



The European Commission's Knowledge Centre for Global Food and Nutrition Security



KNOWLEDGE REVIEW: Fisheries and food and nutrition security in developing countries

This knowledge review is based on the following publications:

(1)
THE STATE OF WORLD FISHERIES AND AQUACULTURE - 2020
<http://www.fao.org/3/ca9229en/ca9229en.pdf>

(2)
Illuminating Hidden Harvests - 2012
<https://fish.cgiar.org/research-areas/projects/illuminating-hidden-harvests#:~:text=Illuminating%20Hidden%20Harvests%20is%20a,of%20small%20scale%20fisheries%20globally.>

(3)
Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (2015)
<http://www.fao.org/3/a-i4356en.pdf>

(4)
Sustainable fisheries and aquaculture for food security and nutrition – HPLE 2014
<https://ec.europa.eu/knowledge4policy/sites/know4pol/files/a-i3844e.pdf>

(5)
Agroecology and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition – HPLE 2019
<http://www.fao.org/3/ca5602en/ca5602en.pdf>

(6)
FOOD SYSTEMS AT RISK - 2019
http://agritrop.cirad.fr/593617/1/Food_systems_at_risk.pdf

(7)
Study on EU Achievements in Food and Nutrition Security and Sustainable Agriculture 2014-2018
The report can be found here:
https://ec.europa.eu/europeaid/eu-achievements-food-and-nutrition-security-and-sustainable-agriculture-2014-2018_en

Key knowledge

- Small-scale fisheries contribute in many developing countries to food and nutrition security as well as to household, local and national economies.
- Sustainable fisheries can contribute toward sustainable food systems.
- Trade of fish and fish products plays an important role in food and nutrition security in developing countries.
- Unsustainable management of marine stocks, climate change and pollution of waters represent major threats for the sector and could comprise its contribution to food and nutrition security.
- Effective fisheries management has been implemented with success in some locations and can be used as a model.
- The EU promotes worldwide sustainable fisheries and aquaculture through different instruments.
- Exploiting the synergies between aquaculture and agriculture, through an agroecological approach, represents a promising option.

Conceptual framework: fisheries, food security and nutrition

In addition to high-quality protein, fish, especially small fish consumed whole, can be rich sources of omega-3 fatty acids, vitamins A, D and B, and minerals such as calcium, zinc, iodine and iron, while algae represents an excellent source of fatty acids, vitamins and minerals. Benefits of consuming fish include: reduced risk of chronic diseases such as cardiovascular disease; improved maternal health during pregnancy and lactation; improved physical and cognitive development during early childhood; and mitigation of health risks associated with anaemia, stunting and child blindness (1).

The nutritional value of fish gives it the potential to address the “triple burden of malnutrition”: undernutrition, overweight and obesity, micronutrients deficiencies.

In low-income food-deficit countries and least developed countries, fish can therefore play an important role in improving food security and the nutritional status of individuals, where populations may be overly dependent on a relatively narrow selection of staple foods, which cannot provide adequate amounts of essential amino acids, vitamins, micronutrients and healthy fats (1). This is particularly true for population at risk of malnutrition: young children, pregnant women, breastfeeding mothers.

However, the increase of consumption of fish and its addition to the diets of low income populations depend both on the availability of the resource and its affordability. Both large-scale industrial fisheries and small-scale fisheries play a crucial role in the access to the resource.

While large-scale industrial fisheries allow the wide commercialization of cheap, easily stored and transported (e.g. canned) nutritious pelagic fish such as sardine, pilchard, herring, anchovy or even tuna, small-scale fisheries make fish available and accessible to local poor populations and are a key mean to sustain livelihoods of marginalized and vulnerable populations in developing countries (4).

