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# Fisheries and Aquaculture Management and Food Security Policy Analysis

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## Abstract

The relationship between seafood and food and nutrition security is becoming increasingly recognised in policy and practice, yet many governance instruments do not articulate this link, or do so in a limited context. Identifying the best practices for linking fisheries management and associated public health policies, will help inform future policy development and review, and ultimately improve a range of food system outcomes. This report outlines a review of governance instruments across relevant sectors for a select range of countries.



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# Fisheries and Aquaculture Management and Food Security Policy Analysis

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AUSTRALIAN NATIONAL CENTRE FOR
OCEAN RESOURCES & SECURITY

The **Australian National Centre for Ocean Resources and Security (ANCORS**), University of Wollongong , is Australia's only multidisciplinary university-based centre dedicated to research, education and training on ocean law, maritime security and natural marine resource management providing policy development advice and other support services to government agencies in Australia and the wider Asia-Pacific region, as well as to regional and international organizations and ocean-related industry.

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## 1.0 Executive Summary

The relationship between seafood and food and nutrition security is becoming increasingly recognised in policy and practice, yet many governance instruments do not articulate this link, or do so in a limited context. Identifying the best practices for linking fisheries management and associated public health policies, will help inform future policy development and review, and ultimately improve a range of food system outcomes. This report outlines a review of governance instruments across relevant sectors for a select range of countries. The extent to which these instruments linked fisheries/aquaculture and food and nutrition security was one of two criteria used to identify best practices. Instruments that made linkages across multiple contexts, for example developing fisheries to improve food security, increasing consumption, or education about the nutritional benefits of eating seafood, were considered more comprehensive than those which made a linkage within a single context. The second criteria used to identify examples of best practice was the extent of commitment to implement actions to achieve the aspirations stated in the governance instruments. Over one third of the documents examined made no link between fish and food and nutrition security, whilst 29% made links across three or more context. Of those documents that linked the sectors (65%), the majority made the linkage in the context of developing fisheries/aquaculture to improve direct food security (51%) followed by developing fisheries/aquaculture to improve indirect food security (33%), for example through income generation. The context in which the least links were articulated was support for nutrition sensitive fisheries/aquaculture to improve availability of nutritious foods (5%). While the majority of instruments examined in the review linked seafood and food and nutrition security, one quarter had low to very low levels of commitment to implement actions.

The recommendations from this review for the current best practices to link fisheries management and food and nutrition security, based on examples of instruments reviewed, include:

1. Broaden the context of links between fisheries/aquaculture and FNS articulated in policies beyond developing fisheries/aquaculture to increase production. Considering the link between these sectors across a range of different contexts, for example ensuring equitable and fair allocation of resources and distribution of benefits, is critical to supporting the role of fisheries/ aquaculture in improving food security and livelihoods.
2. Support the link between fisheries/aquaculture and FNS across a range of both sectoral and multisectoral policies. This approach will help facilitate greater incorporation of fisheries and aquaculture into national food systems and food security dialogues and encourage cross-sectoral collaboration, which is necessary to manage the contribution of fisheries/aquaculture to a broad range of social, economic and environmental goals.
3. Include clear goals, targets and actions as well as information on how the policy impact will be monitored and evaluated.
4. Strengthen support for nutrition sensitive fisheries/aquaculture which considers the nutrient composition of different species and prioritises nutrition alongside economic and environmental objectives.

## 2.0 Introduction

Food and nutrition security (FNS) exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life (FAO, 1996). Failure to meet these conditions can result in hunger and malnutrition which can take the form of undernutrition (stunting, wasting) or overnutrition (overweight, obesity). Whilst the outcomes of these two forms of malnutrition are very different, poverty is a key determinant of both (FAO et al., 2020). Two billion people, or 25.9% of the global population, experienced hunger or did not have regular access to nutritious and sufficient food in 2019 (ibid). The developing world bears much of the burden of food insecurity in regards to malnutrition, however, there is an increase in the incidence of overnutrition across the world which has led to a phenomena known as the nutrition transition (Popkin, Adair and Ng, 2012).

Seafood is a high-quality animal protein that contains an assortment of highly bioavailable micronutrients that are essential to human health (Thilsted et al., 2016). These include essential fatty acids, vitamins D, A and B and minerals (calcium, phosphorus, iodine, zinc, iron and selenium) which make seafood an attractive solution in the fight against malnutrition (Bene et al., 2015). Seafood not only helps to address macro and micronutrient deficiencies associated with malnutrition, but it also plays an important role in providing a diverse diet that can help to prevent overnutrition and the associated non-communicable diseases (NCD).

Seafood consumption has grown at an annual growth rate of 3.1% from 1961-2017 which outpaced population growth (1.6%), largely driven by the increase in aquaculture production over this period (FAO, 2020a). This growth has resulted in an increase in the per capita consumption of seafood from 9kg (liveweight equivalent) in 1961 to 20.5kg in 2018 which represents around 17% of all animal proteins and 7% of all protein consumed globally (ibid). Nearly all countries that depend heavily on seafood as a source of nutrition are situated in the developing world where the burden of malnutrition is highest (Golden et al., 2016).

As well as directly contributing to FNS, fisheries and aquaculture indirectly contribute to FNS through income generation, increasing the household's ability to purchase food and providing a source of employment for women and men who participate in fishing and postharvest activities (Kawarazuka and Béné, 2011). It is estimated that 59.5 million people work directly and indirectly in the primary sector, of which 14% are women (FAO, 2020a). Fisheries can also act as an economic multiplier in marginal rural areas and as an important source of government revenue (Allison, 2011). Although it is difficult to quantify the extent of their total contribution (Bennett et al., 2018), it is estimated the sector supports the livelihoods for as much as 10-12% of the world's population (FAO, 2020a)

Despite the rapid growth of aquaculture, capture fisheries remains the dominant source of seafood in many populations in the global south (Hall et al., 2013). This is due to several reasons including the lower entry level requirements for fishing compared to aquaculture (Bene et al., 2016) and the cultural preference for wild-capture species (Belton and Thilsted, 2014). The nutritional quality of the seafood derived from aquaculture has also been shown to have less desirable nutritional characteristics compared to the nutrient dense wild capture species (Belton and Thilsted, 2014; Bogard et al., 2017a). Regardless, governments and development partners around the world are focusing on the

development of aquaculture to increase production and improve FNS status of their population (Costello et al., 2020).

Whilst it is estimated that the production of seafood from fisheries and aquaculture can increase substantially in the future (Costello et al., 2020, Gentry et al., 2017), the fisheries sector faces numerous challenges including overexploitation of resources, pollution, destruction of mangroves, competition for water resources and climate change (FAO, 2017a). Further to this, the environmental impacts of aquaculture on the land, water and biodiversity together with competition over land and water resources will limit the future expansion of marine and fresh-water aquaculture (Troell et al., 2014). This potential decline in production could have detrimental impacts for the people reliant on fisheries and aquaculture as a source of food and livelihoods. The impacts of this will be more detrimental in countries where there is limited capacity and lack of strong governance to take action, and where there are fewer alternatives to make up for these impending shortfalls in micronutrients (Golden et al., 2016).

Despite the important role seafood plays in the direct and indirect FNS status of some of the world's most vulnerable populations, fisheries and aquaculture have typically been considered separately from other parts of agri-foods systems in research and policy-making (Kawarazuka and Béné, 2011). Traditionally fisheries policies have been centred around value creation through export to urban and international markets, with governance reforms promoting greater exclusivity of access to prevent overfishing and capitalize on economies of scale (FAO,2017). Similarly, aquaculture has focused on productivity and economic efficiency (Hishmunda et al., 2009). While increasing production is a common theme of both, it has been shown that increased availability does not automatically lead to improved FNS (Allison, 2011; Bogard et al., 2017b). To overcome this, production-based metrics need to be accompanied by others that focus on issues such as the equitable allocation of resources, promoting seafood consumption, reducing food waste and loss (including nutritional quality) and building resilience to future shocks (FAO, 2017a, Farmery et al., 2020).

Although language in key international and national governance instruments is beginning to reflect these needs (Bene et al., 2015; Bennett et al., 2018), the level of integration globally remains relatively low (Koehn, 2019) and the extent to which that language will translate into effective action is not yet known (Allison, 2011). In fact, it has been argued that promoting FNS, without clear actions and targets may benefit proponents of intensifying food production and trade liberalisation more than those who are food insecure (Jarosz, 2011; Rosin, 2013; Tomlinson, 2013). As such, further efforts are required to set clear actions and targets that deliver effective FNS outcomes and measure performance overtime (Farmery et al., 2020). This is particularly true for seafood, which has enormous potential to improve global diets, as a highly nutritious food that can have a lower environmental footprint than other animal sourced proteins (Costello et al., 2020).

