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United Nations



STRENGTHENING SECTOR POLICIES FOR BETTER FOOD SECURITY AND NUTRITION RESULTS

Fisheries and aquaculture

POLICY GUIDANCE NOTE | 1



These policy guidance notes have been produced in the frame of the strategic partnership between the Food and Agriculture Organization of the United Nations (FAO) and the Directorate for International Cooperation and Development of the European Commission to boost food and nutrition security, sustainable agriculture and resilience.

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This policy guidance note is part of a series that the Food and Agriculture Organization of the United Nations (FAO), the Directorate for International Cooperation and Development (DEVCO) of the European Commission and partners are producing to support policy makers address the food security and nutrition situation in their country. Each note provides guidance on how to sharpen the focus of sector policies in order to achieve sustainable food security and nutrition outcomes.

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Introduction

This guidance note addresses the overarching question: “What changes are needed to existing policies that govern the fisheries and aquaculture sector to have greater impact on food security and nutrition, and how might these changes be achieved?”. The note identifies a range of issues to be taken into account when attempting to harmonize fisheries and aquaculture policies with food security and nutrition concerns. Such alignment would be beneficial to both those who make a living from fishing and fish farming, and to people who depend on access to fish to maintain a healthy diet.

The fisheries and aquaculture¹ sector plays a crucial role in food security, nutrition and health (Figure 1). It contributes directly by providing micronutrient-rich fish and other aquatic foods² to billions of people, and indirectly by providing a source of full-time, part-time or supplementary income for over 100 million people in fishing, aquaculture operations, processing, trading, retailing and ancillary industries (HLPE, 2014). Local and international fish trade and licences to access fisheries resources or fees to lease sea areas for aquaculture also provide important contributions to national trade balances and government revenues. Profits from businesses that range in size from household economies to multi-national vertically integrated seafood companies derive business profits from the capture, farming, processing, trading and retailing of fish. These profits in turn contribute to growth and prosperity from local to national levels.

¹ The term “fisheries” generally refers to capture of fish from the wild, while “aquaculture” refers to fish that are raised under farm conditions, either in the sea, in freshwater, or in land-based systems, such as enclosed tanks. There is a continuum from totally wild to intensively farmed, with some species raised in hatcheries but released to the wild, other species with juveniles caught in the wild to be reared on farms, and numerous other variations. The term “fisheries sector”, when used generically in this guidance note, refers to both fisheries and aquaculture.

² In the rest of this guidance note, “fish” is used to refer to both fin-fish and shellfish (both molluscs and crustaceans). Other aquatic animals (e.g. echinoderms, amphibians, reptiles, marine mammals) are also included where relevant. Aquatic plants (mostly seaweeds) are not included unless specified.

→ Key messages

- The policy agenda of the fisheries and aquaculture sector tends to be oriented towards economic and, to a lesser extent, social interests and undervalues the importance of the sector for food security and nutrition.
- Where the importance of fish is not reflected in food security, nutrition and public health policies, filling key data and knowledge gaps should be a priority so that necessary policy shifts and investments can be identified to make the sector nutrition-sensitive.
- Any scoping of the sector’s potential to better contribute to nutrition and food security needs to evaluate the potential of the sector to increase availability of and access to fish, as well as what drives demand.
- Nutrition-sensitive fisheries and aquaculture policies and interventions face a triple challenge: engaging with the fisheries and aquaculture sector to place food security and nutrition on its agenda, working with the fisheries and aquaculture sector to ensure that fisheries and aquaculture (and food security) interests are included in river basin and marine spatial planning; and ensuring that these issues stay on the agenda in the context of trans-boundary negotiations over resource use and allocation.
- The lack of a nutrition-sensitive policy focus on capture fisheries and aquaculture represents an untapped opportunity that must be realized to ensure sustainable healthy diets for all.

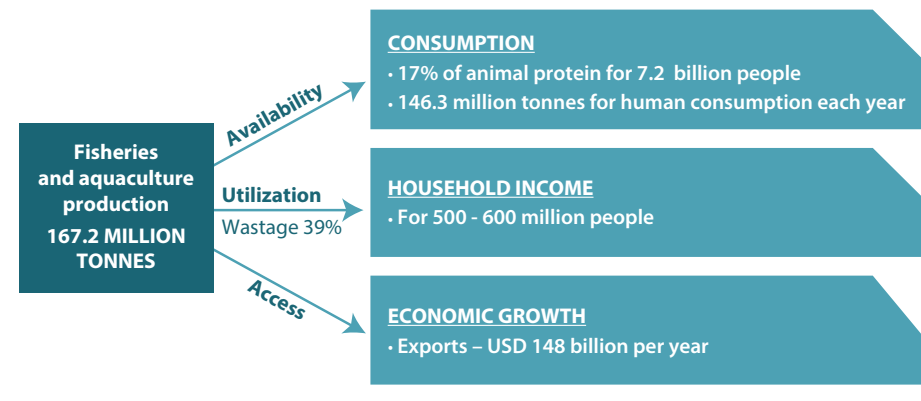
Different pathways linking fish to food security, nutrition and human health vary in importance in this most diverse of animal production systems. National and regional policies to increase the contribution of fish to food security and nutrition must therefore be similarly diverse. The pathways that offer the greatest potential contribution to human welfare will differ from country to country, and between individual fishing and farming areas and their associated communities and firms.

Purpose of this guidance note

This guidance note aims to identify trade-offs and synergies between fisheries and aquaculture policy objectives and food security and nutrition objectives, and suggests policy options to build on potential synergies. Decision-makers across the fisheries, economic and social development and public health sectors at local, national, regional and global levels face the following challenges:

- How can the fisheries and aquaculture sector further contribute to a nutritious and safe diet among men and women affected by stunting, wasting and micronutrient deficiencies, especially those dependent on fisheries and aquaculture for their livelihoods and those consumers for whom fish is a culturally preferred food, and where alternatives are unavailable?
- How can the fisheries and aquaculture sector better contribute to securing income and livelihood opportunities for the vulnerable poor, with special attention to women and youth, in the face of competition over resources and increased global demand for fish?
- How can fish supply, including production and post-harvest utilization, be sustainably increased in the face of limited resources, widespread gender inequalities, environmental impacts, including climate change impacts, and competition over land and water from other users?
- How can fisheries and aquaculture sustainable supply continue to keep up with population growth and rising consumer demand?

FIGURE 1. Fisheries-food security linkages: Global contributions of fisheries and aquaculture to food security and nutrition - direct and indirect pathways



Source: Data from FAO (2016), Sumaila & The, 2013.

In each case, the overarching question is: What changes are needed to existing policies and how might these changes be achieved? The guidance note adopts the stepwise approach outlined in the introductory guidance note to tackle these questions and to identify policy options to address food security and fisheries governance challenges and opportunities at local, national and regional levels. The first step is a situation analysis, to understand the way that fisheries and aquaculture contribute to food security, nutrition and health, and to identify food security and fishery-sector governance challenges. The second and third steps draw on recent fisheries sector governance reforms and evolving policy interest in nutrition-sensitive agriculture to identify the range of policy options and instruments that could be applied to improve coherence between fisheries and aquaculture, food security and public health policies. The fourth step aims to develop an understanding of the political economy of the fisheries and aquaculture sector in order to identify opportunities and facilitate policy change.

Fish, food security and nutrition linkages

Fish is a major source of animal protein and, according to FAO estimates, fish accounted for 17 percent of the global population's intake of animal protein in 2010 (FAO, 2016). In addition to protein, certain micronutrients from animal-source foods, like iron and vitamin A, are more easily absorbed into the body, while vitamin B12 is only available from animal-source foods. Box 1 summarizes recent evidence of the health benefits of fish consumption.

The growth of farmed fish production has contributed to increased consumption of fish by lowering global fish prices and thereby increasing the economic access for all but the very poorest consumers (FAO, 2015b). Farmed fish production has been growing faster than any other food sector and is expected to play an increasingly important role in the provision of essential nutrients from fish and fisheries products, although differences in the nutritive value of farmed and wild fish (due in part to decreased use of fishmeal feeds) suggests that one may not be a direct substitute for the other in terms of health (Beveridge *et al.*, 2013).

Fish and fish-related products also provide a primary source of income and livelihood for many communities worldwide, as an estimated 45 million people are directly engaged in the production and harvesting sector. Small-scale fisheries are a key source of employment opportunities and related income (Box 2). Globally, over 90 percent of those depending on commercial fisheries value chains operate in the small-scale fisheries sector (World Bank, 2012). In addition, secondary sectors such as handling and processing provide employment for millions more. Altogether, it is estimated that fisheries and aquaculture support the livelihoods of some 10 to 12 percent of the world's population (FAO, 2014).

Fish is one of the most-traded food commodities across the world, contributing not only to food security at the local level, but also at regional and international levels. Fish production and trade contribute significantly to global agricultural output. Fish production in 2012 exceeded 158 million metric tons, while the value of international fish trade amounted to USD129 billion (HLPE, 2014). An increasing share of fish entering global markets derives from aquaculture, while much of the fish produced and traded within low-income countries still derives from capture fisheries. These production systems have important complementary roles in meeting rising demand for fish and other products (such as fish feed and oil), and enhancing incomes and nutrition among smallholder producers, fishers and poor consumers. However, fisheries policies are increasingly orientated around value creation through export to urban and international markets. Capture-fisheries governance reforms promote greater exclusivity of access to prevent overfishing and capitalize on economies of scale to maximize economic output. This may bring benefits to resource conservation and trade, but risks decreasing the quantity of fish available on local markets and leaving many small-scale fishers excluded from livelihood opportunities (Béné *et al.*, 2010). Aquaculture policies tend to focus on maximizing productivity and economic efficiency (Hishamunda *et al.*, 2009). If too indiscriminately implemented, these policies leave little room for promoting diversity of systems and species, or accessibility of fish among poor consumers, whose diets typically lack nutrient-rich foods.

Availability of fish to consumers is affected by two other key issues, both of which affect supply: food waste and food safety. Loss and waste have been estimated to be 39 percent of fish landed globally (HLPE, 2014). Post-harvest loss in low-income countries occurs mainly due to poor infrastructure, cold chain (temperature-controlled supply chain), processing and storage facilities, while in high-income countries waste is mainly seen at retail and consumer levels. Given women's important role in post-harvest activities (Box 3), advisory services aiming to improve their knowledge and skills in processing, storage and market connectivity can greatly contribute to reduce post-harvest losses.

Box 1

The benefits of fish consumption to human health: some recent evidence

As consensus on the health benefits of fish consumption builds, an increasing number of countries (mostly high-income) are recommending minimum levels of regular fish consumption in their national dietary guidelines – Denmark, the UK and the USA are three examples.

Fish intake is associated with a 36 percent reduced mortality risk from heart disease while consumption of 60 g fish/day is associated with a 12 percent reduction in mortality from all causes. Diets low in seafood-derived omega-3 fatty acids accounted for 1.4 million deaths in 2010 and are responsible for roughly 1 percent of the world's total burden of disease-related disability-adjusted life years (DALYs). In addition, fish consumption in the USA is significantly associated with long-term weight loss.

The benefits of fish are associated in part with high concentrations of bioavailable minerals and vitamins, essential fatty acids and animal protein. Fish are a rich source of vitamin B12, only found in animal-source foods, which is essential for multiple functions, including growth, brain function and nervous system maintenance. As a source of highly

bioavailable calcium, small fish are particularly important in the diets of the poor, which are often low in milk and milk products. The same applies to zinc and iron: these are considered 'problem nutrients' globally. Fish are also a unique source of long chain omega-3 fatty acids, intake of which, during pregnancy, is associated with reduced risk of early preterm delivery (and a modest increase in birth weight), whereas, low seafood consumption during pregnancy increases the risk of the child's suboptimal neurodevelopmental outcomes, including cognition and fine motor skills. In addition, fish enhances the uptake of micronutrients from plant-source foods in the meal.

The high levels of nutrients in fish underpin the potential value of fish to healthy diets. Small indigenous fish species which are eaten whole (with bones, head and viscera; very little cleaning loss and no plate waste) have large potential to contribute to micronutrient intakes. Similarly, ground dried small fish provide a dense source of nutrients which is valuable for young children who eat small meals due to limited stomach capacity.

Sources: FAO/WHO (2010); FAO (2011); Thilsted *et al.* (2016).

Box 2**The importance of small-scale fisheries and aquaculture for food security and nutrition**

While large-scale fisheries land more fish, only 80 percent of it is destined for direct human consumption compared to almost every fish caught in small-scale fisheries. In absolute global production terms, both small- and larger-scale fisheries contribute approximately the same amount to human consumption (HLPE, 2014). In addition, small-scale fisheries (including small-scale processing and marketing) employ 90 percent of the world's fishers, the vast majority of whom are in developing countries (World Bank, 2012). For each million US dollars invested, between 3 and 30 jobs are generated in large-scale fisheries, as compared to 200 to 10,000 in small-scale fisheries (HLPE, 2014). Nevertheless, the small-scale fisheries sub-sector receives fewer financial and governmental resources in the form of policy support and infrastructure investment. However, the contribution of the small-scale fisheries sub-sector to improving food security and nutrition is gaining recognition through, for example, the World Summit on Sustainable Development Rio+20 outcome document (The Future We Want), the reports to the UN General Assembly of the UN Human Rights Commission's Special Rapporteur on The Right to Food, the endorsement of the Voluntary

Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication, and the United Nations Environment Programme's Sustainable Development Goal 14 to enable access by artisanal fishers to markets (World Summit on Sustainable Development, 2012).