State of play

The FAO report “THE STATE OF WORLD FISHERIES AND AQUACULTURE – 2020” provides the following quantitative information:

- Global **fish production** is estimated to have reached about 179 million tonnes in 2018 with a total first sale value estimated at USD 401 billion, of which 82 million tonnes, valued at USD 250 billion, came from aquaculture production. Aquaculture accounted for 46 percent of the total production and 52 percent of fish for human consumption (1);
- Global **fish consumption** increased at an average annual rate of 3.1 percent from 1961 to 2017, a rate almost twice that of annual world population growth (1.6 percent) for the same period, and higher than that of all other animal protein foods (meat, dairy, milk, etc.), which increased by

2.1 percent per year. **It is estimated that globally, fish provides more than 3.3 billion people with 20 percent of their average per capita intake of animal proteins, reaching 50 percent or more in countries such as Bangladesh, Cambodia, the Gambia, Ghana, Indonesia, Sierra Leone, Sri Lanka and several small island developing (1);**

- **The importance of developing countries as consumers has been steadily increasing.** Among these, the LDCs, most of which are located on Africa, increased their annual per capita fish consumption from 6.1 kg in 1961 to 12.6 kg in 2017. This growth rate has increased significantly in the last 20 years, reaching an average of 2.9 percent per year, explained by different factors, among them increased urbanisation, the expansion of the middle-class, the increase of fish production and imports (1).

It has been further analysed that in West African coastal countries, where fisheries have historically been a central element in local economies, the proportion of total dietary protein from fish is remarkably high: e.g. more than 60 percent in the Gambia, Sierra Leone and Ghana. Likewise, in Asia, where fisheries are extremely important and fish farming has developed rapidly over the last 30 years: total dietary protein from fish is between 50 and 60 percent in Cambodia, Bangladesh, Indonesia and Sri Lanka. Fish provides a similarly significant proportion of protein in the human diets in most small island states (e.g. almost 60 percent in Maldives) (4).

It should be stressed that in Africa actual values are probably higher than indicated by official statistics, in view of the under-recorded contribution of subsistence fisheries, some small-scale fisheries and informal cross-border trade (1). Indeed, a study (2) has found out **that millions of tonnes of fish from the small-scale fisheries are “hidden”** – in the sense of being invisible and unreported – with the inland fisheries catch estimated to be underreported by about 70 percent. The same study has estimated that:

- out of the 120 million people who depend on capture fisheries, 116 million work in developing countries. **Of these, more than 90 percent work in small-scale fisheries**, and women make up almost 50 percent of the workforce;
- in developing countries, **small-scale fisheries produce more than half the fish catch, and 90–95 percent of this is consumed locally** in rural settings where poverty rates are high and good-quality nutrition is sorely needed;
- employment in small-scale fisheries is several times higher per tonne of harvest than in large-scale fisheries.

In this context, the **major role of small-scale inland fisheries in food security and nutrition** deserves to be highlighted (6): it is estimated that 95 percent of the global inland catch is in developing countries and most of it is consumed domestically.

The role of aquaculture has become nowadays predominant in the production of fish. In the last three decades,

aquaculture has increased 12 times at an average annual growth of over 8 percent, making it the fastest growing food production sector. It is now widely agreed that the foreseen future increase in demand for fish will have to be satisfied through aquaculture production (4).

Fish farming is dominated by Asia, which has produced 89 percent of the global total in volume terms in the last 20 years. Over the same period, the shares of Africa and the Americas have increased, while those of Europe and Oceania have decreased slightly (1).

Aquaculture has expanded fish availability to regions and countries with otherwise limited or no access to the cultured species, often at cheaper prices, leading to improved nutrition and food security (1).

Trade is another important feature of the sector in regards to the availability and affordability of fish and fishery products.

Fish and fishery products remain some of the most traded food commodities in the world. In 2018, 67 million tonnes, or 38 percent of total fisheries and aquaculture production, were traded internationally. From 1976 to 2018, the share of developing countries of trade in fish and fish products increased from 38 percent of global export value to 54 percent, and from 39 percent to 60 percent of total quantity, supported by strong aquaculture production growth and heavy investment in export market development (1).

International trade has confirmed its important role as a driver of economic growth and a contributor to global food security. Exports of fish and fisheries products are essential to the economies of many countries and regions. For example, they exceed 40 percent of the total value of merchandise trade in Cabo Verde, Faroe Islands, Greenland, Iceland, Maldives, Seychelles and Vanuatu (1).