The aim of this research is to examine public governance instruments (frameworks, laws, policies, plans, programmes, and strategies,) related to fisheries/aquaculture and FNS to identify current best practice in linking fisheries management and food and nutrition security. To achieve this aim, we determine, firstly, the existence of linkages between the sectoral instruments; secondly, the context of the linkage; and thirdly, the level of commitment to achieving goals. The research includes documents focused specifically on fisheries/aquaculture and FNS as well as a range of other related

areas such as agriculture, economic development, and climate change. The results provide insights into the approaches taken by different countries to link seafood with food and nutrition security, and common themes and examples of current 'good' practice so that recommendations can be made for linking fisheries/aquaculture and FNS in future policy development and reform.

## 3.0 Method

### 3.1 Selection of case study countries

To identify countries for inclusion in the analysis which potentially offered good examples of best practice, a list was compiled based on national seafood production and the importance of seafood for FNS. The initial list included the world's 30 largest seafood producing countries (based on FAO production data 2009-2018), seven countries identified by Oceana where seafood plays an important role in FNS, and seven Pacific Island Countries and Territories (PICTs) identified by the research team.

The second step to select the countries was undertaken using the FNS and fisheries database developed by Koehn (2019) which scored countries based on the degree of linkages between fisheries and FNS governance instruments. Countries were selected from the original list based on their score, with all countries that scored three or above (out of four, with four being a high score showing strong linkage) for fisheries and/or nutrition selected. This came to a total of 14 countries, one of which was the USA. Since Oceana already has a good overview of this country, it was replaced with Senegal which scored two for both fisheries and nutrition but had been identified by Oceana as a country where seafood plays an important role in FNS.

Indonesia was added to the final list after discussion with the author of the FNS/fisheries database who noted the reason it had a low score at national level was potentially because the government has recently shifted responsibility for fisheries to the provincial level in response to the problems associated with the complex mix of law, regulations and decrees at national level. Indonesia was, therefore, added to provide a case study of a provincial based approach to fisheries policy. The final list of countries and the parameters that determined their inclusion in this review can be found in Table 1.

*Table 1: List of countries selected for review based on results of two-step prioritisation*

| Country | Region | Prioritisation Step 1 | Prioritisation Step 2 | |
|---|---|---|---|---|
| | | | Fisheries Score (Koehn, 2019) | FNS Score (Koehn, 2019) |
| Bangladesh | South Asia | Top 30 Seafood Producers | 4 | 4 |
| Chile | South America | Top 30 Seafood Producers | 1 | 3 |
| Ghana | West Africa | Oceana List | 1 | 3 |
| India | South Asia | Top 30 Seafood Producers | 3 | 0 |
| Indonesia | South East Asia | Top 30 Seafood Producers | na | 2 |

| | | | | |
|---|---|---|---|---|
| Japan | East Asia | Top 30 Seafood Producers | 3 | 1 |
| Mauritania | West Africa | Top 30 Seafood Producers | 4 | 3 |
| Norway | Europe | Top 30 Seafood Producers | 0 | 3 |
| Peru | South America | Top 30 Seafood Producers | 4 | 3 |
| Philippines | Southeast Asia | Top 30 Seafood Producers | 3 | 0 |
| Samoa | Polynesia | PICTs | 3 | 0 |
| Senegal | West Africa | Oceana List | 2 | 2 |
| South Africa | Africa | Top 30 Seafood Producers | 3.5 | 1 |
| Tanzania | Africa | Oceana List | 3 | 1 |
| Vanuatu | South Pacific | PICTs | 4 | 3 |

For each case study country the following process was undertaken to identify examples of best practice:

1. Search for governance instruments relevant to fisheries/aquaculture or FNS,
2. Search for presence of key words reflecting fisheries/aquaculture or FNS,
3. Determine the context of the mention and 'linkages' between fisheries/aquaculture or FNS,
4. Determine the level of commitment to linking fisheries/aquaculture and FNS i.e. if the fisheries or FNS were mentioned as part of an introductory paragraph (low commitment) or were as part of objectives connected to clear targets for implementation (high commitment).

Further details of this process are detailed in the following sections.

## 3.2 Selection of Governance Instruments

The FAOLEX database (FAO, 2020b) was used as the primary search engine to find relevant governance instruments. Searches were conducted using a filter for polices relating to *food and nutrition* as well as *fisheries and aquaculture*. In some cases, FAOLEX delivered results that included governance instruments addressing related topics such as coastal development, climate change or sustainability. In these cases, a search of the text was conducted to ascertain the relevance of the content to this research, and if there was a clear link made between fisheries/aquaculture and FNS then the instrument was included in the review. A separate search was conducted using FAOLEX and Google search engines to locate laws that related to fisheries/aquaculture and FNS. Only the original Act (not amendments or additions) was included in the assessment. In cases where there were periodic updates of the instrument, only the most recent versions were included and any documents that were not in English were translated using a combination of Google Translate and bilingual members of the research team.

For Indonesia, the provinces were selected based on several considerations. First, provinces such as Central Java and West Java province provided more comprehensive strategic planning documents,

which suggests linkage of food security and fisheries objective with the overall national social development strategies (2020-2024 National Midterm Development Planning). Second, these provinces were chosen because they were coastal provinces with a higher number and trajectory of seafood consumption due to greater socialization of the national Eat Fish Campaign. Third, a high percentage of the population in these provinces depended on fisheries activities for their livelihoods. The relevant instruments were then sourced from the provincial government websites.

## 3.3 Review of Governance Instruments

A framework was developed to guide the review based on a summary of the key issues identified in the report on Strengthening Sector Policies for Better Food Security and Nutrition Results – Fisheries and Aquaculture (FAO, 2017a). A detailed tabular summary of this analysis can be found in the accompanying excel file (*Detailed Country Review)* with a summary of key information provided in Appendix 1. A list of key search terms was developed and translated to Indonesian, Spanish and French by bilingual members of the research team (Table 2 and Table 3).

*Table 2: FNS terms used to search fisheries/aquaculture governance instruments*

| English | Spanish | French | Bahasa Indonesian |
|---|---|---|---|
| Food security | seguridad alimentaria | La sécurité alimentaire | Ketahanan Pangan |
| Nutrition | nutrición; alimentación | La nutrition | Nutrisi |
| Malnutrition | malnutrición; desnutrición | La malnutrition | Malnutrisi |
| (Food) access | acceso (a alimento, a alimentación, alimentaria) | L'accès/ l'accessibilité (aux aliments) | Akses ke makanan |
| (Food) availability | disponibilidad | La disponibilité (des aliments) | Ketersediaan makanan |
| (Food) utilization | utilización biológica | L'utilisation (des aliments) | Penggunaan makanan |
| Affordable (food) | asequible | Le prix abordable (des aliments) | terjangkau |
| Hunger | hambre | La faim | Kelaparan |
| Livelihood | medios de vida; sustento | Les moyens de subsistance | Kebutuhan hidup |
| Poverty | pobreza | La pauvreté | Kemiskinan |

*Table 3: Fisheries/aquaculture terms used to search food security/food security documents*

| English | Spanish | French | Bahasa Indonesian |
|---|---|---|---|
| Fish | pez; peces; pescado | Le poisson | Ikan |
| Fisheries | pesquería | La pêche | Perikanan |
| Aquaculture | acuicultura | L'aquaculture | Budidaya Laut |
| Seafood | mariscos | Les fruits de mer | Makanan Laut |
| Mariculture | maricultura | La mariculture | Kultur Maritim |

These terms were then used to identify the inclusion of fisheries/aquaculture or FNS in the governance instruments. Where they were located, a more detailed examination was undertaken of that section of the document to understand the context of the reference and identify linkages between the two sectors. The context was then recorded using the list shown in Table 4 to categorise the context/s of the linkage made between FNS and fisheries/aquaculture. These classifications were adapted from the shared FNS and fish objective themes identified in Farmery et al (2020). The **range of contexts within which these linkages between fisheries/aquaculture and FNS were made in the governance instruments** was one of two criteria used to identify best practices, with those instruments that made linkages within multiple contexts assumed to be more comprehensive than those made within a single context.

