percent of fish for human consumption, is important they could potentially also be converted to nutritious products, suited to low income consumers. However, efforts to date have been largely unsuccessful, principally because of lack of technology, unfavourable economics and the fact that they are not included in traditional food baskets.

Intensified rice production to feed growing numbers of people, particularly in Asia, has led to massive increases in fertilizer and pesticide application that have seriously reduced the availability of the many species traditionally available to the rural poor from rice-based aquatic ecosystems and associated water bodies. Damming of rivers for hydroelectric power production also impacts seriously on these resources. The incidence of micro-nutrient deficiencies in these communities has been exacerbated as a result.

In recent years there has been a lot of publicity on the potential risks from fish consumption, related to the presence of pollutants or contaminants. Much of this has been sensationalist but there are real problems that need to be faced not only with chemical contaminants but also with fish-borne diseases caused by poor hygiene and lack of effective food control.

Possible interventions

Interventions to overcome the above constraints are wide ranging and will involve a number of actors including: international organizations, governments and civil society organizations, industry and academia.

The issue of falling availability to the poor as a result of rising prices is an intractable problem that cannot fully be solved without accompanying efforts to reduce poverty. However, international agencies (FAO) should continue to assist governments by producing statistics on production and consumption, as well as carrying out projections and analyses of demand and prices. The role of governments is to monitor the situation and develop and implement appropriate policies and strategies, including ensuring linkages and synergies with macro-economic, nutrition and other related policies and requirements. Governments also need to provide adequate funding for implementing the policies and strategies. Funding must also be provided for educational efforts to ensure that consumers are aware of the specific nutritional benefits of fish products.

Reducing post-harvest losses and discards is technically an easier target but will require far reaching government interventions in policy change and investment in infrastructure. Before industry can be expected to invest in bringing the fish to market with efficient transport and functioning cold chains, government must fund the construction of landing centres and roads to link production areas to centres of population. Access to credit must be assured to encourage participation from small-scale operators and comprehensive educational and technology programmes are needed to change perceptions. Efforts are required from all the actors in the technologies and facilities for processing stable products from discards, material currently used for fish meal and waste from processing. These efforts must be accompanied by progress in substituting fish meal and fish oil in aquaculture feed, while preserving the unique nutritional properties of fish. This is a goal for industry and academic research and promising results are emerging, including the selection of genetically modified plants to produce EPA and DHA.

The reduction of availability of traditional aquatic food resources as a result of changing patterns of land use in aquatic eco-systems must be tackled in the first instance by giving the needs of poor rural people's nutrition a voice in national policy formulation, alongside rural development, agriculture, climate change, fisheries management and other related sectors.

More research and development of technologies (particularly in aquaculture) will also show results, as has been demonstrated in Bangladesh and Cambodia, where small traditional species, rich in vitamin A and calcium, have been grown in polyculture with high value fish. It is also essential that the population in general, but specifically pregnant women, be advised of the need for and sources of micro-nutrients, especially for infants.

The risks from chemical contaminants are best addressed by information rather than emotion. At issue are accumulation of heavy metals (Hg,Pb,Cd) as well as dioxins and dioxin-like PCB's from the environment. The available compositional data bases for aquatic foods lack good international coverage and figures they contain are often unreliable. An international cooperative programme to create accurate baseline contaminant and nutrient data bases would make future monitoring much more effective. Keeping unsafe foods out of the food chain requires effective food control and inspection. While most countries manage to apply an adequate level of inspection to their exports there are many instances when these controls are not extended to fish for domestic consumers. Thus those buying from local markets are potentially exposed to contaminants, parasites, toxins and microrganisms of public health significance. The risks are greater for the poor who must accept the cheapest product on offer. In addition to government efforts to implement fish inspection and food control there must be awareness programmes on safe food. These would include the needs for hygiene and food safety, accompanied by community action to clean up the environment of landing sites, transport, markets, restaurants, homes, etc.