In inland aquaculture in Asia – the region and sector that dominates global fish production – attempts to support household-based aquaculture for subsistence and small-scale farmers through development assistance projects have had relatively little impact on fish production and availability. Instead, major growth in the sector has occurred in the small- and medium-enterprise sector, despite little governmental or donor support. However, the impacts of this growth on poverty reduction and food security are ambiguous. Aquaculture growth has exerted downward pressure on fish prices, making fish more affordable to the poor, but also decreasing incomes of small-scale fishers, many of whom may be poor and food-insecure themselves. Aquaculture enterprises have also encroached on common property and the land of small-holder farmers, notably in low-lying coastal areas, where commercial shrimp farms often compete with smallholder rice.

Source: Belton and Thilsted (2014).

Box 3

The role of women in fisheries and aquaculture

Overall, women constituted 15 percent of all people directly engaged in the fisheries primary (catching) sector in 2012 (FAO, 2014). Among the workforce engaged in all parts of the small-scale fisheries sub-sector, 50 percent is female (FAO, 2015c). Women play important roles in the fishery industry and engage in subsistence fishing on a seasonal or occasional basis, especially in inland fisheries. In coastal small-scale fishing communities, women often manage and own smaller boats and canoes. They are mostly directly involved in skilled and time-consuming onshore tasks, such as net making and mending, processing and marketing catches, and providing services to the boats. Nevertheless, there is a misperception that fishing operators are the only resource users to be considered in decision-making processes relating to these resources and subsequent assistance planning, while post-harvest operators are less involved. Women's contribution to household food security through subsistence fisheries is often the key part of household livelihood strategies; for example in the South Pacific Islands as much as 56 percent of the catch for subsistence is caught by women. As women often have a double burden of economic activities and household tasks, they are more likely to be absent or not have their voice heard when important decisions on resource management are being made. This has important implications, as women post-harvest actors can drive sustainable resource management through their responsible demand and their influence on their peer fishermen.

Very often women work in low-paid jobs and on informal casual and temporary contracts that disqualify them from receiving social benefits.

This situation is also often linked to their weak bargaining power, the lack of interest by decision-makers to address women's specific constraints and their limited access to training and advisory services. In some developing countries, women have become important fish entrepreneurs, administering and controlling significant sums of money, financing a variety of fish-based enterprises, and generating substantial returns for the households and communities.

Due to over-exploitation of resources, fishing communities often look for other sources of income. Women are generally willing to take on new livelihood activities (like vegetable gardening and farming) to support their families and communities, with a risk of being overburdened.

Nevertheless, since women are rarely recognized as fishers in their own right and often their fisheries-related activities are considered as an extension of their household responsibilities, their contribution to the sector goes undervalued and they are not adequately recorded as "fishers" in official statistics. By failing to address gender-specific constraints to improving production and productivity, policies have often resulted in significant losses to the sector in terms of employment optimization and income, household food security and nutrition, particularly for poor women and men. More efforts are needed to support marginalized women, to engage them in decision-making processes by including them in fisheries organizations, and increase their access to physical and capital resources, technologies, know-how and profitable markets for developing their businesses and meeting their needs and aspirations. The resulting positive impacts will be felt not only by women but also by their households and communities, and society as a whole.

In industrialized fisheries, large discards (portion of catch returned to the sea) from marine capture fisheries, prior to landing, also constitute waste, but these are being reduced as selective catching technologies improve and the market for so-called “trash fish” expands. Policies, such as the European Union’s recent ban on discarding, are further reducing waste.³

³ This includes markets for novel species, surimi products, aquaculture, poultry and pet feeds. Processing waste from factories may also enter these markets.

Box 4

The importance of food safety in fish for food security and nutrition

Fish and fishery products are highly perishable. Therefore food safety is a major concern for the sector. Developing countries play a major role in supplying world markets, accounting for 61 percent of fish exports in volume, and 54 percent in value in 2012. Seafood’s contribution to food security can be compromised when food safety is not well understood and controlled throughout the fisheries and aquaculture supply chains, which have become even more complex due to increased processing and trade globalization. For this reason, frameworks for ensuring food safety in the international context are extremely important. The fisheries sector counts on the following instruments and agreements: Article 11 of the FAO Code of Conduct for Responsible Fisheries, regarding post-harvest practices and trade; the Codex Alimentarius Commission through more than 20 fishery standards; the Code of Practice for Fish and Fishery Products; the Codex texts such as the Food Hygiene Basic text; the Food Import and Export Inspection and Certification Systems, among others; and the Agreements on the Application of Sanitary and Phytosanitary Measures and Technical Barriers to Trade of the World Trade Organization.

Some food safety issues are common to the whole sector, while other issues

Food safety issues in fisheries result from poor post-harvest handling and processing, harvest from polluted waters, and from occurrence of environmental toxins – for example ciguatera and paralytic and amnesiac shellfish poisoning, all of which originate from fish and shellfish that have ingested toxic micro-algal species (Box 4). Although some fish (including longer-lived, fatty-acid-rich species like tuna and swordfish) accumulate heavy metals (such as mercury) and synthetic chemical pollutants (such as

will depend on environmental factors (for example salinity, temperature, and pH of the water), nature of the innumerable fishery products (cephalopods, crustaceans, fish, gastropods and mollusks) and production methods (wild capture vs. aquaculture). Some common food safety challenges related to fish products are: histamine levels; mercury, cadmium and other heavy metals above maximum permissible levels; veterinary drugs and other chemicals above maximum permissible levels; presence of biotoxins such as ciguatera, Paralytic Shellfish Poisoning toxins, Diarrhoeic Shellfish Poisoning toxins, Amnesic Shellfish Poisoning toxins, Neurologic Shellfish Poisoning toxins, and Azaspiracid Shellfish Poisoning toxins; presence of pathogenic microorganisms at levels above the maximum permitted; or parasitic infestation, usually anisakis, which is more common among fish coming from wild capture.

Almost 50 percent of the seafood production comes from aquaculture, and some of the food safety issues are specific to this sector. Most of the problems at international level are due to the irresponsible use of antimicrobials and other veterinary drugs, such as the application of non-authorized substances or their use in high doses, which leads to residue levels of authorized substances above maximum residue level.

The fisheries sector is one of the most globalized and dynamic industries in the world. Thanks to this, every year more countries meet international food safety requirements in line with the Codex Alimentarius standards and codes of conduct. And as a result, the levels of import/export rejections at borders are decreasing in the main fishery markets.

Box 5

Global policy discussions: the Committee on World Food Security (CFS)

During its 41st session, the CFS adopted a series of recommendations to maintain and enhance the contribution of fisheries and aquaculture to nutrition and food security, including the following priorities:

Give to fish the position it deserves in food security and nutrition strategies, policies and programmes

- Make fish a visible, integral element in food security and nutrition strategies, policies and programmes, with special regard to promoting fish as a source of good protein and micronutrients.
- Encourage consumption of fish, especially by pregnant and breastfeeding women, by children, including through school feeding, and by elderly people.
- Promote food safety as an important element in food security and nutrition.
- Support all efforts aimed at addressing overcapacity and overfishing in the context of food security and nutrition, in line with the Rio+20 outcome document “The Future We Want”.
- Support and promote initiatives to minimize fish discards and post-harvest losses and waste at all steps of the fish value chain.
- Strengthen international statistics and support research to improve knowledge on the impact of the production and consumption of fish on nutrition.
- Recognize the knowledge of local and indigenous fishing communities and promote its use regarding food security and nutrition.

Promote sustainable fisheries and aquaculture policies and management and design climate change adaptation strategies for food security and nutrition

- Promote the implementation of the Food and Agriculture Organization of the United Nations (FAO) “Code of Conduct for Responsible Fisheries” to increase the contribution of fisheries to food security.
- Collect information and data to improve knowledge regarding the impacts of climate change on fish harvesting and farming, and monitor the impact of climate change on fisheries resources.
- Mainstream and integrate climate change adaptation in fisheries and aquaculture policies, and include fisheries and aquaculture considerations in policies on climate change, as appropriate.
- Identify and promote policies, programmes and activities aimed at addressing the impact of land-based agriculture, including the management of pollutants, sediments and nutrients to receiving coastal and inland waters.

Integrate food security and nutrition concerns into fisheries and aquaculture-related policies and programmes

- Promote the implementation of the ‘Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security’ (VGGT), recognizing the particular relevance of article 8.3 on collectively used and managed land, fisheries and forests.

(cont.)

Box 5 (cont.)

- Promote the participation of fishing communities and fish workers in all decisions that impact their livelihoods and enjoyment of the right to adequate food as defined by national laws.
- Promote the protection of existing rights and ongoing tenure over sites for food-insecure people, fishing communities and indigenous and tribal peoples, taking into account the VGGT.
- Consider the impact on food security and nutrition of policies, interventions and investments affecting fisheries and aquaculture sector and their communities.
- Strengthen international cooperation to build the capacity of developing countries, to:
 - sustainably manage their living aquatic resources;
 - prevent, deter and eliminate Illegal Unreported and Unregulated (IUU) fishing;
 - promote and support the implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication;
 - facilitate access to finance and markets especially for small-scale fisheries and small-scale aquaculture; and
 - strengthen fishers and fish farmers associations;
 thereby increasing the contribution from fish to food security and nutrition.

Source: Report of the 41st Session of the Committee on World Food Security, 2014 presented to the FAO Conference in 2015 as paper C 2015/20.

polychlorinated biphenyls or PCBs), risks to consumers from these pollutants usually arise only from high levels of consumption during vulnerable life stages (e.g. pregnant and lactating women). In aquaculture, safety issues can arise from the integration of livestock (particularly poultry and pigs) into farming systems, risking zoonotic disease transmission. A major economic impact of fish diseases and pollution incidents is the loss of markets – including international ones – that follow from media reports of such incidents.

The absence of food security and nutrition concerns on the fishery agenda

The fisheries sector is threatened by many challenges that jeopardize the livelihoods, food security and nutrition status of vulnerable and marginalized people dependent on the sector. Examples of these threats include the overexploitation of resources (including through illegal or “pirate” fishing), pollution, the destruction of mangroves, degradation of coral reefs and other sensitive areas, competition for water and land in coastal areas, and the impacts of global environmental change – including climate change and ocean acidification. Further, international fish trade is growing rapidly as a result of increased global demand for fish, leading to increases in competition with global actors. This has important consequences on the livelihoods of small-scale fishery communities, which are less integrated with food chains and international trade and often have insecure tenure rights to fishery resources (FAO, 2015c). In addition, aquaculture faces concerns of environmental impacts on land, water and biodiversity, consumer safety, and competition over land and water from other users (Troell *et al.*, 2014). Furthermore, socially and culturally fueled gender inequalities in access to resources and income-generating opportunities hinders women’s contribution to the fisheries and aquaculture sector, with negative impacts on household well-being and food security and nutrition.

Box 6

Fish, food security and nutrition linkages – knowledge and data gaps

Lack of data and monitoring: data on the importance of fishing as a livelihood to food and nutrition security, its role in consumption, and its value to trade, are scarce, with very little sex-disaggregated data. There is also an absence of a comprehensive database on the nutrient composition of important species consumed. No national or global sex- and age-disaggregated data are available on the number of people dependent on the fisheries and aquaculture sector for income and livelihood who are food-insecure and malnourished. Fish production is often underreported. A large part of the sector is informal (production, processing and trade) and therefore invisible and not communicated to government ministries.

Lack of research: there is a lack of ex-ante and ex-post evaluations of fisheries policies and investment programmes, making it difficult to rigorously examine the impacts of key policy measures on household incomes, food security, nutrition and health. The state of our empirical understanding of the linkages between fisheries and aquaculture and food security and nutrition has recently been reviewed for the UK Department of Development. The study (Béné *et al.*, 2012) concluded that a large and consistent literature demonstrates that fish contribute to nutrition and health. However, much of it is focused on Asia (specifically Bangladesh and Cambodia) and information from other low-income food-deficit countries (especially those in sub-Saharan Africa) is generally lacking. There is a lack of focus on vulnerable groups (e.g. infants, expectant mothers, the elderly)

with respect to both the risks and benefits of fish consumption. Importantly, existing research does not allow the resolution of some key policy debates in the sector, such as whether the rise of aquaculture is resulting in a reduction in potential health benefits from fish consumption and whether global fish trade improves or undermines domestic food and nutrition security. Research and statistics focus mainly on the male-dominated fish-catching sector, rather than fish processing and marketing, where women play an important role. Also, the knowledge base on women's role in subsistence fisheries and their representation in fisheries management needs to be improved to support decisions aiming to promote women's rights in the sector and ensure their improved access to resources and contribution to agenda-setting. To overcome this constraint, gender (and poverty) profiles are required to assess the implications of changes in the fisheries and aquaculture sector through a gender lens. Detailed intra-household information is needed to assess the different impacts of risks and gains on the livelihoods of men and women, and to produce the evidence base for policy-makers so that appropriate actions can be taken to reduce the vulnerability of the most affected categories of men and women.