*Table 4: Classification of context of linkage between FNS and fisheries/aquaculture*

| | |
|---|---|
| **A** | Develop the fisheries/aquaculture sector to improve availability, access and affordability of seafood (direct improvement of food security) |
| **B** | Develop the fisheries/aquaculture sector to create jobs, alleviate poverty and improve livelihoods (indirect improvement of food security) |
| **C** | Support nutrition sensitive fisheries/aquaculture production to improve availability of nutritious foods |
| **D** | Improve resilience of the system to protect long term food security and/or livelihoods |
| **E** | Ensure equitable and fair allocation of production resources and distribution of benefits to improve food security and/or improve livelihoods |
| **F** | Increase seafood consumption to enhance nutritional status |
| **G** | Importance of seafood to diets and/or livelihoods of vulnerable groups within society (children, women, rural, poor) |
| **H** | Educate national population about the nutritional benefits of eating seafood and/or provide guidance on how to prepare |
| **I** | Encourage cross-departmental collaboration to develop nutrition sensitive fisheries/aquaculture production |

The second criteria used to identify examples of best practice was **the extent to which the goals stated in the governance instrument were being acted upon** (i.e. the level of detail and evidence of commitment to implement actions). Since it was not in the scope of this project to ground truth these for such a large number of instruments, a proxy was used to assess the level of commitment based on the classifications shown in Table 5. It is important to note that this assessment was not done for each individual reference to FNS or aquaculture found in the document (using the classifications in Table 4), but rather it was used to assess the highest level of commitment made for at least one of the references.

*Table 5: Classification of the level of commitment to integrating FNS and fisheries/aquaculture*

| Level of Commitment | Description |
|---|---|
| **None** | No mention of search terms |
| **Very low** | Search terms appear in general discussions |
| **Low** | Search terms stated in general aims but not linked to clear objectives |
| **Moderate** | Search terms linked to objectives, but not details provided about how they intend to fulfill these |
| **High** | Search terms are linked to objectives with plans clearly described for how they intend to fulfill these OR Search terms are linked to clear objectives with targets set to measure performance, but no clear plans described for how they intend to fulfill these |
| **Very high** | Search terms are linked to clear objectives with plans described for how they intend to fulfill these and targets set to measure performance |

## 4.0 Summary of results

A total of 110 documents were reviewed for this research, 81 of which covered a range of sectors, with fisheries the most common (29%), followed by nutrition (11%), aquaculture (11%) and agriculture (11%). The significantly higher number of fisheries documents is due to the inclusion of both fisheries laws and other relevant fisheries governance instruments for each country which essentially doubled the count. In addition to this, several countries had both overarching fisheries instruments as well as separate sub-sector instruments (e.g. for specific species or artisanal fisheries) which also increased the total count. A summary of the sectors for these documents can be found in Table 6, however, it is important to note that many of the documents were multisectoral and/or multidimensional in nature and these classifications cover only the primary focus.

*Table 6: Summary of sectors for documents reviewed*

| Sector | Count | % total |
|---|---|---|
| Agriculture | 11 | 10% |
| Aquaculture | 11 | 10% |
| Climate change | 5 | 5% |
| Economic Development | 8 | 7% |
| Financial investment | 4 | 4% |
| Fisheries | 32 | 29% |
| Fisheries and Aquaculture | 6 | 5% |
| Food security | 5 | 5% |
| Food security and nutrition | 8 | 7% |
| Health | 1 | 1% |
| Natural resource management | 1 | 1% |
| Nutrition | 11 | 10% |
| Social development | 3 | 3% |
| Sustainable Development | 4 | 4% |

Over one third (35%) of the documents examined made no link between fish and FNS, whilst 65% made at least one link, and 29% made links across three or more contexts. Of those documents that linked the sectors, the **majority made the linkage in the context of developing the fisheries/aquaculture and aquaculture sector to improve direct food security (51%) followed by developing the sector to improve indirect food security (33%),** for example through income generation. **The context with the least links was support for nutrition sensitive fisheries/aquaculture to improve availability of nutritious foods (5%).** An overview of the results for all linkages can be found in Table 7.

*Table 7: Summary of linkages made between seafood and FNS*

| Context of linkage | Count | % total |
|---|---|---|
| Develop the fisheries/aquaculture sector to improve availability, access, and affordability of seafood (direct improvement of food security) | 56 | 51% |
| Develop the fisheries/aquaculture sector to create jobs, alleviate poverty and improve livelihoods (indirect improvement of food security) | 36 | 33% |
| Support nutrition sensitive fisheries/aquaculture production to improve availability of nutritious foods | 6 | 5% |
| Improve resilience of the system to protect long term food security and/or livelihoods | 29 | 26% |
| Ensure equitable and fair allocation of production resources and distribution of benefits to improve food security and/or improve livelihoods | 12 | 11% |
| Increase seafood consumption to enhance nutritional status | 15 | 14% |
| Specific focus on vulnerable groups within society (children, women, rural, poor) | 11 | 10% |
| Educate national population about the nutritional benefits of eating seafood and/or provide guidance on how to prepare | 16 | 15% |
| Encourage cross-departmental collaboration to develop nutrition sensitive fisheries/aquaculture production | 11 | 10% |
| No mention of the linkage | 38 | 35% |

The level of commitment to implementing or strengthening the linkage between seafood and FNS was measured by the extent to which the document integrated these matters into the objectives and whether or not actions were identified to meet these objectives and targets set to measure progress. Of the 110 documents reviewed, 72 documents linked fish with food and nutrition. Of the total documents, 25% demonstrated a low to very low level of commitment by limiting reference to the link to the general discussion (n=7) or stating it only in the general aims of the document (n=21). Only 12% of documents showed a very high level commitment by integrating the link into objectives, actions and targets, with a further 15% outlining objectives and actions with no targets (Table 8).

*Table 8: Summary of the level of commitment to linking seafood and FNS*

| Level of Commitment | Description | Count | % total |
|---|---|---|---|
| None | No mention of linkage | 38 | 35% |
| Very low | Search terms appear in general discussions | 7 | 6% |
| Low | Search terms stated in general aims of the instrument but not linked to clear objectives | 21 | 19% |
| Moderate | Search terms linked to objectives, but no details provided about how they intend to fulfill these | 15 | 14% |
| High | Search terms are linked to objectives with plans clearly described for how they intend to fulfill these OR Search terms are linked to clear objectives with targets set to measure performance, but no clear plans described for how they intend to fulfill these | 16 | 15% |
| Very high | Search terms are linked to clear objectives with plans described for how they intend to fulfill these and targets set to measure performance | 13 | 12% |

Table 9 shows the link between seafood and FNS governance instruments broken down by sector as well as those that showed a high or very high level of commitment to implementing these commitments. There is no clear relationship for either, but rather a spread between the groups, with many of the high-level commitments coming from governance instruments with a broader focus than individual sectors such as FNS or fisheries/aquaculture. It is important to note the results for fisheries are distorted due to the inclusion of 14 laws, only two of which made any mention of FNS.

*Table 9: Linkages and high level of commitment broken down by sector*

| Sector | Total instruments reviewed | Instruments with linkage | Instruments with high or very high level of commitment |
|---|---|---|---|
| Agriculture | 11 | 9 | 4 |
| Aquaculture | 11 | 6 | 2 |
| Climate change | 5 | 3 | 2 |
| Economic Development | 8 | 6 | 2 |
| Financial investment | 4 | 4 | 2 |
| Fisheries | 32 | 16 | 4 |
| Fisheries and Aquaculture | 6 | 5 | 2 |
| Food security | 5 | 3 | 2 |
| Food security and nutrition | 8 | 4 | 3 |
| Health | 1 | 0 | 0 |
| Natural resource management | 1 | 1 | 0 |
| Nutrition | 11 | 9 | 2 |
| Social development | 3 | 2 | 0 |
| Sustainable Development | 4 | 4 | 1 |

There was, however, a clear link between the document type and the above-mentioned measures, with only 20% of the 21 laws reviewed making any reference to the linkage between seafood and FNS, all of which were very low commitment as they were stated only in the general aims of the document.

This contrasts with the 89 policy and strategy documents of which 76% referred to the linkage, with varying degrees of commitment as discussed above.

## 5.0 Country Reviews

The following section summarises the key findings from the individual country reviews, a tabular summary of which can be found in Appendix 1 together with the associated references.

### 5.1 Bangladesh


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

#### *5.1.1 Country Overview*

Bangladesh is located on the Bengal delta comprising the Ganges, Brahamaputra and Meghna flood plain which is the world's largest flooded wetland and contains more than 800 species of fish (General Economics Division, 2012). It is therefore not surprising that it is one of the world's most important fishing nations and is home to a wide diversity of seafood species that have traditionally been utilised by capture fisheries (Bogard et al., 2017a). Inland fisheries account for over 80% of total catch whilst marine and coastal fisheries account for around 19% and is made up of three distinct sub-sectors, small-scale coastal fisheries, mechanized semi-industrial and industrial, of which small-scale dominates (FAO, 2019a).