Africa is a net importer in volume terms, but a net exporter in terms of value (1).

African fish imports authorize the wide commercialization of cheap, easily stored and transported (e.g. canned) nutritious pelagic fish such as sardine, pilchard, herring, anchovy or even tuna (4).

Opportunities, Threats and Best Practices

The sustainability of fisheries in their environmental and natural resource dimensions is recognized to be a sine qua non condition for food security and nutrition (4).

The state of marine fishery resources, based on FAO's long-term monitoring of assessed marine fish stocks, has continued to decline. The percentage of stocks fished at biologically unsustainable levels increased from 10 percent in 1974 to 34.2 percent in 2017. While developed countries are improving the way they manage their fisheries, developing countries face a worsening situation in terms of overcapacity, production per unit of effort and stock status (1).

In general, it is becoming increasingly clear that intensively managed fisheries have seen decreases in average fishing pressure and increases in average stock biomass, with many reaching or maintaining biologically sustainable levels, while fisheries with less-developed management systems are in poor shape (1).

Fisheries are expected to be significantly affected by climate change, as a result of changes in abiotic (sea temperature, oxygen levels, salinity and acidity) and biotic conditions (primary production, and food webs) of the sea affecting aquatic species in terms of their distributional patterns, growth and size, catch potential, etc. (Barange et al., 2018) (1). Several global and regional quantitative studies project that fisheries productivity will increase in high latitudes and decrease in mid- and low latitudes (Porter et al., 2014), primarily due to species shift. This has important implications for developing countries, which are generally located in the tropics (1).

Inland fisheries and aquaculture may face higher mortality due to heat waves, water scarcity and competition for water. Impacts of extreme events are increasing, with more risks of damage or loss of infrastructure and housing. Sea level rise might lead to the relocation of communities (4).

Pollution of waters represents another threat. Many pollutants (organic and inorganic nutrients – e.g. nitrogen and phosphorous) end up in water through leaching and run-off, provoking eutrophication, with negative impacts on aquatic ecosystems, reducing fish and seafood stocks (6). A rapidly growing concern is plastic pollution, especially micro- and nanoplastics, as they have become ubiquitous in inland waters and oceans and are of growing significance (6). Antibiotics, used on a large scale in animal and fish production, are causing growing concerns for the resistance they can generate (Rodríguez-Eugenio, 2018; IPES-Food, 2017) (6). Freshwaters are one of the ecosystems most heavily impacted by humans (pollution, habitat loss and degradation, draining of wetlands, river fragmentation and poor land management), concerns have emerged with regards to their sustainability (6).

In parallel, opportunities to enhance the sustainability and the contribution of fisheries and aquaculture to food and nutrition security also exist.

In some locations, **effective fisheries management has worked and has allowed fish stock to recover.** These successful policies and mechanisms can be replicated and re-adapted (1).

The **Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries**, as well as the **Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests**, have the goal of supporting the development of small-scale fisheries and fishing communities through a human-rights-based approach to fisheries that is socially, economically and environmentally sustainable (3).

Fisheries and aquaculture sustainable practices have low impact on the environment. Aquatic animal production systems have a lower carbon footprint per kilogram of output compared with other terrestrial animal production systems. Nitrogen and phosphorous emissions from aquaculture production systems are much lower compared to beef and pork production systems though they are slightly higher than those of poultry (4).