Complexity of research methodologies: investigating fish-food security-nutrition linkages is challenging given the complexities of each variable. It requires unpacking the relationships between many interrelated factors including fish prices, wages and social security, household diet diversity, intra-household allocation of food, child growth and other indicators of nutrition status, competition for resources, insecurity of tenure or access to fishery resources, environmental concerns, food safety concerns, and climate change impacts.

In trying to accommodate these challenges, policy-makers need to strike a balance between short-term gains and longer-term sustainability needs, the different interest groups, and the domestic priorities and international agreements signed by each country. A broad spectrum of national policy instruments are often adopted to develop and regulate the fisheries and aquaculture sector, each with its own objectives, which may be competing or contradictory and could have different implications for food security and nutrition of vulnerable men and women of different ages.

In general, the policy agenda of the fisheries and aquaculture sector tends to be oriented towards commercial interests, concentrating mainly on long-term exploitation of fish and related resources. The importance of the sector for food security and nutrition is undervalued. With a few exceptions (Box 5), specialist fisheries discussions tend to be mostly geared towards tackling issues of sustainable resource management and economic efficiency and neglect issues related to impact on food security, nutrition and people's livelihoods (HLPE, 2014).

Due to the overall lack of knowledge and recognition of fish, food security and nutrition linkages as well as poor coordination across the respective

policy domains, food security and nutrition concerns are often not well factored into fishery-related policy measures. This is in part due to a lack of information on food security and nutrition issues in the sector (Box 6).

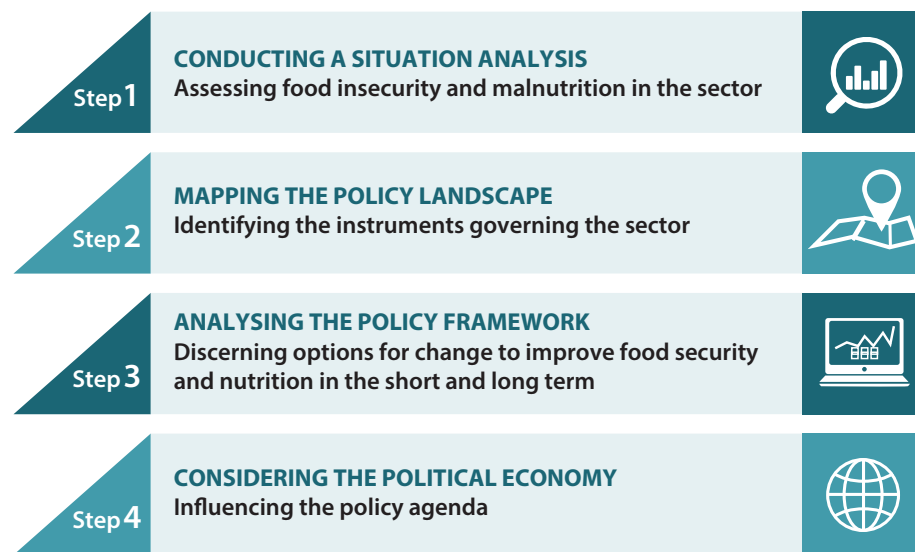
However, some encouraging examples exist. In 2013, the Asia-Pacific Fishery Commission (APFIC) recognized the importance of fish for food security and nutrition in its member countries and urged that it be communicated in policy decision-making. In response, the APFIC compiled information on fish and fish product consumption from 30 Asia-Pacific countries (Needham and Funge-Smith, 2014), in an effort to provide information at national and sub-national levels.

Acknowledging the need for public health policy-makers to actively engage with agricultural sub-sectors, the Second International Conference on Nutrition stated that *"fisheries and aquaculture need to be addressed comprehensively through coordinated public policies"* (FAO/WHO, 2014). The call for improved policy coordination, environmental protection, enhanced fish production and reduced loss and waste represents a major opportunity to promote capture fisheries and aquaculture as key nutrition-sensitive agricultural sub-sectors.

Stepwise approach Addressing food security and nutrition in fisheries and aquaculture policies

This section addresses a series of questions and issues aimed at identifying trade-offs and synergies between fisheries and aquaculture policy objectives and food security and nutrition objectives, and to suggest policy options to build on potential synergies.

FIGURE 2. Four steps for addressing food security and nutrition outcomes in fisheries and aquaculture policies



Step 1 CONDUCTING A SITUATIONAL ANALYSIS

The first step sets out to better understand the nature of food security and nutrition problems that affect different parts of the population dependent on the fisheries and aquaculture sector, and the multiple underlying causes. Dependent populations are those whose livelihood derives wholly or partly from fishing or fish-farming and ancillary occupations, and also consumers whose nutrition status is maintained or enhanced by the consumption of fish. The focus is on both the current situation and future trends, both within the sector and in the wider fish-consuming population that might aggravate food insecurity and malnutrition.

A situation analysis for the fisheries and aquaculture sectors would address the following issues:

- i) **What is the current food and nutrition situation and how many of the food-insecure/malnourished men and women depend on fisheries and aquaculture for their livelihood?**

The current food security and nutrition situation in a country can first be broadly assessed from existing data. Key sources may include FAO's National Food Balance Datasheets, derived from production and trade statistics, FAO's Food Security Indicators, which cover the four dimensions of food security (availability, access, utilization and stability), The Economist Intelligence Unit's Food Security Index, WHO's Global Health Observatory Data and Global Database on Child Growth and Malnutrition.

At present, efforts to compile and link databases on health status, food consumption, trade and production statistics into composite one-stop sources are incomplete. Also, very little gender-disaggregated data are available to assess the situation of men and women in fishing communities, to identify their specific constraints in terms of access to resources, technologies, services and institutions, and to design tailor-made equitable interventions.

FAO's Nutrition Country Profiles,⁴ like its Fishery Country Profiles, are useful summary situation analyses but are incomplete, with only a few countries having nationally representative quantitative health, nutrition and food production, trade and consumption data. Therefore, these sources are unlikely to reflect the number and variety of fish-related nutrition programmes and policies globally, but they do reflect the relative neglect of the sector in key monitoring and evaluation efforts.

To get a more complete picture of potential fish-nutrition-health linkages, it is best to conduct a situation analysis based on country- and region-specific search terms in online and bibliographic searches, supplemented by consultation of global databases of standardized national metrics, in-country interviews and visits to relevant ministries, donor programmes and non-governmental and civil society organizations to compile information, disaggregating data by gender whenever possible. By examining these country-level data sources, a preliminary evaluation can be made as to whether fish plays – or could play – an important part of a safe and nutritious diet in a country or region. Indicators that fish could play an important role in nutrition, and that nutrition and fisheries policies should be examined for conflicts and synergies, may include:

- Seasonal or chronic food insecurity in countries where there are significant wild fish resources – both inland and marine – and aquaculture production or potential production;
- High prevalence of child stunting and wasting, and high maternal morbidity and mortality, which could be linked to deficiencies in micronutrients that are available in fish;
- Significant burden of diet-related non-communicable diseases (particularly heart disease), which could be reduced through increased consumption of omega-3-rich fish;
- National food balance data sheets that indicate levels of apparent consumption of fish (production plus imports, minus exports, divided by

population) that make it a significant animal source food (e.g. > 15 percent of animal source protein from fish);

- Presence of fish in household food consumption survey data as a frequent item of consumption;
- Local custom of fish consumption for health reasons (e.g. seen as good source of food for children or pregnant women, or for recovery from illness);
- Tradition of adding fish to infant feeds as a supplement (e.g. in coastal West Africa);
- Regular recorded incidences of food-borne illness associated with seafood (e.g. ciguatera, paralytic shellfish poisoning);
- Known use of fish and fishing during “hungry seasons” in areas with highly seasonal crop harvests (e.g. rainfed agricultural regions in sub-Saharan Africa, seasonally flooded areas in South and Southeast Asia).

While such indicators may indicate the current situation, low levels of fish consumption coupled with high levels of malnutrition might signal an opportunity for increasing fish consumption as a partial solution to these problems. Here, a historical analysis to determine if fish consumption levels have changed should be part of any scoping.

Small-scale fisherfolk, and women in particular, are often not separately identified in census data (where they are usually grouped with farmers), so it is hard to examine their nutrition and health status separately from the general population. Detailed levels of household consumption within each household (i.e. are women and children in the household consuming more or less fish than men?) are also lacking, despite their relevance for public health at the community level. Also, nationally representative surveys on poverty and food insecurity can miss fishing-dependent communities altogether. Several initiatives are underway to try to improve information on consumption of fish by fish-dependent people. For example, the consumption of fish by coastal indigenous people globally has recently been estimated as part of an initiative to improve the recording of artisanal and subsistence catches in national

⁴ FAO Nutrition Country Profiles http://www.fao.org/ag/agn/nutrition/profiles_en.stm

and global fishery statistics, and efforts are being made to include fishing communities in household living standard surveys (Béné *et al.*, 2012).

ii) Who are the food-insecure/malnourished people in the fisheries and aquaculture sector and fish-dependent population? Which population groups are most affected? What are the processes that keep some people in the sector in a condition of food insecurity?

As mentioned previously, there is little data on who is food-insecure or malnourished within fishing communities, and what are the specific needs and priorities of most vulnerable men and women. It is likely that where fisherfolk are poor and marginalized, disadvantaged people, especially women and youth, within those communities will be particularly affected. For example, where women are excluded from economic opportunities, their access to sufficient nutritious food and to health care may be compromised, and their ability to provide adequate nutrition to their children may also be affected (Box 7).

In identifying the relevance of fish in people's diets, it is important not to rely completely on national per capita fish availability (or apparent consumption). Particularly in large countries, there may be only limited regions where fish is important in diets; the importance of fish in some regions can be lost in national data that suggest overall low nutrition dependence on fish. India and Brazil are two such examples (Box 8). Most data on fish consumption are inferred rather than actual, as they are based on national-level food balance data. This leaves a very vague picture of how much fish is being eaten by the people who really need to eat it – those who are malnourished, have higher needs (e.g. pregnant women or children), or are at health risk from their existing diets, which once again underlies the importance of gender- and age-disaggregated data. A rising urban middle class can greatly increase its fish consumption, so that national average apparent consumption rises while the consumption of fish by the poor (who need it more) may not reflect the national trend. This is undetectable

Box 7

Nile perch and the hungry of Lake Victoria

Lake Victoria supports Africa's largest inland fishery, and Nile perch is its most valuable export. It has been argued that there is a direct relationship between the exports of a large share of Lake Victoria's fish production potential and the high rates of child malnutrition along the lake's shores. This presumed link is an over-simplification. It is the way that the income benefits from the Nile perch export business are distributed, likely compounded by poor sanitation and high prevalence of diseases such as malaria and AIDS, that explains the persistence of malnutrition in the face of a booming export sector. In essence, men control the catching sector and choose to sell to factories. They also control household expenditure. The incomes they make are not always spent to provide food for their dependents, and women's lack of bargaining power on household expenditure decisions has been a key reason for the persistence of undernourishment among both women and their children.

There is a clear policy message here: One cannot expect improved economic dynamism from trade to result in welfare gains for vulnerable, food-insecure people unless the source of that vulnerability is also addressed. In this case, vulnerabilities arise from large inequities in relations of power between factories and fishermen, and between fishermen and women in their households and in the communities. It is these relationships that allow malnutrition of dependents – principally young children – to persist in the context of a lucrative export industry. It has nothing to do with the export of protein from the region. Fair contracts for fishermen selling to factories and women's economic empowerment are two potential policy responses in this case.

Source: Summarized from Geheb et al. (2008).