Since the 1990s Bangladesh has developed a significant aquaculture sector with strong support from both the public and private sector (FAO, 2017a). This sector services both local production, predominantly carp and other finfish, as well as export markets, in particular shrimp which is the country's second most important export commodity after textiles (ibid). Approximately 11% of the population are employed in fisheries and aquaculture (full-time and part-time), accounting for around 3.61% of the country's GDP (Department of Fisheries Bangladesh, 2018).

Fish is an important part of Bangladeshi traditional diets and many vulnerable people are reliant on small-scale capture fisheries as their primary source of animal protein and nutrient rich food (Belton et al., 2013). Consumption of seafood has increased in recent years to approximately 20kg/capita/annum (WorldFish, 2020, Bogard et al., 2017b). Whilst this has traditionally come from capture fisheries, there has been an increase in consumption of fish from aquaculture in recent years (Bogard et al., 2017b).

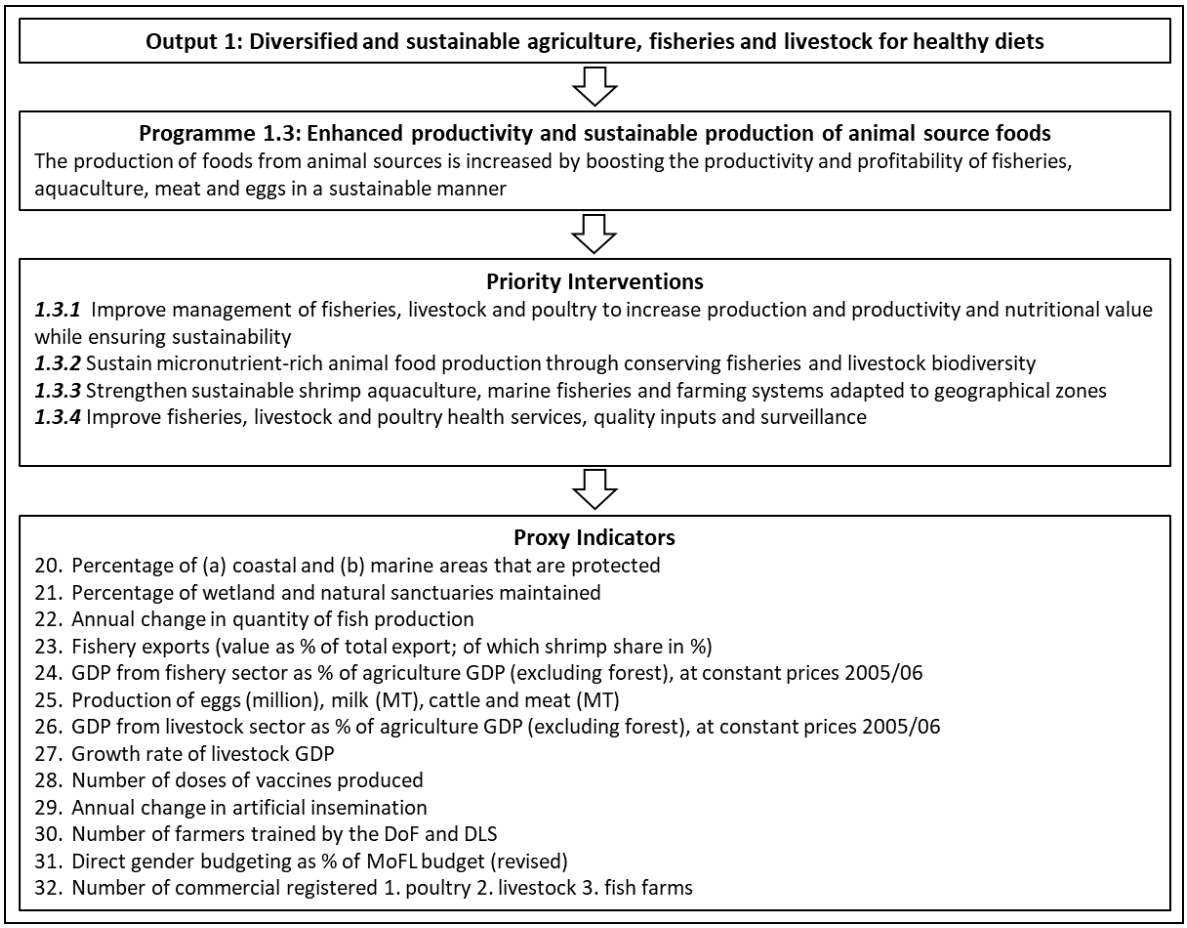
Bangladesh has increased food production over the past few decades, which has helped to improve the nutritional status of the population with child stunting reducing from 70.9% in 1985 to 30.8% in 2019 (UNICEF, WHO and World Bank, 2019). However, achieving food security remains a challenge due to a combination of factors including exposure to natural disasters, fluctuations in food prices caused by volatility in the international markets and the absence of income generating activities that could add to the purchasing power of poor people (General Economics Division Planning Commission, 2012).

### *5.1.2 Review of Governance Instruments*

Bangladesh has a range of governance instruments covering food (*National Food Policy Plan of Action 2008-2015; National Food Policy 2006*), nutrition (*National Nutrition Policy 2015*), aquaculture (*National Aquaculture Development Strategy and Action Plan 2013-2020*), fisheries (*National Fisheries Policy 1998; National Fisheries Strategy 2006; Fisheries Code 1998; Protection and Conservation of Fish Act 1950*), a series of sub-sector instruments (*Inland Capture Fisheries Sub-Strategy 2006; Marine Fisheries Sector Sub-Strategy 2006; Shrimp Sub-Strategy 2006*), economic development (*Second County Investment Plan 2016-2020; Seventh Five Year Plan 2016-2020; Perspective Plan of Bangladesh 2010-2021*), and natural resource management (*Coastal Development Strategy 2006*). Further details of these 14 instruments can be found in *Appendix 1.*

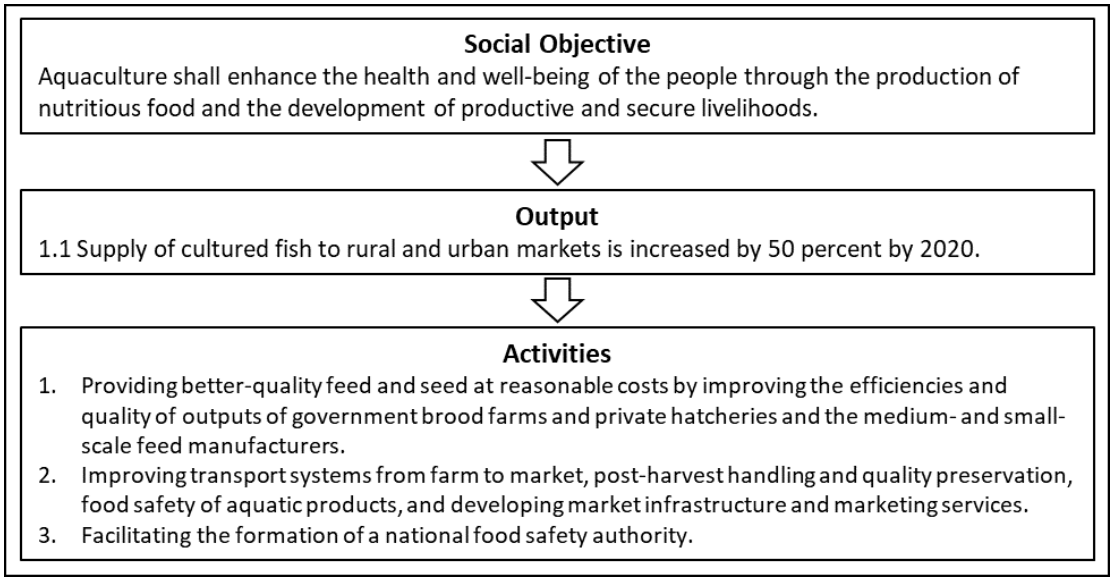
The *Second County Investment Plan 2016-2020* was the most detailed of the Bangladeshi instruments as it covered all linkage context types covered by this research. In addition to setting objectives, actions and targets it also connected these linkages to other national and international governance instruments and frameworks (e.g. SDGs), identified potential partners (government and non-government, national and international) and made an estimate of the investment needed to achieve the desired targets. Figure 1 below shows an example of one programme which is clearly focused on linking production of seafood to healthy diets, with indicators to measure performance clearly identified. Interventions include those aimed at production, with a focus on micronutrient-rich foods, as well as improving the health, quality and surveillance to ensure the products are of a good quality. The proxy indicators are also quite broad, ranging from environmental (e.g. marine protected areas, wetland sanctions) to economic (e.g. quantity produced, value of exports, GDP), however these were all focused on the production side of the equation with no direct measures of FNS outcomes.