Among the sustainable practices, exploiting the synergies between aquaculture and agriculture, through an agroecological approach is a promising option (6). Example: “The rice–duck–fish system in Asia” (5) *“The rice–fish–duck system is an important traditional agroecosystem in Hani terraces in Yunnan Province, Southwest China. Integration of crops and animals and circular economy are at the heart of this system. Fish and ducks eat weeds and pests and loosen the soil to improve the growing environment for rice, while rice provides food, shade and shelter for fish and ducks. Pesticides and herbicides cannot be used in this system because of their toxicity to fish and ducks. Therefore, products from rice–fish–duck systems are very popular in consumer markets. Their prices are usually several times higher than the prices of conventional products. For example, the prices of red rice, fish and ducks raised in paddies in Hani terraces are respectively 5, 3 and 2.5 times higher than conventional prices. An improved rice–fish–duck system has been experimented with in Hani terraces and is now popularized. The agroecosystem efficiently exploits the three-dimensional space (and seasonality) of paddies for developing rice–fish co-culture during the crop growing season while ducks are reared in winter during the fallow period. Its economic value is estimated to be 7.8 times that of the current conventional model that only grows the hybrid rice monoculture in summer for half the year and fallows the field in winter (Zhang et al., 2017). This is an example of a Globally Important Agricultural Heritage System (GIAHS) that combines agricultural biodiversity, resilient ecosystems, local communities and a valuable cultural heritage.¹⁵ There is a network of 50 GIAHS sites in 20 countries of the world (FAO, 2002; Koohafkan and Altieri, 2010; Koohafkan and Cruz, 2011; HLPE, 2017b).”*

Another best practices to ensure responsible investments and promote sustainable aquaculture, is to **take potential impact on the environment into account**.

Example: “Changing the perspective on the economic viability of converting mangrove to shrimp farming in Thailand” (5) *“In considering the conversion of mangroves to shrimp farming in Thailand in the 1980s, initial decisions were based on valuing only a single provisioning ecosystem service of aquaculture: the production of shrimps to supply a growing frozen-shrimp export industry. The value of the shrimp harvest was higher than the mangrove’s marketable forest products and the profitability of shrimp farming was enhanced by input subsidies. However, when other non-marketed ecosystem services are factored into a broader economic analysis, it can be seen that the conversion of an intact mangrove is not economically beneficial because its value as coastline protection and as a nursery for wild fish is greater than the revenues from shrimp farming. If pollution and costs of restoration associated with shrimp farming are also considered, conversion is even more costly. This illustrates two key issues: first that overall economic viability depends on which ecosystem services are valued; and second that profitability of farming (the economic viability for the farmer) is often not the same as the overall economic value to society because of market interventions.”*

EU Cooperation in the sector

The EU is committed to promote sustainable fisheries and aquaculture.

The Principles for Responsible Investments in Agriculture and Food Systems were endorsed by the Committee on World Food Security in 2015 with significant support from the EU and apply to investment in agriculture, fisheries, forests and livestock at all stages of the value chain and address diverse stakeholders’ roles and responsibilities (7).

A few countries, including Cambodia, Myanmar, Somalia and Liberia, have chosen fisheries or aquaculture as focal sectors for bilateral cooperation with the EU. In these countries, EU development policy supports national fisheries and aquaculture policies and fish value chains (7).

The value chain analysis approach allows to provide a detailed assessment of the operations in the value chain and their main economic, social and environmental impact (e.g. analyses of value chains in fisheries in Cambodia).

The EU has been a key partner in strengthening global fisheries governance and developing international instruments to combat illegal, unreported and unregulated (IUU) fishing. For instance, in West Africa, the EU is supporting regional governance of fisheries through better coordination of national fisheries policies. It supports the Economic Community of West African States in developing a framework for regional fisheries’ priorities and facilitating cooperation with sub-regional organisations and development partners. It contributes to building the capacities of competent national and regional monitoring, control and surveillance authorities to deter IUU fishing (7).

Sustainable fisheries partnership agreements with non-EU countries are negotiated and concluded by the Commission on behalf of the EU. They allow EU vessels to fish for estimated surplus stocks in the country’s exclusive economic zone (EEZ), in a legally regulated environment. These agreements also focus on **resource conservation** and **environmental sustainability**, ensuring that all EU vessels are subject to the same rules of control and transparency. These agreements are restricted to agreed target species and give priority to local artisanal fleets, protecting endangered species, banning discard. At the same time, a clause concerning respect for human rights has been included in all protocols to fisheries agreements. In exchange, the EU pays the partner countries a financial contribution composed of 2 distinct parts:

- access rights to the EEZ;
- sectorial support which aims to promote sustainable fisheries development in the partner countries, by strengthening their administrative and scientific capacity through a focus on sustainable fisheries management, monitoring, control and surveillance.