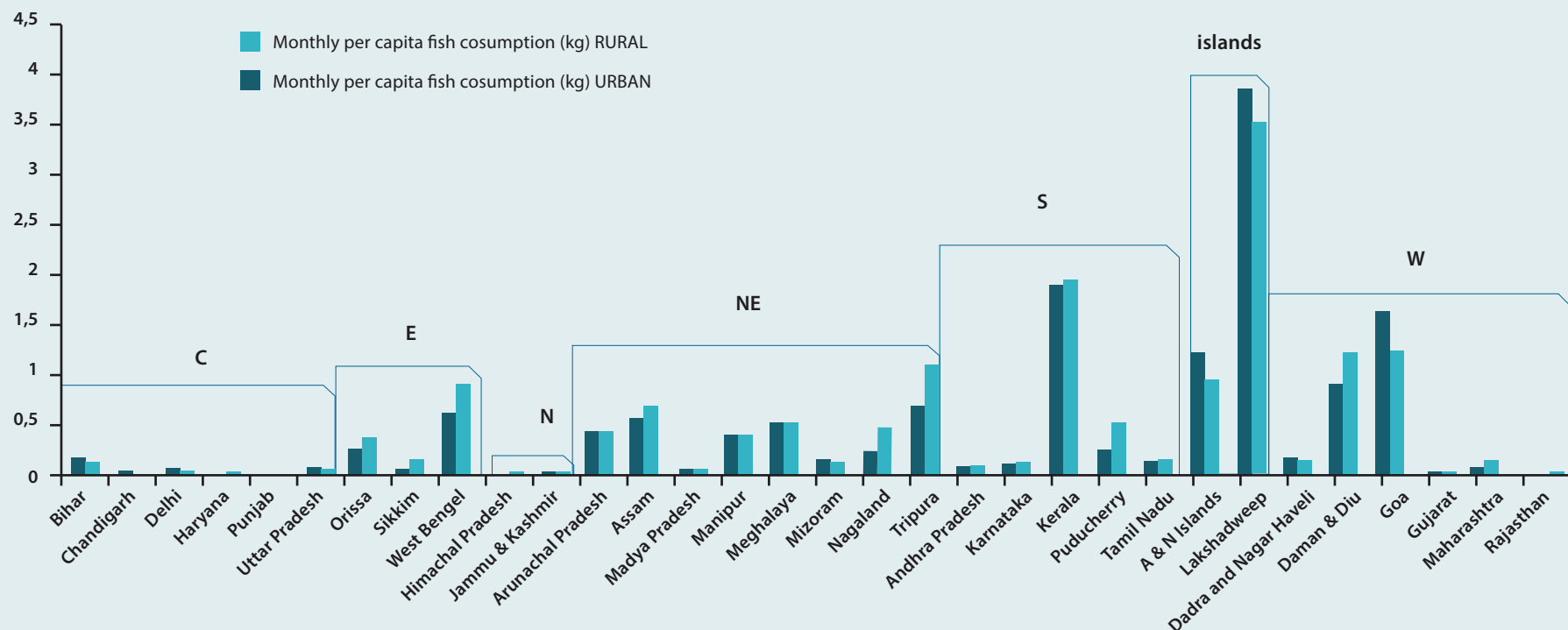
Box 8

In-country variation of fish consumption levels – evidence from India and Brazil

Fish consumption is highly variable by region in India and Brazil, depending on proximity to resources, religion and other cultural and historical factors. In India, fish consumption is highest on islands (e.g.

Lakshadweep, the Andaman and Nicobar Islands) and in parts of South and West India (e.g. Kerala and Goa) and is fairly similar between rural and urban populations (Fig. 3a). In Brazil, absolute and relative expenditure on fresh fish is highest in Amazonas and Nordeste regions (Fig. 3b). Note that often, only proxy measures (such as these) are available for fish consumption at sub-national level.

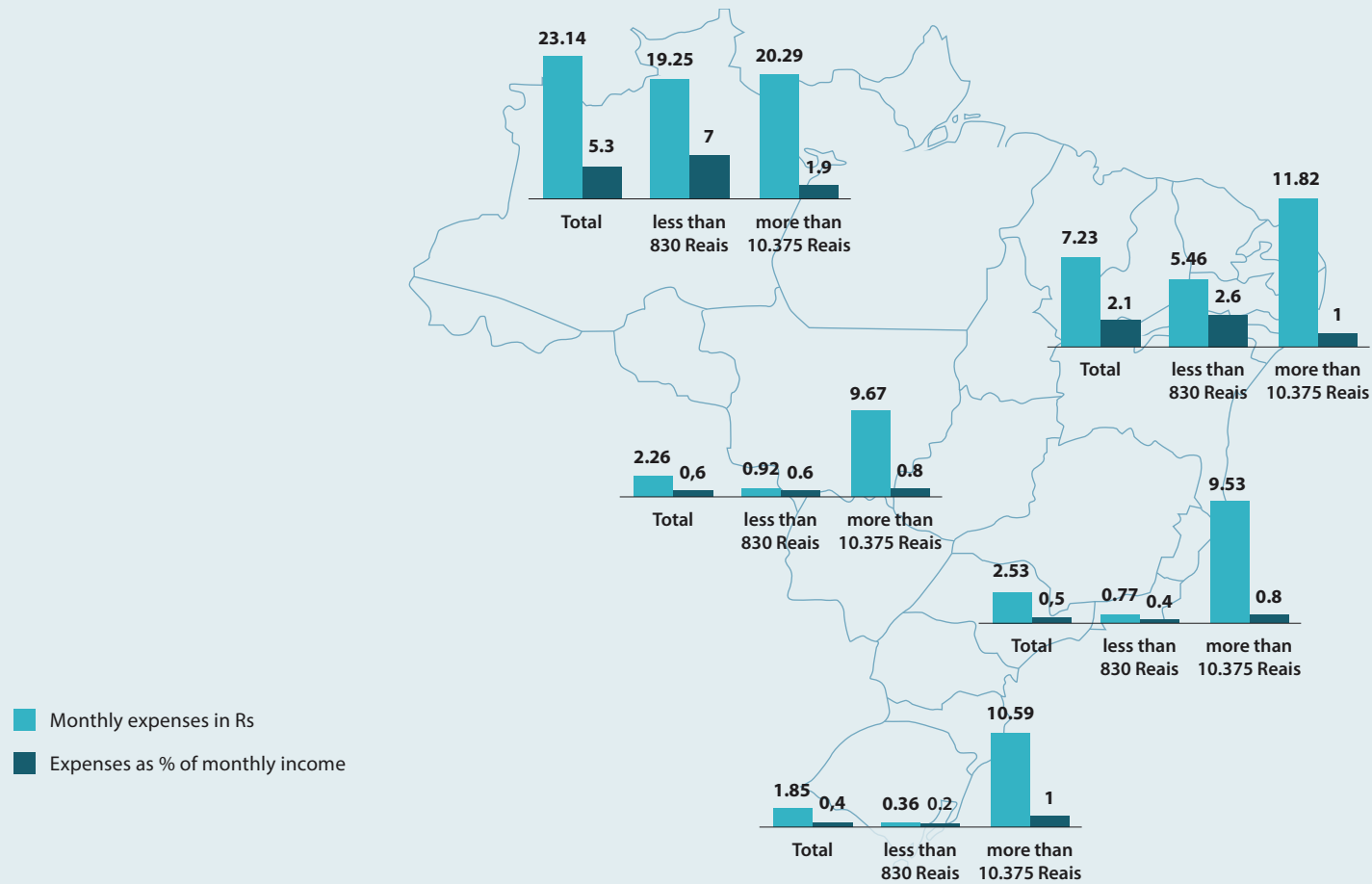
FIGURE 3A. Monthly per capita fish consumption by state and region in India (urban and rural)



Source: 17th Livestock Census of India (2003). Release of the 17th Livestock Census Data by Hon'ble Minister of Agriculture (Jan 19, 2005) from the website: <http://www.dahd.nic.in>, Government of India.

Box 8 (cont.)

FIGURE 3B. Household purchases of fresh fish per income category in Brazil



from national apparent consumption statistics, and the sometimes complex mechanisms linking food availability and access to nutrition and health require detailed local-level analysis (e.g. Box 9).

There is an urgent need for better information on patterns of fish consumption by nutritionally vulnerable populations, disaggregating data by sex and age whenever possible. If the role of fish is not known and not reflected in nutrition, food security and public health policies, then it should be a priority to fill key data and knowledge gaps, so that necessary policy shifts and investments in making the sector nutrition-sensitive can be identified.

iii) What are major trends over time that impact the fisheries and aquaculture sector and how do they affect the food security and nutrition situation of different groups?

Any scoping of the sector's potential to contribute to nutrition and food security needs to evaluate what drives the potential of the sector to increase availability of and access to fish, as well as what drives demand. Key drivers of demand (increased or decreased) are population growth, economic growth, urbanization, globalization of food markets and associated changes in consumption habits (e.g. Box 9), awareness of health benefits and perceptions of health risks of fish consumption.

Pressures on fisheries are expected to increase along with increasing tropical population densities both inland and along coastlines, which are anticipated to place additional local environmental stress if not mitigated by improved management (Sale *et al.*, 2014). Climate change-related impacts may also imply new gender dynamics within the households and the communities, and women and youth might be more affected.

Supply is affected by five major drivers:

- Natural fluctuations in the productivity of capture fisheries;
- Fishery management regimes and their ability to regulate harvest from

Box 9

Linking food availability and access to nutrition and health

Resource conservation policies may undermine access to food for vulnerable populations. For example, infant malnutrition may have increased after the creation of a Marine National Park (Moshy *et al.*, 2013).

A small-cohort study of nutrition status among under-five children in two villages in the Mafia Island Marine Park in Tanzania indicated that the prevalence of underweight children was high in both villages (69 percent in one, 40 percent in the other). Interviewees in the first village attributed the exceptionally high underweight problems to a substantial reduction in breastfeeding frequency. This was further attributed to mothers having to resume the arduous work of seaweed farming and octopus fishing soon after delivery, as more accessible sources of food and household income were no longer available after the creation of the Marine Park, which restricted people's access to resources previously harvested. Consequently, infants were fed poor-quality nutritional substitute foods at a tender age. Decreased family income, food insecurity, changes in gender roles and increased responsibilities for women were also perceived to be key underlying problems contributing to higher levels of undernutrition among children in the study areas. The study recommended a revision of policies on fishing restrictions, and investment in improving fish trading (by introducing labour-saving technologies and practices) to increase household food security and liberate mothers' time for breastfeeding and child-caring activities.

Source: Moshy, V.H., Masenge, T.J. and Bryceson, I., 2013. Undernutrition among under-five children in two fishing communities in Mafia Island Marine Park, Tanzania. *Journal of Sustainable Development*, 6(6), p.1.

wild stocks in seas and inland waters to sustainable levels and to reduce waste in the form of discarded fish;

- The rate of aquaculture growth, which is more closely linked to demand than is wild-fish production but is also affected by input costs (principally of feed), availability of suitable sites in increasingly crowded coastal and inland waters, and technological innovation;
- Global environmental change associated with anthropogenic greenhouse gas emissions, which potentially affect both aquaculture and fisheries;
- Supply chain management that affects post-harvest losses. This may include investments and specific measures, including social policy measures, to improve artisanal fish handling, marketing and responsible demand or advances in food technology and new markets for products from underutilized species and currently discarded wastes.

Scoping the effects of each of these drivers is a technical challenge but first-order projections per country can be found in the FAO/IPPRI/World Bank publication “Fish to 2030” (Msangi *et al.*, 2013).

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Step 2 MAPPING THE FISHERIES AND AQUACULTURE POLICY LANDSCAPE

Having understood the status of the fishing and aquaculture sector and identified its contribution to food security and nutrition, as well as factors that affect the relationship, the next step identifies and describes the main policy measures in the sector that have or could have a positive or negative impact on food security and nutrition (in the short and longer term). Mapping the policy landscape that governs the fisheries and aquaculture sector would address the following issues:

- i) **What are main national policy measures in the fisheries and aquaculture sector?**

In most countries, the policy framework for managing capture fisheries is based on a simple model that describes how production increases as more fishing takes place, up to a point, and then decreases as the rate of harvest exceeds the natural productivity of the system (Box 10). Fisheries management seeks to limit harvest rates. Fisheries policy sets out the priorities for the national fishery sector – for example maximizing profitability of the sector, or fish production, or maintaining as many fishing jobs as possible – and fishery assessments determine what level of fishing can be sustained at each of these target reference points for management. In the past, these policies have been highly sectoral and poorly integrated with wider development policy, although efforts to make national policies compatible with wider economic and social goals, and with environmental conservation, have increased in recent years.

In aquaculture, most national policies set an aspirational production target and, if effective, they provide enabling policy and legislation for private sector (including smallholder) investment to contribute to meeting that target. State and donor-supported aquaculture support programmes aimed at the poorest have not been particularly successful on the whole, but small- and medium-scale private enterprises have driven the rapid increase in aquaculture seen over the last 30 years, particularly in Asia.

Based on standard fishery assessment models, different countries may pursue rather different policy objectives, according to the size of their resource, its potential for generating macro-economic benefits, its importance to formal and informal employment, and the role fish plays in a nation’s diet.

For example:

- **Export-based fisheries: Namibia** has significant marine fisheries resources in the Benguela Current system but does not have a large population with cultural preferences for marine fish in their diet; neither does the industrial fisheries employ a large segment of the population, and Namibia has no significant small-scale marine fisheries. In these circumstances, leasing the right to fish to industrial fleets (both domestic

and foreign) and aiming to maximise the revenues (licence and access fees, business profits and taxes on them) relative to costs is the likely policy choice. The policy aim corresponds to achieving the maximum economic yield (Box 10). Contributions to national food security are in the form of a generalized contribution to government revenue, trade balance and economic growth. Food security and nutrition benefits are experienced if these macro-economic benefits reach both poor men and women through redistributive economic and social policy measures.