*Figure 1: Details for Programme 1.3 of the Second County Investment Plan 2016-2020*




The *National Aquaculture Development Strategy and Action Plan* 2013-2020 also made multiple linkages between FNS. The example shown in Figure 2 demonstrates how FNS was successfully incorporated into the document. This instrument had four overarching objectives (social, economic, ecological and institutional) of which the social objective had the most direct link to FNS. This objective was assigned five desired outputs (including targets), of which one is shown below, together with a range of activities to be undertaken by the aquaculture sector to achieve the target, including production (provision of better-quality seed and feed), logistics (improving transportation) and quality related activities that would indirectly achieve this social objective. There was no mention of how the impact of these actions on FNS would be measured.

*Figure 2: Example of integration of FNS into Bangladeshi National Aquaculture Development Strategy 2013-2020*




*Summary*

All instruments reviewed across sectors, except three fisheries management instruments, linked fisheries/aquaculture and FNS, with the majority making this link in more than one context. The context of the linkages tended to be on developing fisheries for improving direct and indirect FNS, with a mixture of low and high commitment demonstrated. The *Second County Investment Plan 2016-2020* and the *National Aquaculture Development Strategy and Action Plan* 2013-2020 provide clear linkages between fisheries/aquaculture and FNS across a range of contexts, with a high level of commitment to FNS outcomes. These instruments provided good examples of linking fish and FNS policies and could be strengthened further by adding metrics related to FNS. The *Second County Investment Plan 2016-2020* was also one of the few instruments examined which linked fish and FNS in the context of nutrition sensitive fisheries/aquaculture production to improve availability of nutritious foods.

## 5.2 Chile


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.2.1 Country Overview*

Chile is located on the western slope of South America and due to its western limit with the Pacific Ocean, it has one of the most extensive coasts in the world, with approximately 4,200 km in a straight

line (Packard Foundation, 2019). This relationship with the sea means it has one of the richest and most productive marine ecosystems on earth. Chile is also highly vulnerable to climate change owing to its low-lying coastal areas and highly variable in environmental conditions (e.g. temperature, oxygen and currents), which has serious food-security implications for Chile's fisheries and aquaculture communities (FAO, 2020a).

The bulk of fish landings are pelagic (anchovies, mackerel, and sardines) used as raw material to produce high-quality fishmeal for export. The Chilean fishing sector has a highly organized production structure in terms of both industrial and artisanal fisheries. In 2013, the fishing fleet consisted of some 254 industrial vessels and approximately 12,700 artisanal vessels (FAO, 2014b). The distinction between industrial and artisanal fishers is often blurred (Nelson, 2013) due to unintended consequences of the government's approach to provide specific protections to its small-scale fishers, which has led to the industrialization of the artisanal fleet and a number of unforeseen negative outcomes in regards to fisheries management (Eisman, 2016).

The aquaculture sector experienced rapid development in the 1980s based mainly on salmonid farming. In 2019 the sector produced 989,500 tonnes of salmonids (SERNAPESCA, 2019), making it the world's second biggest producer after Norway (FAO, 2018a). It also produced 381,000 tonnes of mussels (SERNAPESCA, 2019), which is again second in the world after China (Sub-secretaría de Pesca y Acuicultura, 2019). Despite the significant production of marine produce, approximately 80% goes to external markets (SONAPESCA, 2018) making Chile the fifth largest exporter of seafood globally (FAO, 2018a). Despite the high levels of production, the country has a relatively low per capita consumption of seafood of 13.3kg per capita in 2013, which was down by 1.3% from 1993 (Mancini, 2020) and below the global average of 20kg.

Chile has experienced rapid economic growth and a decline in poverty since the early 1990s (Jadresic and Zahler, 2000). As a result, the Chilean population is generally well-nourished, however, they have also been one of the fastest Latin American countries to undergo a nutrition transition with a high prevalence of obesity in most population groups driven by negative lifestyle changes (Atalah, Amigo and Bustos, 2014). Chileans are also amongst some of the biggest meat eaters in the world (OECD, 2019) which represents approximately 64% of their dietary intake of animal protein with seafood playing a much less significant role at just 7.4% (Mancini, 2020).

### *5.2.2 Review of Governance Instruments*

Chile had a mixture of governance instruments focused on fisheries (*National Fisheries Policy 2007, General Law of Fishing and Aquaculture 1998*), aquaculture (*Chilean National Aquaculture Policy 2003*), health (*National Health Strategy 2011-2020),* climate change (*Climate Change Adaptation Plan for the Health Sector 2016, Climate Change Adaptation Plan for Fisheries and Aquaculture 2015*) and sustainability (*Chilean Action Plan for Sustainable Consumption and Production 2017-2022*). Further details of these seven instruments can be found in *Appendix 1.* Interestingly, the specific fisheries/aquaculture and health instruments made no linkage between FNS and fish, however, two documents from the climate change and sustainable development sectors made a link through a focus on increasing consumption, which reflects the government focus. These instruments also showed a high or very high level of commitment as described below.

The *Chilean Action Plan for Sustainable Production and Consumption 2017-2022* provided a detailed list of actions the country needed to take in order to achieve this important goal linked to the UN SDGs. It made very little reference to FNS and fisheries other than a clear target to increase the consumption of seafood by 1kg per capita by 2022, together with information relating to SDGs, responsibilities and finance as shown in Table 10 below. There was however no discussion of fisheries or nutrition throughout the document.

*Table 10: Seafood and FNS related activities noted in the Chilean Action Plan for Sustainable Production and Consumption**

| Name | Type of Initiative | Objective | Responsible | Lines of Action | SDG |
|---|---|---|---|---|---|
| National program of feeding (increase seafood consumption by 1kg/year) | Generation of information, communication and dissemination | Seeks to increase consumption of seafood in Chile. The goal is to increase by 1kg/year, reaching 15kg/capita by 2022. | Sociedad Nacional de Pesca | Sustainable Food Systems and Sustainable Lifestyles and Education | 12 |

*Please note: This is an English translation taken from page 46 of the original Spanish version of the Plan.

In contrast, the *Fisheries and Aquaculture Climate Change Adaptation Plan 2015* made numerous references in the general text of the importance of fisheries and aquaculture for food security and the risks climate change places on this. The plan has five overarching objectives, the last of which was to develop direct adaptation measures aimed at reducing the vulnerability and impact of climate change on fishing activities and aquaculture. This objective has five specific actions (total of 29 for the entire plan), of which two relate to FNS as shown in Table 11 below. Once again, both of these relate directly to the promotion of seafood consumption, with marketing and value-adding activities identified as the areas the government will focus on to achieve this. Both of these actions were linked to Objective 5 which is to develop direct adaptation measures aimed at reducing the vulnerability and impact of climate change on the activities of fishing and aquaculture.

*Table 11: Overview of actions linked to FNS from Chilean Fisheries and Aquaculture Climate Change Adaptation Plan 2015**

| | Action 28 | Action 29 |
|---|---|---|
| **Measure** | Promotion of direct human consumption of anchovy and sardines | Promote consumption and added value in artisanal fishing resources |
| **Objective of the measure** | Increase direct human consumption of anchovy and sardines, to improve socio-economic benefits and sustainability of resources | Improve the sustainability of resources, reducing the extractive pressure on them through the improvement of the economic benefits of the catches. |
| **National coverage** | Terms 2016 onwards | Terms 2016 onwards |
| **Actions** | • Develop advertising campaigns to increase domestic consumption of sardines and anchovy<br>• Implement technologies and marketing strategies to encourage consumption of sardine and anchovy | • Development of advertising campaigns to increase the consumption of fish and seafood.<br>• Development of productive projects to diversify the product offer derived from fish and shellfish. |

| | | |
|---|---|---|
| | • Develop products based on anchovy and sardines for human consumption | • Development of strategies to improve economic and physical accessibility to resources and their derivatives.<br>• Develop strategies to improve the conservation and presentation of resources offered to the public |

*Please note: This is an English translation taken from page 70 of the original Spanish version of the Plan.

*Summary*

The *Chilean Action Plan for Sustainable Production and Consumption 2017-2022* and the *Fisheries and Aquaculture Climate Change Adaptation Plan 2015* both included targets to increase the consumption of seafood. These instruments showed a high or very high level of commitment although they did not include any means of measuring contribution to FNS. In contrast, the fisheries/aquaculture and health instruments made no linkage between FNS and fish.