- **Mixed export and artisanal fisheries:** in **Ghana** and **Senegal**, there are both offshore fisheries caught by industrial vessels (which pay the governments to legally access the territorial waters of these countries – although some fish illegally) and near-shore fisheries caught by artisanal or small-scale fisheries. There are also coastal lagoon, river, reservoir and lake fisheries that support full- and part-time fishers and farmers and the landless poor who may be occasional fishers, as well as networks of small-scale traders, many of whom are women. Here, policies and management objectives vary among sub-sectors of the fishery, with an overall policy aim to minimize trade-offs among the conflicting objectives of maximizing revenues, catches and employment (Box 10). Aiming to maximize economic yield by granting or selling fishing rights only to larger-scale, export-orientated fisheries would, at least in the short term, lead to loss of employment and disruption of domestic marketing of fish, and may be both politically unfeasible and undesirable from a nutrition and health perspective. Thus, policies in these countries are a trade-off between maximizing revenues, fish availability for consumption, and fish-related jobs.
- **Aquaculture-based regional production:** in **Egypt**, the largest aquaculture producer in Africa, aquaculture for tilapia and mullet supply middle-class consumers in domestic and regional urban markets with fish. Increasing production and profitability are the main policy objectives.

Box 10

Surplus-production model for exploited fisheries, illustrating fishery management target-reference points and the implicit trade-offs between them

The basic requirement for sustainable capture-fisheries management is that at the end of each fishing year, sufficient spawning-stock of fish should remain in the water to sustain future harvests. The Gordon-Shafer model and its derivatives quantify this principle. This model proposes an equilibrium between catch (or yield) and fishing effort, so that fishing effort can be regulated to achieve a maximum sustainable yield), maximum economic yield and related targets. Failure to regulate fishing effort leads to fishing effort tending toward the point where economic returns from the fishery equal the costs of exploiting the resource – the “open-access equilibrium”. Beyond this point, where the (red) cost curve crosses the (blue) catch/yield curve, resource rents are negative. At this point, harvesters make no net income. Normally, harvesters would stop at this point or earlier, but if signals of resource scarcity are distorted or masked by subsidies to the fishing industry (in the forms of grants for modernizing fishing technology, compensation for poor fishing seasons, fuel subsidies that lower costs, etc.), then fishing effort can even exceed the open-access equilibrium, possibly leading to stock extinction and certainly to a situation where the fishery is a net drain on the economy. This model, linked to property and use rights ideas from institutional economics, is the theoretical underpinning of current policies on “wealth-based fisheries management”.

Source: Allison, E.H. (2011). Fisheries, aquaculture, poverty and food security. WorldFish Center Working Papers 2011-65, Penang, Malaysia http://www.worldfishcenter.org/resource_centre/WF_2971.pdf

- **Aquaculture-based export and local production:** in **Bangladesh**, aquaculture policy supports pond-based culture of fish to improve small-farm productivity and nutrition among the rural poor, small- and medium-enterprise aquaculture to supply domestic and regional urban markets, and the development of an export-orientated shrimp farming industry supplying developed-country markets. The challenge lies in balancing investments and support to these sub-sectors in ways that do not set them up in competition with one another.
- **Gender integration in coastal resources planning:** **Mexico** has adopted an affirmative gender policy for government fisheries functions, and women have reached ministerial positions to assist the sector's development. Research on social and ecological systems focused on the divisions of labour and responsibilities between men and women, property rights, access to credit and resources in coastal states, investing in resource management institutions and ways to support the most vulnerable groups, and the sustainable functioning of marine ecosystems.

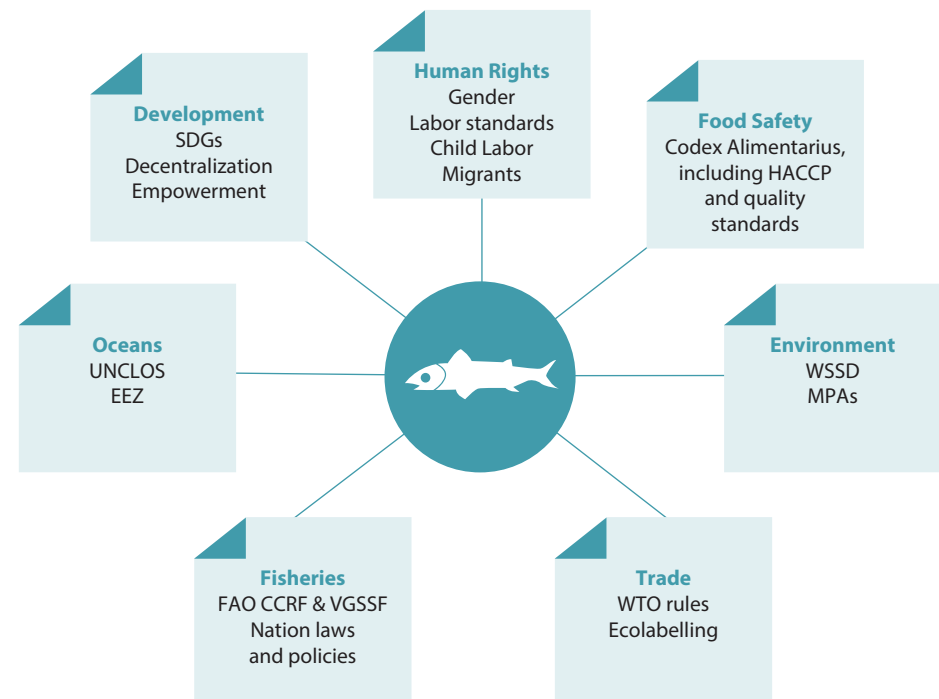
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ii) How are fisheries and aquaculture sector-specific policies interlinked? How do they relate to international/regional agendas or agreements?

Fisheries policy and law are usually set at national level, although with decentralization prevalent in many countries, fisheries management is sometimes devolved to the local level, and on occasion fishing communities are key partners in the management of the resource they depend on. Fisheries policy does not occur in a vacuum, however, and it interacts with a range of other legal and policy instruments at multiple levels (Figure 4).

As well as national laws and policies, fisheries and aquaculture are governed through a set of policy standards and guidelines, such as the FAO Code of Conduct for Responsible Fisheries and the Voluntary Guidelines for Securing Sustainable

FIGURE 4. Examples of governance domains relevant to fisheries and aquaculture and linkages to food security



SDGs = Sustainable Development Goals; **UNCLOS** = UN Conference on the Law of the Sea; **EEZ** = Exclusive Economic Zone; **FAO CCRF** = Code of Conduct for Responsible Fisheries; **VGSSF** = Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication; **WTO** = World Trade Organization; **WSSD** = World Summit on Sustainable Development; **MPA** = Marine Protected Area; **HACCP** = Hazard at Critical Control Point.

Source: modified from FAO. 2007. Making global governance work for small-scale fisheries. New Directions in Fisheries – A Series of Policy Briefs on Development Issues, No. 09. Rome. 16 pp. <http://www.fao.org/3/a-a0992e.pdf>

Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. These instruments are endorsed by the member states of FAO through the Committee on Fisheries, which meets biannually. The codes and standards are meant to guide national governments, as well as other fisheries and aquaculture stakeholders.

Fishing takes place within the broader frame of ocean governance, with the oceans governed under the UN Convention on the Law of the Sea, under which states have claimed Exclusive Economic Rights (including to fisheries) in the zone adjacent to their coastlines, extending out to 200 nautical miles from shore.

Various global, regional and national laws and policies governing pollution, trade, food safety, water resources (for inland waters), environmental conservation and international development also influence fisheries and aquaculture policies. There are also influential regional policy forums (Box 11), such as the Inter-American Tropical Tuna Commission to name but one. Recently, human rights instruments have become influential in governing fisheries, as the displacement and marginalization of the world's small-scale fisherfolk has become an increasing concern. Considering that women's role in fisheries is often overlooked and undervalued and that they are often excluded from fisheries decision-making, their perspective and priorities are not reflected in fisheries policies. To enhance women's rights in fisheries, the recently adopted General Recommendation 34 on the rights of rural women of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) specifically calls on States to establish quotas or targets for rural women's representation in decision-making positions, including fisheries bodies. It also recommends the development of gender-responsive fisheries policies.⁵ Further, recent media reports of slavery in shrimp value chains is a dramatic and distressing example of a larger and more subtle concern voiced by the general

⁵ See CEDAW General Recommendation 34 on the rights of rural women http://tbinternet.ohchr.org/Treaties/CEDAW/Shared%20Documents/1_Global/INT_CEDAW_GEC_7933_E.pdf

Box 11

Regional organizations with food security objectives

Recently, a number of regional organizations, both specific fisheries organizations and broader regional organizations, have incorporated explicit food security and nutrition objectives in their policy and strategy documents. Examples include the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa of the African Union Commission and NEPAD Planning and Coordinating Agency and the Fisheries and Aquaculture Integration Policy 2015-2025 of the Central American Fisheries and Aquaculture Organization. These regional organizations play an important catalytic function for their members and can promote the sharing of experiences and good practices.

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public, encouraging a shift in thinking and process by value chain players. Civil society organizations have drawn on labour rights and other provisions of international human rights law to campaign for justice for fish workers and to oppose policy that seeks to privatize resources that are held in common by communities.

This policy complexity risks incoherence but also presents multiple entry points for improving fisheries and aquaculture sectoral performance with respect to economic performance, sustainability, food security, nutrition and human health. A key part of mapping sectoral policies is to understand which of these other policy domains is influential in a particular country or for a particular issue.

iii) To what extent are fishery-sector policy measures implemented/enforced?

Until recently, the enforcement of fishery-specific policies was largely regarded as a failure, due to lack of monitoring, control and surveillance capacities and lack of political will. Mobile, trans-boundary fish resources, lucrative global markets and the “out of sight, out of mind” nature of maritime activities all meant that policies existed on paper but were not well enforced at sea. More recently, there have been notable successes in fisheries management. Several developed countries that are major fishing nations (e.g. Chile, Iceland, New Zealand, Norway, United States) now have sustainably managed a profitable capture fisheries. The European Union is also seeing improvements in compliance with catch-limits, when private actors comply with fishery harvest rules set by governments (Da Rocha *et al.*, 2012). In smaller scale decentralized fisheries that are managed in partnership with communities, a global analysis of successful fisheries indicated that enforcement was important but less influential than local-level leadership, the setting of harvest quotas, and social cohesion within communities (Gutiérrez *et al.*, 2011).

Many developing countries continue to experience problems enforcing fisheries management regulations but the political will to tackle illegal, unregulated and unreported (IUU) fishing seems to be strengthening, with interventions by high-level politicians to support sustainable fisheries in major fishing nations (Box 11 for two examples). Substantial negative economic incentive were created under the European Union’s IUU Regulation, in which signatories agreed to leverage trade sanctions on varying scales, limiting imports to the European Union from seafood-producing nations based on infraction (European Commission, 2009). Accused countries have responded to the regulation, including Fiji, Panama and Papua New Guinea, by reforming fishery systems to address IUU concerns (European Commission, 2015).

iv) Historical evolution of fisheries policies: towards greater stakeholder inclusion in policy-making

A wave of reform has swept through fisheries policy over the last 20 years or so. Broadly, the “governance revolution” in fisheries is an ongoing attempt to replace a system of largely unsuccessful attempts to manage conditions of access to a state-owned resource through licensing and technical measures, with one based on a combination of participatory local-level management, a variety of market-based instruments and a set of global principles and codes of conduct. Increasing attention is also being given to address gender inequalities and empowering the most vulnerable women. The overall goal of these reforms is to end the “race for fish”, whereby currently each individual fishing enterprise has very limited fishing rights and every incentive to try to maximize its share of the resources in the state-managed or high-seas commons by racing other fishers to catch fish. A key initiative framing a transition to a rights-based and more sustainable fishery sector has been the 1995 FAO Code of Conduct for Responsible Fisheries, and the development and implementation of its related instruments, in particular the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication, which include a specific chapter on gender equality. Examples of decentralized fisheries governance and its influence on fisheries policy are given in Box 12.

Step 3 ANALYSING THE POLICY FRAMEWORK

Here, the set of relevant policy measures identified in Step 2 are analysed for their impacts on food security and nutrition – both individually and collectively. This step will also try to identify gaps within and across the identified policy measures in order to yield policy options for enhancing the contribution to food security and nutrition. To date, few of the below questions have been systematically addressed in the fisheries and aquaculture sector, so we illustrate some emerging consequences of policy reform attempts with reference to available case studies.

Box 12

Examples of community- and civil-society-led governance reforms in small-scale fisheries

Post-apartheid fisheries reform in **South Africa**, through the Marine Living Resources Act 18 of 1998, used individual transferable quotas (ITQs) to broaden resource access by allocating small quotas to new entrants, even though the system has been created to reduce capacity through a reduction in the number of active fishers. Artisanal fishers were not recognized by the Act. Through a class action led by a civil society organization linking fisherfolk with activists and academics (Masifundise), a court case was initiated against the ITQ system. The action cited inequities of access and concerns about food and livelihood insecurity of small-scale fishers. An out-of-court settlement with the claimants in 2007 led to 1000 interim relief permits being allocated to artisanal fishes and the development of a new small-scale fisheries policy for South Africa (Isaacs, 2011).

In **Cambodia**, the country most dependent on inland fisheries for food and livelihood in the world, a tenure system inherited from colonial times created tension as the commercial exploitation of inland fisheries accelerated in the 1990s, along with growing demand from subsistence and small-scale users. Conflicts sometimes turned violent and human rights non-governmental organizations started to address the issue, producing reports and organizing workshops. Fishing communities also organized letter-writing campaigns and public protests. In this context, the Prime Minister announced in December 2000 that more inland fishing areas would be opened up for the benefit of communities, and by the following year 56

percent of private fishing concessions had been released for public access (FAO, 2011). Most recently, a second wave of reform was also linked to civil society advocacy around equity and social justice for fishing communities, with a strong food and nutrition security orientation.

In **Fiji** a movement to revive traditional forms of local reef management began in 1990, mainly driven by conservation non-governmental organizations working in partnership with traditional authorities. There are now over 400 villages around Fiji working with government and non-government organization partners under the umbrella of the Fiji Locally Managed Area network (LMMA Network). These villages all have one or more taboo areas within their traditional fishing grounds and manage this together with other restrictions on what can be caught, when and how. A key objective is to conserve fish so that they can continue to play a part in local diets (FLMMA, 2011).

The governments of **Chile**, **Brazil** and **Mexico** have devolved local fisheries management to fishing communities (indigenous and non-indigenous), cooperatives, or individuals and firms, often following pressure for community and fisherfolk organizations. The mechanisms used to devolve management rights and responsibilities from the central state have varied but often involve responsibility over sea areas – Territorial Use Rights in Fisheries (TURFs) (Basurto *et al.*, 2013). TURFs have provided a means by which local communities can benefit from the sale of high-value commodities such as abalone and spiny lobster (Hilborn *et al.*, 2005), thereby contributing indirectly to food security by raising household income and fostering community economic development.

i) Have food security and nutrition considerations been included in the different policy instruments? What are the intended results and who is targeted?

Analysis of the content of current fishery policy and legislation can provide insights on the degree to which current national or regional fisheries policies are aligned with food security and nutrition initiatives (Box 13). A review of integration of fisheries and aquaculture into food security policies among African countries bordering the Indian Ocean found that fisheries were underrepresented but could play an essential role in the future, and that fishery officials could substantially contribute to progress as the link between the sector and policy-makers (Kurien and Rios, 2013).

ii) What are the actual and potential effects (positive and negative) of the different policy measures on food security and nutrition, currently and possibly in the medium to long-term?

There are three major policy thrusts in the global fisheries sector that have important influences on food security and nutrition: the reform of aquatic and marine tenure rights; the promotion of greater global market integration, and the development of aquaculture.

Tenure rights reforms, if built on pre-existing (often communal) access schemes, may help distribute benefits from improved fisheries through existing social and market networks. Replacing traditional communal access arrangements with private fishing rights or other more exclusionary forms of

Box 13

Attempts to align national fisheries policies with food security and nutrition concerns in Ecuador

Ecuador is a major fish exporter (small pelagic fish and farmed shrimp), but Ecuadorians consume only 6 to 7 kg of fish per year, a third of average consumption of neighboring Peruvians. The Government has recommended seafood consumption as a healthier alternative to beef or chicken and is moving to increase local demand (Ortiz, 2010).

Ecuador has strong enabling legislation to support food security policies. First, in 2008 a Right to Food guideline was written into Ecuador's Constitution: "*access to healthy, sufficient, nutritious, and culturally appropriate food, preferably produced locally and in accordance with people's diverse identities and cultural traditions.*" The following year, a Food Sovereignty Law was passed, and created a participatory organization responsible for drafting nine subsequent laws. One of the nine laws addressed artisanal fishing, aquaculture and the conservation of mangrove fisheries, highlighting the

importance of productive marine habitats for food security. This fisheries-specific food sovereignty law was developed in a number of workshops, including input from thousands of citizens and hundreds of organizations and state institutions. The law targeted policy issues, including a marine zone for artisanal fishers and protection for their practices, gender equality, health insurance and safety. To help ensure continued development of the food security programme, a partnership of food security actors and politicians was formed: COPISA (*Conferencia Plurinacional e Intercultural de Soberanía Alimentaria – Plurinational and Intercultural Conference on Food Security*), which facilitates research and knowledge sharing across disciplines and technology, and promotes the importance of public health and nutrition (Peña, 2013).

While Ecuador's national food sovereignty framework law was passed and has enabled legislation specific to fisheries and food security, the fisheries specific fishery development laws for artisanal fishing have been developed and codified, but many artisanal fishermen criticize the laws' contents (e.g. *El Mostrador*, 2016).

tenure may help, in the short to medium term, to recover a depleted fishery, ecologically and economically. However, it carries the risks of concentrating wealth among a small elite in situations where those excluded have few alternative opportunities to gain income and food, with long-term effects of disenfranchising traditional fishing communities, and the risk of exacerbating existing inequalities and discrimination. Enthusiasm for maximizing economic benefits and achieving conservation benefits from fisheries must therefore be tempered by concern for the long-term distributional impacts of tenure reform. Land, water and sea tenure guidelines, published recently, provide guidance on appropriate reforms (FAO, 2012). Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication reinforce these concerns and frame support for small-scale fishing communities' resource access and livelihoods in terms of human rights principles – including the Right to Food and gender equality and equity (FAO, 2015c). These interlinked guidelines are an example of emergent policy coherence between the fisheries sector and broader development concerns. Special attention is also being given to the promotion of gender equality in small-scale fisheries.

The impacts of trade on local food security and nutrition remain ambiguous. Global trade enables local fishers to access larger markets and earn potentially higher revenues to purchase goods flowing into the region. Trade can thus create a “quality exchange” where developing countries export high-value seafood (shrimp, lobster, octopus, live reef fish) and import lower-priced seafood (sardines, mackerels, small tunas, the heads of various species of farmed and wild-caught fish), which – as well as being more affordable by the poor – is often more nutritious. Net nutritional benefit may therefore be positive (Asche *et al.*, 2015). For example, global market integration has made cheap fish more available to low-income consumers in Nigeria, and the import of fish feed from the globalized market in processed small pelagic fish (sardines, anchovies, etc.) has opened up livelihood opportunities for fish and shrimp farmers in the tropics. In other cases, however, global trade

may have put pressure on local small-scale fishing and trading livelihoods (Table 1). Distribution of economic benefits is not equitable across the value chain supporting fisheries. Small-scale fishers are, in general, receiving the smallest economic benefit relative to other segments, due in part to stronger bargaining power held by processors and retail markets, which can select where to distribute product (Bjørndal *et al.*, 2015).

Aquaculture impacts on food security and nutrition are often related to both tenure reform and global trade. For example, the conversion of communal land and water spaces to privately owned or leased aquaculture sites in many of the world's mangrove-fringed coasts has displaced large numbers of fishers and gleaners previously using those areas. Global demand for seafood has also led to rapid development of export-orientated aquaculture, such as shrimp and catfish (*Pangasius*) culture in coastal Vietnam.

iii) How can the fisheries and aquaculture sector better contribute to rapidly increasing the intake of a nutritious and safe diet, and especially for those populations dependent on fisheries and aquaculture for their livelihoods and for those consumers for whom fish is a culturally preferred food, or where alternatives are unavailable? What change is needed and how can this be achieved?

Adapting the idea of nutrition-sensitive agriculture to the fisheries and aquaculture sector provides a policy pathway to improving intake of fish by the malnourished – which includes both the billions of people whose cognitive and physical development and health status is affected by micronutrient deficiencies and the billion people who are obese or overweight (many in developing and transitional countries). A transition towards nutrition-sensitive fisheries and aquaculture requires integration of capture fisheries and aquaculture into local and national food systems to improve future diets. Promoting the inclusion of fish in food-based strategies can address

micronutrient inadequacy as well as health concerns related to diets that are too high in refined carbohydrates and saturated fats. Fisheries can also contribute a vital line of nutrition to vulnerable populations in protracted crises or emergencies (FAO, 2015d). There are a number of interlinked opportunities for this:

- Improving the quality and quantity of fish supply (which can improve diets of both producers and consumers);
- Facilitating women's empowerment, which improves maternal and child health and can ensure improved intra-household distribution of food, including fish, and providing decent employment to women and youth;
- Promoting equitable trade and enhanced markets, which can increase access by lowering prices; and

- Including fish in nutrition programmes targeting those at risk of malnutrition, including school feeding programmes.

Policy analysis to identify possible food security-, nutrition- and fishery-sector synergies would include national and regional searches for examples of both successful and unsuccessful policy and programmatic interventions in these domains.

Food-based approaches⁶ – maintaining people's access to the diverse range of foods necessary for a healthy diet – are increasingly seen as an important strategy for treating micronutrient malnutrition. The potential role and importance of

⁶ Food-based approaches are sometimes compared to micronutrient supplementation, which requires expensive administration of pharmacologic supplements (tablets, capsules, powders or pastes) to prevent and treat micronutrient deficiencies in children and women of child-bearing age. In contexts where deficiencies are common, both approaches may be necessary, at least in the short term.

TABLE 1. Direct and indirect impacts of fish trade on food security and nutrition, based on expert reviews in a multi-country case study

	Impact on trade revenues	Impact on fishers	Impact on fish workers	Impact on fish consumers	Impact on fish resources
Brazil	+	+++	++	+	---
Chile	+++	+	++	-	-
Fiji	+++	+	+	+	-
Ghana	---	--	+ and -	--	--
Kenya	-	+	+ and -	---	---
Namibia	+++	+++	+++	+	+
Nicaragua	+++	+++	++	+	---
Philippines	++	-	+ and -	-	---
Senegal	+++	++	+ and -	--	---
Sri Lanka	++	++	++	+++	--
Thailand	+++	++	+++	+	---

+ small positive impact ++ substantial positive impact +++ large positive impact - small negative impact -- substantial negative impact --- large negative

Source: adapted from Kurien (2004) by Allison (2011).

fish in nutrition strategies that build on people's existing food production and culinary systems needs to be promoted if it is to form part of such an approach. The following initiatives demonstrate some of the ways that fish have been incorporated in nutrition and health programmes.

- **Conducting proof-of-concept demonstrations of the relevance of fish to improving maternal and child health.** Fish is included in research on dietary needs for the first 1000 days of human life – from conception to the second birthday – in Bangladesh, Cambodia and India. Trials and evaluations on child health and learning efficacy are currently underway in a number of countries (Box 14). These trials would benefit from policy coordination among fisheries, education and health ministries if they are to be scaled out to have significant impact among food-insecure and malnourished populations.

- **Promoting nutrition education and improved access to fish in populations where changing diets and/or lifestyles have led to a rise in non-communicable disease, including heart disease, skeleto-muscular disorders related to obesity, and diabetes.** These initiatives could be focused on diet advice only, or could be linked to community-led or community-private partnerships for fish farm production in schools, hospitals and religious missions. For national “eat fish for health” campaigns, the popularity of television cooking shows in more urbanized or developed rural areas of developing countries offers potentially novel opportunities; celebrity chefs have been influential in shaping dietary habits in developed and transitional countries and have often replaced official government health advice as opinion-leaders. Indeed government-led health campaigns often enlist such people to design their interventions (Box 14).

Box 14

Policy and programmatic interventions to increase access to and use of fish as part of diverse, healthy diets in children

South Africa has had a primary school feeding programme since 1994 and the programme continues to innovate with new ways to improve child health and cognitive performance. Following a trial that showed the addition of omega-3 to children's diets improved their verbal learning and memory, a bread spread (like peanut butter) was developed from fish waste products (the heads of hake, a marine fish that supports a major fishery), a rich source of long-chain omega-3 polyunsaturated fatty acids. The idea was to give fatty acids to the schoolchildren in a form that would be more acceptable. An evaluation of the spread indicated that children who consumed it at school performed better in verbal learning and memory tests, including spelling and reading (Dalton *et al.*, 2009).

Along the Pacific coast of the United States, a growing number of businesses supply locally caught seafood to at-need children via school cafeteria programmes, and an Alaskan non-profit has released a guide to effective distribution of fish in schools.

Zambia's First 1000 Most Critical Days Programme addresses malnutrition challenges facing women and children in the first 1000 days of the child's life. Limited intra-household surveys showed that women were far more likely to eat fish than other animal-source foods. The surveys also showed fish-derived nutrient contributions to children, but that contribution varied by age and by region. Recommending more developed data on critical intra-household diets of children could provide the opportunity for children to accrue significant nutritional benefits (Longley *et al.*, 2014).

In **Peru**, celebrity chefs including Gastón Acuri and Ferran Adrià have focused on Peruvian cuisine, which has helped shape a gastronomic epicentre in Peru, but along with it a focus on social and economic development (Peru Sabe, 2012).