## 5.3 Ghana


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.3.1 Country Overview*

Ghana has a diverse fisheries sector owing to the broad range of fish stocks derived from their 550 km continental coastline and the many inland waterbodies which cover approximately 10% of the land surface (Hasselberg et al., 2020). The marine sector makes up around 75% of the total catch, with the remainder coming from inland fisheries, in particular those located in Lake Volta which is the largest man-made lake in Africa (FAO, 2016). The artisanal sub-sector accounts for the majority of landings from the marine sector which are predominantly small pelagics (Fisheries Committee for the West Central Coast of Guinea, 2019) including sardines, mackerel and anchovies (Hasselberh et al., 2020). However, production from marine fisheries has suffered significant declines since the 1990s, following overexploitation by the industrial fleet, which resulted in an increase in imports to sustain local consumption (FAO, 2016).

Whilst the aquaculture sector in Ghana is relatively small, it has shown significant growth over the past decade with production increasing from 5,000 tonnes in 2000 to 76,630 in 2020 (FAO, 2018a). This growth is in part due to increased government support with the Ministry of Fisheries and Aquaculture established in 2013 to give more emphasis and support to the industry as a means to improve food security and reduce poverty (Akuffo and Quagrainie, 2019). Small-scale ponds have been the main production system in Ghana, although in recent years there has been a shift to larger cage-based operations, with tilapia the main species grown (Hasselberg et al., 2020).

Ghanaians are amongst the biggest consumers of seafood in Sub-Saharan Africa at 25kg/annum which represents approximately 60% of their total animal protein consumption (Akuffo and Quagrainie, 2019). The fisheries sector is also a significant source of employment and revenue, with approximately 10% of Ghanaians reliant on the sector for their livelihoods (FAO, 2016). Although the majority (75%) of total production is consumed locally, export earnings from fish and fish products are a significant source of foreign exchange, with smoked fish the main product exported to Europe, USA and other African nations (Asiedu, Failer and Beygens, 2018).

Despite the significant economic growth in Ghana over the last few decades, issues such as increasing inequality and unsustainable fisheries management are challenging local FNS (Hasselberg et al., 2020). Malnutrition is a persistent challenge with recent improvements in child stunting and wasting at the national level masking significant regional variations, in particular in the northern regions (USAID, 2018).

### *5.3.2 Review of Governance Instruments*

Ghana had a very broad range of governance instruments including those relating directly to FNS (*National Nutrition Policy 2013-2017*), fisheries (*Fishery Management Plan of Ghana 2015-2019*) and aquaculture (*Ghana National Aquaculture Development Plan 2012*), climate change (*National Climate-Smart Agriculture and Food Security Action Plan 2016-2020*), agriculture (*Medium-term Agricultural Sector Investment Plan II, 2014-2017, National Medium-Term Development Plan of Ministry of Food and Agriculture 2014-2017*), economic development (*Ghana Shared Growth and Development Agenda 2014-2017*), and social development (*The Coordinated Programme of Economic and Social Development Policies 2017-2024*). Further details of these ten instruments can be found in *Appendix 1.*

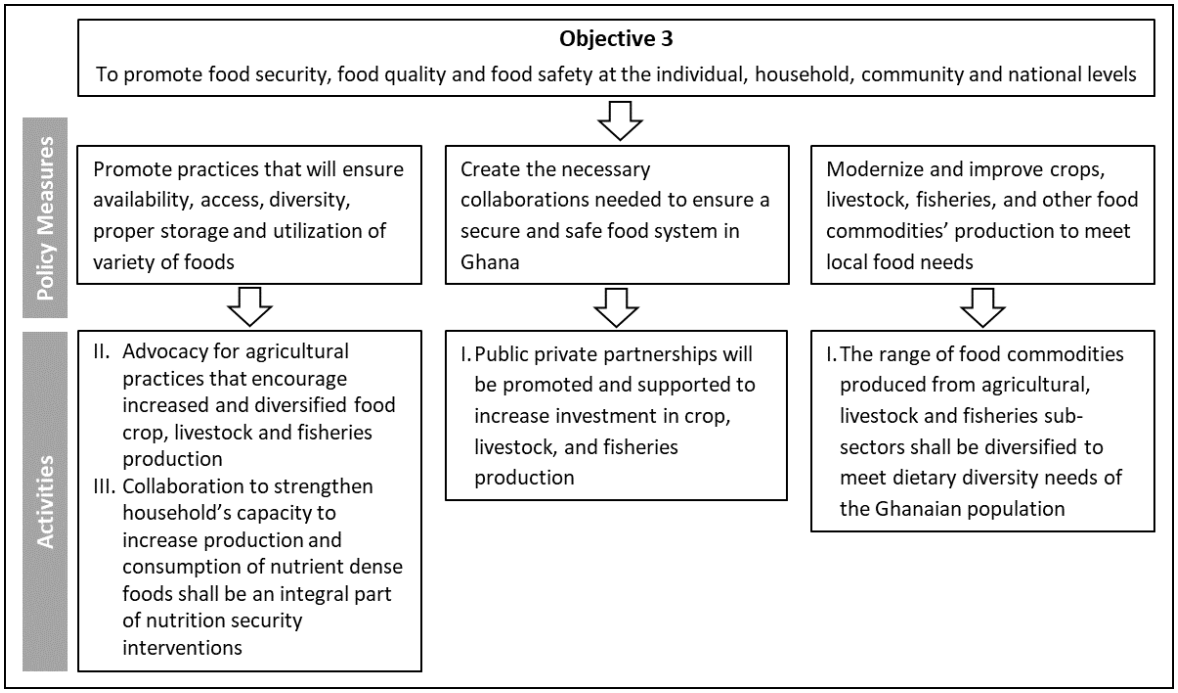
The *Medium-Term Investment Plan for Agriculture 2014-2017* made a clear link between the need to promote the consumption of seafood in the Programme Area 2 (Food and Nutrition Security and Emergency Preparedness), sub programme H (Nutrition sensitive agriculture). However, the adopted strategies for this sub-programme (Table 12) make no specific mention of seafood but rather they refer more generally to micronutrient foods and dietary diversification which could be assumed to include fish. That said, this document together with the *Medium-Term Development Policy Framework 2018-2020* appeared to be more focused on the promotion of other food groups, mainly poultry, livestock and crops as a source of food and nutrition which is perhaps a reflection of the importance of these food groups in the national diet.

*Table 12: Adopted strategies for nutrition-sensitive agriculture sub-programme from the Ghana Medium-Term Agriculture Sector Investment Plan 2014-2017*

| | |
|---|---|
| 2.6.1 | Promote the production and consumption of micro-nutrient rich foods by children and women of reproductive age especially in rural areas |
| 2.6.2 | Develop through research bio fortified high nutrient crops and link to the school feeding programme |
| 2.6.3 | Facilitate the development of high-quality staples through breeding and promotion of regenerative health and nutrition |
| 2.6.4 | Reposition nutrition as a cross-cutting issue and facilitate the integration and mainstreaming of nutrition into all national development efforts |
| 2.6.5 | Promote school and kitchen gardens |
| 2.6.6 | Education campaigns on nutrition to enhance dietary diversification |
| 2.6.7 | Research to measure the impact of nutrition intervention |

The most comprehensive instrument for Ghana was the *National Nutrition Policy 2013-2017* which set four objectives collectively aimed at improving the nutritional status of the population. Objective three was directly related to FNS with six policy measures, three of which include activities that link directly to fish as shown in Figure 3. These include a range of measures including those aimed at increasing fisheries production and consumption, with a focus on collaboration and dietary diversification.

*Figure 3: Policy measures and activities relating to seafood for Objective 3 in the Ghana National Nutrition Plan 2013-2017*




The *National Climate-Smart Agriculture and Food Security Action Plan 2016-2020* also took a strong approach with one of the eight action areas linked directly to fisheries/aquaculture. The plan clearly outlines actions to be taken at district, national and agro-ecological zone level as shown in Table 13.

However, the focus of these initiatives was very much on protecting the livelihoods of people in coastal and riparian communities (indirect food security), with no mention of nutritional outcomes (direct food security). In comparison to the previously mentioned document, there is a much stronger focus on aquaculture, which could be due to the increased focus the government placed on this sector during the time between when the two instruments were developed.