- **Addressing health risks of seafood consumption among indigenous people.** Some indigenous populations (e.g. coastal aboriginal Australians, Amazonian Indians, Inuit and other groups in the high Arctic) eat marine mammals, turtles, predatory fish and other long-lived animals high in the food chain that tend to accumulate organic toxins (e.g. heavy metals, organochlorines, radionuclides), putting them and their children at potential risk of developmental diseases (Kuhnlein and Chan, 2000).
- **Supporting the implementation of the Right to Food and Food Sovereignty in fisheries.** Where fish is a vital component of a nutritious diet, any management action that purposively makes it less available to food-insecure people is a violation of the human right to food (De Schutter, 2012).
- **Supporting initiatives to reduce loss (including waste) of fish in food systems.** Gains in fish availability made by investing in reducing losses and waste in value chains may be of similar magnitude or greater than gains realized by optimizing fishing effort, and may be easier to achieve (Box 15).
- Conveying to policy makers and development practitioners (including agencies such as UNICEF or the World Food Programme) the message on the comparative advantage of fish, and on how it can make a difference in nutrition, beyond protein provision.

iv) How can the fisheries and aquaculture sector better contribute to securing income among the vulnerable poor in the face of competition over resources and increased global demand for fish? What change is needed and how can this be achieved?

Improving access of small-scale fishers and processors to markets can help secure livelihoods for vulnerable communities faced with limited resource access by providing high-value buyers. For various niche and high-value products with markets in developed countries (e.g. spiny lobster from Central America to the United States; ornamental reef fish to European Union and North American

markets), schemes are underway to ensure that small-scale producers use resources sustainably, meet market standards and are given fair prices. These approaches currently have limited application to markets elsewhere in the world, although progress has been made in regulating shark fin and live reef fish trade to East Asia. What is clearly missing from current attempts to use market linkages for poverty reduction and sustainability is investment in fostering sustainable and ethical consumerism in developing and transitional countries. China is the most prominent such market, but Brazil, India, Malaysia and South Korea are other potential areas for introducing sustainability standards in seafood markets. There may also be interest in traditional products by first- and second-generation urbanites with nostalgia for a recent rural past. So-called diaspora markets already exist, supplying traditional products to émigré populations in developed countries (e.g. bushmeat to West Africans living in Europe), so there is clearly potential for investment in shorter value chains to regional urban centres.

Specific actions could include:

- Invest through market intermediary organizations to support domestic and regional markets for fish, with an emphasis on value-chain upgrading and promotion of traceability in support of a move towards sustainable, equitable and ethical supply chains.
- Identify technical measures to strengthen local and regional markets by improving product quality, reducing losses, improving provision of real-time price information, and providing lines of credit to local traders for purchase of fish supplies for local processing and sale, taking into account the specific needs of men and women.
- Support greater integration of small-scale fisheries and aquaculture into global markets where appropriate, for example through Fisheries Improvement Programmes, which aim to give producers access to sustainably sourced markets in return for a planned programme of transition to sustainability. Unfortunately, such transitions may be slow and many fisheries have gained access to these markets without delivering the promised improvements (Sampson *et al.*, 2015)

Box 15

Examples of initiatives to reduce waste and improve utilization in fisheries and aquaculture**Reducing discards at sea**

Significant fish losses at the harvesting stage partially result from using methods and gears that are destructive and/or not selective. This leads to capture of unsellable, unwanted and inedible products, which are subsequently discarded dead or debilitated. The volume of fish discards varies greatly between and within fisheries, and global discard volumes are challenging to estimate, but the latest report published by FAO in 2005 on the issue has given an estimate of an 8 percent global discard rate of the world total capture fisheries, with a lower rate of 3.7 percent for small-scale fisheries (Kelleher, 2005).

Improving drying technology for omena fish on Lake Victoria

Omena, a small nutrient-rich fish, forms a staple of populations around the lake and is normally dried before transportation and sale. Drying omena on the beach is usually done by women using fishing nets that are hired from the fishermen at a fee. The women use brooms to turn the omena. The hygiene on the landing beaches is poor. Animals can wander freely on the beach, where they eat the dropped fish. Bigger omena take longer to dry and, during the rainy seasons, traders may suffer up to 80 percent economic losses, especially if there is insufficient sunlight to dry the fish for more than two days. Omena is transported to the market in airtight sacks and transported on public transport. The sacks do not allow air circulation

and may cause bacterial and fungal spoilage, especially if the fish was not well dried (FAO, 2014).

Recently, a non-governmental organization that is helping communities to export omena came up with a new design for drying. This consists of raised racks within a fenced area. The racks are covered with polythene covers to protect the fish from wind, dust, rain and other elements. The polythene helps to trap heat and therefore the fish dry faster on cloudy days. In order to benefit from the intervention, traders must commit themselves to certain hygienic standards for handling the fish and must also organize themselves in groups. This technology is adapted to local conditions and is cost-effective.

Improved utilization of tuna: linking food loss and waste reduction with food and nutrition security

Tuna provides an example of diversified utilization of parts of the fish. The canning industry generates a considerable quantity of by-products, the utilization of which varies by region. Thailand is one of the largest producers of canned tuna, and the by-products are mainly utilized as tuna meal, tuna oil and tuna soluble concentrate. In the Philippines, most of the canning industry by-products are converted to tuna meal, but darker meat is also canned and exported to neighbouring countries. Edible tuna by-products from the fresh/chilled tuna sector, such as heads and fins, are used for making soup locally, and visceral organs are utilized to make a local delicacy or to produce fish sauce. Leftover meat and trimming from processing are also used for human consumption (Globefish, 2013).

v) How can fish supply be sustainably increased in the face of declining resources, population growth and increasing per capita demand, environmental impacts and competition over land and water from other users? What change is needed and how can this be achieved?

While advocating for greater inclusion of fish in healthy diets, and therefore greater coherence between food, health and fisheries policy, there is a need to be aware of the constraints the fisheries sector faces. In evaluating whether the sector can maintain or expand its contribution to food security, nutrition and health, these constraints need to be identified and, where possible, assessed. Constraints may include pollution, climate change (including sea-level rise), rising price of land in coastal and river-side areas leading to displacement of fishing communities and aquaculture production facilities, and competition for water and coastal land from agricultural, industrial, residential, recreational, environmental conservation and energy-sector interests.

The policy forums in which these issues are typically considered cross-sectorally are those that engage multiple economic sectors and other stakeholders in planning the use of coastal and aquatic spaces. These may include authorities for integrated coastal zone management, lake catchment, river basin and floodplain management, and marine spatial planning. These planning forums are often trans-national, as major river basins and coastal eco-regions transcend political boundaries. Unfortunately, fisheries and aquaculture are not always well represented in these forums: water resource and land-use planning tend to dominate lake and river catchment forums; and urban, industrial, tourism and offshore oil and gas sectors tend to dominate coastal and marine spatial planning. In coral-reef-dominated coastal areas of the tropics, marine biodiversity conservation interests increasingly drive the policy process. There is scope for integrating habitat and ecosystem conservation with improved fisheries governance, as healthy fisheries need functional ecosystems to support them.

Nutrition-sensitive fisheries and aquaculture policies and interventions thus face a triple challenge: engaging with the fisheries sector to get food security and nutrition on its agenda; working with the fisheries and aquaculture sector to ensure that fisheries and aquaculture (and food security) interests are included in river basin and marine spatial planning; and ensuring that these issues stay on the agenda in the context of trans-boundary negotiations over resource use and allocation. Examples of relevant regional forums where fisheries are engaged in such debates include:

- The Mekong River Commission, which advises on the management of the water resources in the basin shared by Cambodia, China, Lao PDR, Thailand and Vietnam. Hydropower developments upstream and their fisheries and food security consequences downstream are a particular source of concern.
- The Bay of Bengal Large Marine Ecosystem Programme, where the livelihood and nutrition needs of hundreds of millions of people in coastal Bangladesh, India, Myanmar and Thailand depend on successful management of coastal seas affected by changes in a vast and heavily populated coastal zone.

In addition to policy engagement to ensure that fisheries and food security interests are heard at appropriate levels, there are a range of technical options to address some of these constraints and ensure that the sector continues to supply nutrient-rich food at affordable prices. Many of these possibilities are in the aquaculture sector, where there is great potential for expanding production and better incorporating nutrition concerns:

- Intensification of production systems. This may include avoiding competition in coastal and inland surface waters by investing in closed or recirculation systems. These are used for shrimp aquaculture in Saudi Arabia and Singapore, for example, and for salmon in Chile, Canada and the United States.
- Promotion of risk-based approaches, knowledge and practices for the responsible use of veterinary drugs in aquaculture.

- Advances in feed technology. This includes reducing the use of fishmeal and the possibility of developing “designer feeds” to produce fish with particular nutrition attributes. This is already being done in the poultry industry.
- Multi-trophic aquaculture. This involves the culture of different species together in less intensive systems, such as ponds, as well as the integration of aquaculture systems with other agricultural and waste-treatment systems, to increase energy-use efficiency and reduce waste treatment costs.
- Moving offshore. With coastal and inland space becoming restricted, aquaculture operations are beginning to move to open waters. This requires technological and legislative change.

In capture fisheries, the task of meeting rising demand can be made easier by making more efficient use of existing productive potential. This means looking for opportunities to reduce losses at sea (incidental killing of fish not caught or use of destructive fishing gear or techniques), reducing quality changes in fish post-harvest, and improving utilization of fish through good handling practices, processing technologies and use of rest raw materials or by-products that are currently considered to be waste (Box 15).

Improved fisheries governance, investment in aquaculture and improved utilization can, together with policy support for human development in the small-scale sector, result in fish production and distribution keeping pace with demand by those likely to be at risk of malnutrition (Box 16).

Step 4 UNDERSTANDING THE POLITICAL ECONOMY

This final step in assessing the scope for policy interventions to support integration of food security and nutrition in fisheries and aquaculture policy is to consider the overall policy process at relevant (usually national or regional) scales. Many policy prescriptions emanate from global think-tanks and international organizations or are the product of “lessons learned” from other countries, and their transferability is often assumed. However, policy reform is a political process, and understanding what shapes policy and how policy changes is a necessary

part of any attempt to improve the integration of food and nutrition policies and fisheries policies. A political economy analysis of the potential for policy change to support the transition to a more nutrition-focused fisheries and aquaculture sector would begin with a cluster of questions to identify stakeholders, their interests and their power to support or block policy change and policy implementation. These questions may include:

- Who are the main stakeholders in the fisheries and aquaculture sector and what are their interests and powers? Which stakeholders are representing the specific interests and needs of the most vulnerable men and women in fishing communities?
- Who sets the fisheries and aquaculture policy agenda? Who advises/ influences whom?
- What are local, national, regional and international influences?
- Who are the policy-change champions? Who obstructs change?
- Who are the potential winners and losers in case of policy change to a more nutrition-focused fisheries and aquaculture sector?
- How are formal and informal policy processes organized? (forums, coordination mechanisms and institutional set-up, rules and procedures). How is the policy debate organized? What and where are the policy spaces? How inclusive is the process?

Fisheries and aquaculture policy is shaped by both state and non-state actors operating at multiple levels (Fig. 5). Global standards, codes of conduct and policy initiatives from FAO, UNEP and other UN organizations have an important agenda-shaping function. These standards and codes are increasingly developed through extensive stakeholder consultations, including the recent Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Reduction. These guidelines represent a global consensus on small-scale fisheries governance and development and are the result of a long consultation process directly engaging over 4000 stakeholders from over 100 countries. In fisheries, the key process of ratifying these initiatives is

Box 16

**Fish for a rising population
in the Pacific Islands**

Solomon Islands fisheries play an important role in food security. As with other Pacific Island Countries and Territories (PICTs), most animal-source protein has historically come from fish, and subsistence fishing around fringing coral reefs supplied most of the consumption needs in the Solomon Islands. Solomon Islanders now face challenges with fishery access, degradation of coral reef habitat, increasing travel time to fishing grounds, and an increasing population (Weeratunge *et al.* 2011). They are not currently expected to meet anticipated demand for fish in 2030. The National Development Strategy for the Solomon Islands identified improving food security as a major focus for 2011–2020. The Strategy identified the need to improve access to nutritional foods (Box 8 for more on the nutrition situation in PICTs) and ensure that increases in fisheries and agricultural productivity sustainably enhance food security and elevate livelihoods. At least three options are available to maintain and increase fish availability: maintain and enhance inshore (reef) fisheries; develop coastal and freshwater aquaculture; and divert to domestic markets some of the vast tuna resources of the Solomon Islands Exclusive Economic Zone (EEZ) that are currently nearly all exported and contribute to food security indirectly, though they do provide revenue to the Solomon Islands Government.

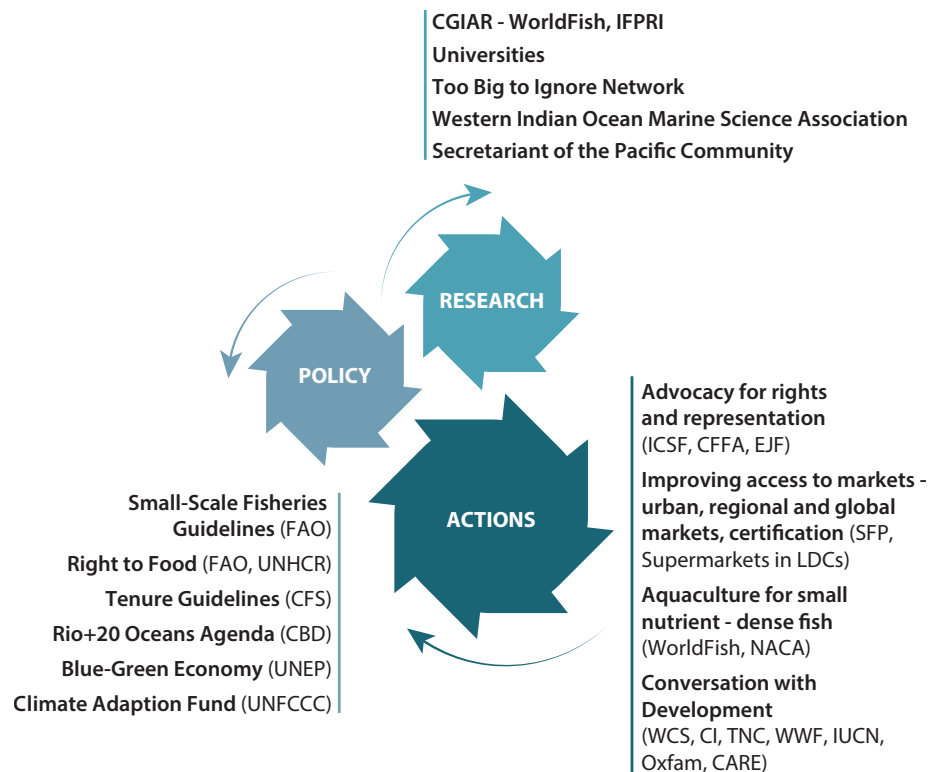
International and national development and aid programmes are involved with both fisheries and food security issues in the Solomon Islands, and the environmental non-profit sector has also played an increasing role in marine resource development, responding in part to conservation concerns with the large increase in fishery engagement experienced by many PICTs. The Coral Triangle Support Partnership is one such effort unifying governmental aid programmes as well as non-governmental and conservation organizations to conserve reef resources. The Initiative is part of a large-scale multi-country effort (also involving Indonesia, Malaysia, Papua New Guinea, the Philippines and Timor L'Este) that focuses on development in the region, aiming to balance conservation, economic opportunity and food security. Several countries in the region are also developing small-scale aquaculture enterprises to meet anticipated fish demand, including the Solomon Islands.

Diverting lucrative tuna exports to domestic markets is a more complex policy undertaking. The Nauru Agreement is a joint management strategy for migratory Western Pacific fish among the governments of Kiribati, Marshall Islands, Micronesia, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu, which together control 25–30 percent of the world's tuna supply. Changes to Nauru Agreement tuna management can enable or restrict access to tuna and supported livelihoods (Havice, 2013). Populations living in urban areas with transnational shipments of tuna are expected to see additional input of tuna to local markets. For example, a recent ban on the discard of undersized fish at sea may lead to larger volumes of tuna passing through shipping markets, and some of this volume is anticipated to also reach local consumers (Hayes, 2015).

the FAO Committee on Fisheries, comprising representatives from all 193 FAO member states, which meets every two years. Policy initiatives are debated and, if approved, this provides a mandate for their implementation through national and regional policies. It is these kinds of processes that are working toward including food security and nutrition in fisheries sector policy reforms. Funding fisheries policy reform and implementation has typically been the preserve of government, bilateral and multilateral donors and investors such as the World Bank, the Asian Development Bank and the International Fund for Agricultural Development. In recent decades, philanthropic organizations and the private sector have invested substantially in research, policy development and pilot testing of new initiatives. These initiatives have been most prominent in the arenas of marine environmental conservation, investments in global market linkages, and promotion of sustainable fishing.

Civil society organizations in both the social and environmental realms, and influential market actors (such as major seafood buyers) as well as some research organizations are influential in either shaping policy or implementing fisheries policy (Fig. 5). Organizations representing fish producers, such as the International Fishworkers and Fisherfolk Coalition, the World Forum of Fish Harvesters and Fish Workers, the World Forum of Fisher People and the International Collective in Support of Fishworkers work on behalf of fishing communities, including women fishers through their Women in Fisheries section. To ensure their voices are heard in high-level negotiations on the governance of coasts and oceans, numerous regional, national and local producer and trade organizations exist to support members at national and regional forums. As fisheries and aquaculture cross over into food security, nutrition and health, other global and regional players become influential; much current work on fish and nutrition is taking place through regional organizations like the New Partnership for African Development and the work on USAID’s “Feed the Future” and “First 1000 Days” programmes.

FIGURE 5. A selection of influential global and regional actors and policy processes in the fisheries sector and its intersection with food security and nutrition



CGIAR = Consultative Group on International Agricultural Research; **IFPRI** = International Food Policy Research Institute; **UNHCR** = UN Commissioner for Human Rights; **CFS** = FAO Committee on World Food Security; **CBD** = Convention on Biological Diversity; **UNEP** = UN Environment Programme; **UNFCCC** = UN Framework Convention on Climate Change; **ICSF** = International Collective in Support of Fish workers; **CFFA** = Coalition for Fair Fisheries Agreements; **EJF** = Environmental Justice Foundation; **SFP** = Sustainable Fisheries Partnership; **NACA** = Network of Aquaculture Centres in Asia; **WCS** = Wildlife Conservation Society; **CI** = Conservation International; **WWF** = World Wildlife Fund.

Towards implementing food security and nutrition-focused fisheries policies

A simple analytical approach, building on the identification of stakeholders, can help identify necessary steps towards more integrated policy at regional, national and sub-national levels:

i) Analyse the dominant style of policy-making in the sector and use this analysis to identify how to influence that policy.

If fisheries and aquaculture are identified as nutritionally significant but insufficiently represented in current fisheries policies, then it will be desirable to reform policy to better reflect the sector's nutrition and food security importance. Policy reform requires an understanding of how policy is made in each country. For example, if the fisheries policy is implemented largely through traditional authority (e.g. as in inshore fisheries in Fiji), then reforms to move policy towards greater nutrition and health orientations need to be co-produced with traditional leadership. If the national non-governmental organization sector is influential (as in Bangladesh) then major non-governmental organizations will be important partners in policy dialogue and implementation. In large, decentralized states, such as Indonesia, local and provincial governments may be the key agents of policy reform. In all cases, key ministries to engage in these policy analyses and formulations are Health, Agriculture and Food, Environment and, in some cases, ministries of Finance and Trade. To ensure that policies consider how gender inequalities affect the fisheries and aquaculture sector and that they integrate measures to redress such inequalities, it is recommended that the ministry responsible for women's affairs/gender equality (sometimes it is the ministry of Social Affairs), the gender unit in the ministry of Agriculture, if such a unit exists, as well as women's fisheries organizations, also be consulted.

ii) Assess the feasibility and cost of reforms towards nutrition-sensitive aquaculture and fisheries in the context of the national political economy.

In some countries, there may be strong receptivity to a policy message highlighting the nutrition contribution of fish – for example, Cambodia and Bangladesh, which have large nutrition-sensitive populations who have direct or local-market access to fish.

In countries where the state makes a large proportion of its revenue from the sale of fish licences to domestic and foreign industrial fleets, policies to divert fish to low-income consumers may challenge the interests of the state and influential private-sector actors and may have little traction (e.g. Peruvian anchoveta, Box 17). Here, investing in aquaculture or importing fish may address nutrition needs.

In countries like Ghana and Senegal, where fish yield for human consumption would increase if harvesting pressure could be reduced, the over-capacity is maintained by fuel subsidies that are politically difficult to withdraw. In such cases, political stability is maintained at the cost of improved nutrition security and optimized fishery sector financial performance.

iii) Develop national plans for a transition to nutrition-sensitive fisheries and aquaculture.

Where there is sufficient evidence that fisheries and aquaculture could provide substantial benefits to nutrition and human health if policy were more nutrition-sensitive or food-security-oriented, states and their development partners could use the above analytical steps to identify policy objectives, processes of cross-sectoral engagement and policy harmonization, and institutional mechanisms for policy implementation (including financing and capacity development). This would enable sector-based improvements in resource governance and productivity to be translated into improvements in human nutrition, health and well-being.

Understanding distributive justice issues and unintended consequences from policy reforms.

Box 17

**Policy trade-offs
for Peruvian anchoveta**

Trade-offs for Peruvian anchoveta are between securing increased value for landed fish by selling to fishmeal plants and forfeiting its nutritional contribution, or to secure less economic value by selling to Peruvian markets for local human consumption and contributing to nutritional security. Post-harvest barriers also exist that limit feasibility of anchoveta from entering Peruvian direct-market pathways. First, plants processing anchoveta for direct human consumption require additional health permitting. Second, since anchoveta are delicate, much of the work must be done by hand to maintain higher quality, generating labor opportunities but also potentially higher costs than the mechanized process used to create fishmeal (Caillaux *et al.*, 2013). Evidence from media outlets and market reports suggests that Peruvians are becoming increasingly aware of the value of anchoveta as a means to alleviate malnutrition and support healthy diets. Anchoveta has been included in the Comisión Multisectorial de Seguridad Alimentaria y Nutricional (Multisectoral Commission of Food Security and Nutrition – CMSAN) report on the objectives of the National Strategy regarding

National Food Security and Nutrition in the period 2013-2021, which provides one of the most comprehensive summaries to date. This report recognizes Peru's richness in marine life and the nutritional value it provides to Peruvians, who eat approximately 22 kilograms of fish per year. In particular, anchoveta are described as an abundant and valuable nutritional source.

While the industry prefers to maintain its business in fishmeal trade, small-scale fisheries could provide more fish to local markets. However, the CMSAN report cites that misaligned social norms, lack of good fishing practices, business development and difficulties of incorporating human consumption in the supply chain are reasons why so little of the marine species caught are consumed by Peruvians. The CMSAN report recommends it be in the national interest to promote the nutritional value of anchoveta and secure more of the catch for Peruvian consumption to meet its goals. In addition to national government policy intervention, nonprofits and international academic institutions have entered the anchoveta-food security discussion. For example, using grant donations from a private foundation, the nonprofit organization Oceana established a regional office in Peru and appointed a Peruvian anchoveta fisheries expert to lead in supporting the dual focus of protecting marine habitat and advocating the importance of fish as food for local people (Oceana, 2015).

Identifying those who stand to gain and lose from change is a key task in policy reform. When taken together with an analysis of relative stakeholder power and legitimacy, it can highlight where opposition and support is likely to come from, as well as inform the design of any mitigation required to address those whose interests are challenged, taking into account gender differences.

Policy analysis must also be alert to unintended consequences of policy change. For example, research has demonstrated the high nutrition value of small indigenous fish species in Bangladesh, including the iron and vitamin A-rich 'mola. This fish was

once consumed only by the rural poor and its culture in pond systems has been advocated as part of food security and nutrition initiatives. In the meantime, it has developed a market among the urban middle-class and is now more expensive, by weight, than farmed carp and tilapia (Fiedler *et al.*, 2016). This might be termed the "superfood" effect – whereby an item important in the diet of the poor is identified as beneficial to health, and is marketed to wealthy health-conscious consumers, raising the possibility that it becomes too expensive for the poor to eat. The Andean grain quinoa is perhaps the best-known example of this phenomenon.

Concluding remarks

The Sustainable Development Goals agenda makes achieving food security and ending malnutrition a global priority. Within this framework, the importance of fisheries in local and global food systems and its contribution to nutrition and health, particularly for the poor, are overlooked and undervalued.

Mirroring the call for a diversification of agricultural research and investment beyond a few staple grains, productivity gains for a few farmed aquatic species are unlikely to suffice. Complementarities between capture fisheries and aquaculture must be promoted in ways that support measurable food security, nutrition and health gains. The lack of a nutrition-sensitive policy focus on capture fisheries and aquaculture represents an untapped opportunity that must be realized to ensure sustainable healthy diets for all.

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In the past, fisheries and aquaculture policies have not been designed to focus on food security and nutrition. Broad inferences about fisheries conservation and increasing aquaculture production being good for food security, nutrition and health are commonly made, but details on policy impacts have been lacking, partly due to lack of data at appropriate scales and partly due to the sector's complexities. The sector is diverse, linked to other economic, environmental, social and gender equality and equity concerns and, being partly dependent on the productivity of natural ecosystems, is not as governable as food production systems that are under greater human control.

This note has provided guidance on the range of issues that must be taken into account when attempting to harmonize fisheries policies with food security and nutrition concerns. Such alignment would be beneficial to both those who make a living from fishing and fish farming, and to people who depend on access to fish to maintain a healthy diet.



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