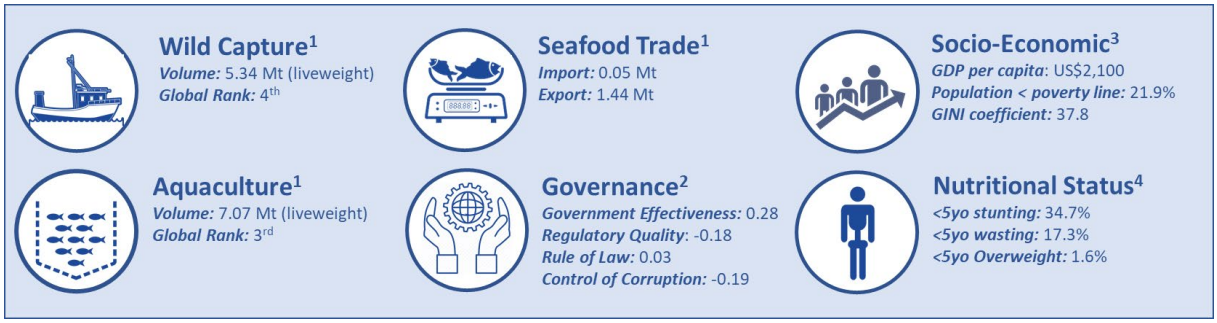
*Table 13: Activities identified to support climate adaptation in fisheries and aquaculture at different levels*

| Level | Activities |
|---|---|
| District level | • Train fish farmers in aquaculture<br>• Support interested farmers to construct ponds and rear fish |
| National | • Strengthen capacity for extension services for climate smart fisheries and aquaculture development<br>• Management of inland and coastal ecosystems |
| Savanah Zone | • Capacity building on knowledge, skills and attitudes<br>• Research and adapt suitable species for rearing<br>• Provide supportive infrastructure along the value chain (storage, processing and marketing)<br>• Promote environmentally sustainable fishing methods (KAPs) |
| Transitional Zone | • Temperature tolerance fish strains<br>• Introduction of fish farming in dugouts and reservoirs<br>• Introduction of small cages in dugouts and reservoirs<br>• Salinity tolerance fish strains<br>• Introduction of new species e.g. shrimps, tilapia<br>• Introduction of new fish culturing systems e.g. aquaponics<br>• Promotion of cage and tank fishing<br>• Hatcheries for quality fingerlings<br>• Availability of quality feed formulation |
| Forest Zone | • Train fish farmers in aquaculture<br>• Support interested farmers to construct fishponds<br>• Support established farms and aquaculture centre to produce fingerlings<br>• Provide fish health care<br>• Identify climate resilient varieties<br>• Identification and protection of wetlands and other water bodies<br>• Promotion and adoption of appropriate techniques for fishpond construction<br>• Climate-smart production techniques |

*Summary*

The majority of the instruments in Ghana across sectors linked fish and FNS, with the main context of the link on developing fisheries for improving direct and indirect FNS. However, in most cases the level of commitment was relatively low as the link was only briefly mentioned in the general discussion and/or goal of the document, with very few instruments providing further detail to define objectives, actions or targets. The most comprehensive instrument for Ghana was the *National Nutrition Policy 2013-2017* which set four objectives collectively aimed at improving the nutritional status of the population, including a range of measures such as increasing fisheries production and consumption, with a focus on collaboration and dietary diversification.

## 5.4 India




[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.4.1 Country Overview*

The Indian subcontinent offers a diverse range of environments and climates from arid deserts in the west to humid tropical regions in the southwest (Dimitrova and Bora, 2020). It has a long coastline of 8,118 km and two major groups of Islands, with rich and diverse marine living resources (India Department of Fisheries, 2020). It also has significant freshwater resources, comprised of 14 major rivers, 44 medium rivers and innumerable small rivers and desert streams which have a combined length of 29,000km and are home to one of the richest diversity of fish resources in the world (Datta, 2011). As such, it is not surprising that India is the fourth largest producer for capture fisheries and the third largest for aquaculture (FAO, 2018a).

Freshwater production dominates both capture and aquaculture production, accounting for 71% of total seafood production in 2017-2018 (Ministry of Fisheries, Animal Husbandry and Dairying, 2019). About 13 million Indians are directly employed in fishing and aquaculture (FAO, 2019b), and another 30 million in associated ancillary activities (Kumar, 2019). Unlike agriculture, the contribution of the fisheries sector to GDP has continued to increase over the past three decades, driven by the rapid rise in aquaculture (Kumar, Datta and Joshi, 2010). Whilst small-scale freshwater pond-based systems were the predominant culture system for many years, there has been an increase in freshwater cage culture (Anand, 2019) and coastal aquaculture (predominantly shrimp) in recent years which has helped to boost production (Krishnan and Birthal, 2002).

Consumption of seafood by Indians varies significantly by region as well as between urban and rural locations (Ministry of Fisheries, Animal Husbandry and Dairying, 2019). Whilst historically seafood has been the food of the poor, given the relative affordability compared to other meats, in recent times it has become one of the most expensive animal-source foods due to a combination of declining stocks and increasing demand (Kumar, 2018). The national average is relatively low at 6.6kg/capita per annum (FAO, 2019b), which increases to around 8kg/capita per annum when adjusted for the large portion of the population that are vegetarian (Kumar, 2018).

The fisheries sector faces enormous challenges with the majority of the commercially important marine species in decline due to severe resource depletion (India Department of Fisheries, 2020) and most of the inland stocks fully exploited (FAO, 2019b). The country also faces significant risks to FNS in the future due to climate change, economic underdevelopment, and high susceptibility to extreme weather events (Dimitrova and Bora, 2020).

While still relatively underdeveloped in some areas, India has undergone significant economic growth over the past decade. This growth combined with a strong focus on FNS from the government, has enabled India to make substantial improvements in malnutrition, with child stunting declining from 48% in 2005-2006 to 35% in 2016-2018 (UNICEF, WHO and World Bank, 2019). Yet, India continues to have one of the world's highest child undernutrition rates alongside growing incidences of overweight/obesity, with significant variation between regions (Pingali et al., 2019). For example, in Madhya Pradesh undernutrition remains a key challenge, whilst rising obesity in Kerala has led to a focus on overnutrition (ibid).

### *5.4.2 Review of Governance Instruments*

India had a small but varied range of governance instruments covering food security (*The National Food Security Law 2013*), nutrition (*National Nutrition Strategy 2017*), fisheries (*National Policy on Marine Fisheries 2017; The Indian Fisheries Act 1897*) and agriculture (*National Policy for Farmers 2007*). Further details of these five instruments can be found in *Appendix 1.*

The most comprehensive was the *National Policy for Farmers 2007* which included fishers in their definition of farmers. One of the thirteen overarching goals for the policy was to strengthen the bio-security of crops, farm animals, fish and forest trees for safeguarding the livelihood and income security of farmer families and the health and trade security of the nation. Numerous actions were highlighted to support the fisheries and aquaculture sectors such as establishing training and capacity building for fishers, policy reforms and provision of centralised services. Although none of these directly related to FNS, it was clear from the general text in the fisheries section of the policy that the aim of promoting fisheries and aquaculture is to provide employment and livelihoods to millions of families, with specific mention given to vulnerable groups within society (landless labour families, women).

The *National Policy on Marine Fisheries 2017* contained a clear reference to nutrition and livelihoods as some of the key outcomes of the fisheries sector, but there were no clear objectives or actions linked to these. The policy included specific reference to FAOs Voluntary Guidelines on Sustainable Small-Scale Fisheries (VG-SSF) and their intention to make all efforts to implement the provisions of this with the aim to improve food security and poverty eradication. Interestingly, it also referred to the need to reduce post-harvest losses to ensure there is more available for human consumption. The policy noted that it will be accompanied by an implementation plan, however, a search for this did not return any results.

The *National Nutrition Strategy 2017* made no mention of seafood, nor did it mention any other meat. Instead the document focused more on nutritional interventions that were not directly linked to food, for example encouraging breastfeeding, discouraging early marriage, improved access to health care, supplementation of infants and pregnant women. The *National Food Security Act 2013* also made no mention of fish, nor any other food group except for grains which was a major focus of the document.

*Summary*

Only two of the five instruments reviewed, the *National Policy on Marine Fisheries 2017* and the *National Policy for Farmers 2007*, established a link between fisheries/aquaculture and FNS, both of

which were in the context of developing fisheries for improving direct and indirect FNS, as well as reference to equity and a focus on vulnerable groups. The level of commitment varied from low for the *National Policy on Marine Fisheries 2017* to high for the *National Policy for Farmers 2007*.

## 5.5 Indonesia


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.5.1 Country Overview*

Indonesia is the world's largest archipelago extending over 5,000km. The country is made up of approximately 17,000 islands with 108,000km of coastline and two thirds of its territory at sea (World Bank, 2019b). It sits between the Pacific and Indian Oceans at an intersection between two tectonic plates. This location, together with its tropical climate makes it one of the most biodiverse ocean environments in the world (Packard Foundation, 2018). As a result, Indonesia has a highly productive fisheries sector which is second in the world to China by volume (FAO Stat, 2018) and accounts for approximately 2.6% of GDP (World Bank, 2019b). Approximately 88% of Indonesia's fishing fleet in 2014 were small-scale fishers, with around 2.7 million people directly employed in the fisheries sector (Californian Environmental Associates, 2018).

The abundance of water resources and warm temperatures also makes Indonesia an ideal location for aquaculture, which has boomed in the past two decades, making Indonesia the second largest aquaculture producer by volume after China (FAO, 2018a). The main species by volume is seaweed, with shrimp the largest by value (ibid) driven mainly by the strong demand from the export market. Aquaculture also plays an important role in the local economy employing around 3.3 million people (California Environmental Associates, 2018) as well as making a positive contribution to the availability of seafood for Indonesia's growing population.

Indonesia is the fourth most populated country in the world and in recent years has experienced a high degree of economic growth leading to a growing middle class and a change in food consumption and expenditure, particularly in urban regions. This has resulted in a reduction in per capita cereal consumption accompanied by an increase in consumption of animal proteins, fruits, vegetables and processed foods (World Bank, 2016). Whilst this has had a positive impact on the nutritional status of the population, levels of food insecurity and poor nutrition remain high and Indonesians are beginning to suffer the double burden of malnutrition with the simultaneous presence of under and over-nutrition (Sleet, 2020).

In 2016 seafood consumption was approximately 43.9kg per capita (Maritime and Fisheries Department, 2018) representing approximately 52% of all animal-based protein in the Indonesian diet (World Bank, 2019b). However, the consumption rate varies significantly between provinces, therefore, the government continues to promote seafood consumption at the provincial, municipal and sub-district levels with the aim to meet their target of 54.5kg per capita (California Environmental Associates, 2018).

In the past decade the Indonesian Government has moved away from a management approach which prioritised extraction of marine resources for economic development (Sutinen, 2013), to one which aims to increase the sovereignty, sustainability and prosperity of Indonesia's people (Packard Foundation, 2018). As part of these reforms, some of the responsibility for fisheries management has shifted to the local and provincial governments (Sutinen, 2013). Indonesia provides an interesting case study of how food security and fisheries/aquaculture are linked at a regional level.

### *5.5.2 Review of Governance Instruments*

A total of ten governance instruments were reviewed for Indonesia, of which four were at a National level covering nutrition (*National Plan of Action for Food and Nutrition 2011-2015*), food security and nutrition (*Bill of the Republic of Indonesia No. 18 Concerning Food by the Mercy of God Almighty 2012*), fisheries (*Fisheries Law No 31/2004*) and social development *(National Mid-term Development Planning 2020-2024*). The remaining six were regional documents from six Provinces (Central Java, Lampung, Nusa Tenggara Barat, Riau, South Kalimantan, West Java) all of which were fisheries-based instruments. Further details of these ten instruments can be found in *Appendix 1.*

At the national level, Indonesia has two main governance documents that deal with FNS, *the Food Law 2012* and the *National Plan of Action for Food and Nutrition 2011-2015*. Both documents made a link between food FNS and seafood, mainly within the context of increasing consumption. Whilst the Law made general references to seafood and the welfare of fishers, the plan is more explicit in the actions required to meet these objectives as well as targets to measure performance. Although the programmes/activities and targets set relate specifically to seafood (Table 14), there is little mention of seafood throughout the document. Rather, it is inferred by the actions and targets identified that seafood, together with other major food groups, plays as important role in achieving strategic pillar number two (increasing the accessibility of diversified food). The plan also specifies the budget required, the source of finance and the executor of the action.

*Table 14: Fisheries Related Programmes/Activities and Targets to Meet Strategic Pillar 2 of the National Plan of Action for Food and Nutrition 2011-2015*

| Programmes/Activities | Indicator | Target* | |
|---|---|---|---|
| | | 2011 | 2014 |
| Development and management of fisheries | Number of productions of fisheries (million tons) | 5.41 | 5.5 |
| Increasing of cultivated fishery productions | Volume of productions (million tons) | 6.85 | 16.89 |
| Improvement of fishery product competitiveness | Volume of value-added fishery processed products with package and quality assurance (million tons) | 4.3 | 5.0 |
| | Number of average fish consumption per caput nationally (kgs) | 31.57 | 38.67 |
| Facilitation activities on strengthening and improving of in country marketing of fishery products | Number of fish auctions and fishery markets that function properly | 36 FAP; 7,000 markets | 90 FAP; 7,000 markets |
| | Number of activities for fish eating habit movements (FEHM) | 33 provinces | 33 provinces |
| Oceanic and fisheries educations | Number of group fishery potentials educated | 400 groups in 50 locations | 700 groups in 50 locations |

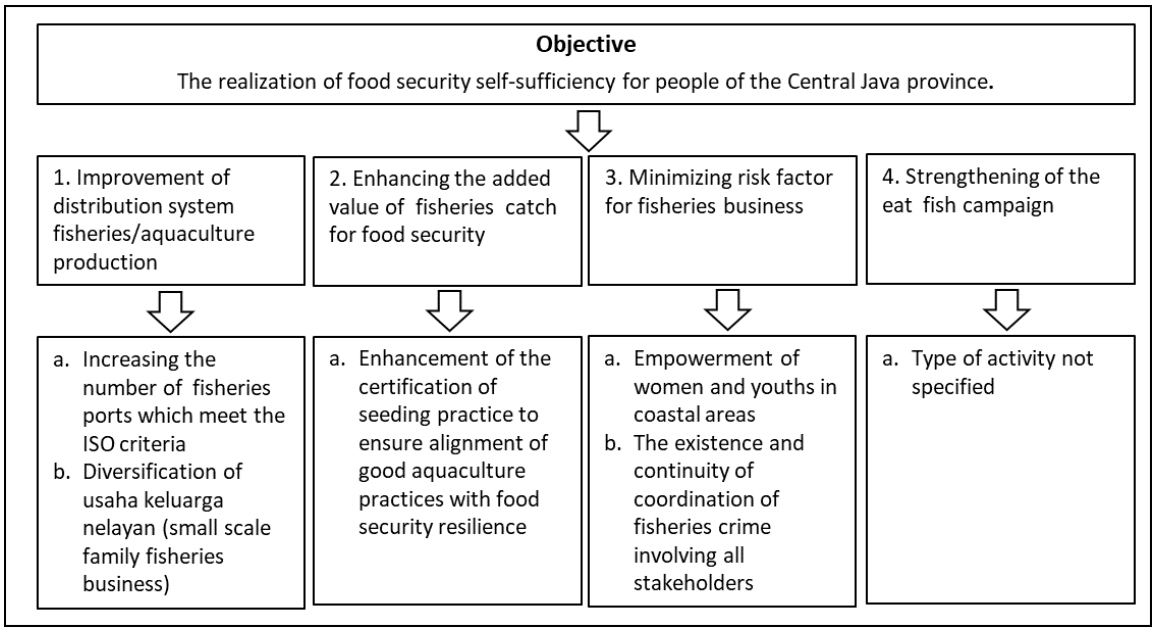
* Annual targets set for 2011-2014, only 2011 and 2014 shown here for demonstration purposes

The *National Medium-Term Development Plan 2020-2024* is the fourth and final phase for the implementation of the Governments *National Long-term Development Plan 2005-2025* which serves as a reference point for the whole Indonesian society to achieve the national development objectives. The 2020-2024 phase places a strong emphasis on food security with the overall objective being *to enhance availability, access, and quality consumption of food through several measures*. In regards to seafood, it makes a clear link between FNS and increasing production to improve food security directly (availability, access and utilization and stability) and indirectly (employment and livelihoods) as well as improving the resilience of the system to protect long term food security and/or livelihoods. Despite having objectives linked to these concepts, it does not outline any action plans or targets.

Since the *National Long-term Development Plan 2005-2025* is intended to be a guide to ministries and government agencies to formulate their respective Strategic Plans (Indonesia Investments, 2020) it is not surprising that there is a strong focus on FNS in all the provincial Strategic Plans reviewed as part of this research. All six of the plans reviewed made a link between FNS and seafood, however, the exact context of the linkage and the level of commitment varied between plans as the decision of what to include is ultimately up to the provinces and is based on their individual priorities. Half of the plans included references to increasing seafood production to improve direct food security, whilst one instrument mentioned increasing production to improve livelihoods. Half of the documents referred to both improving the resilience of the system to protect long term food security and educating the national population about nutritional benefits of eating seafood.

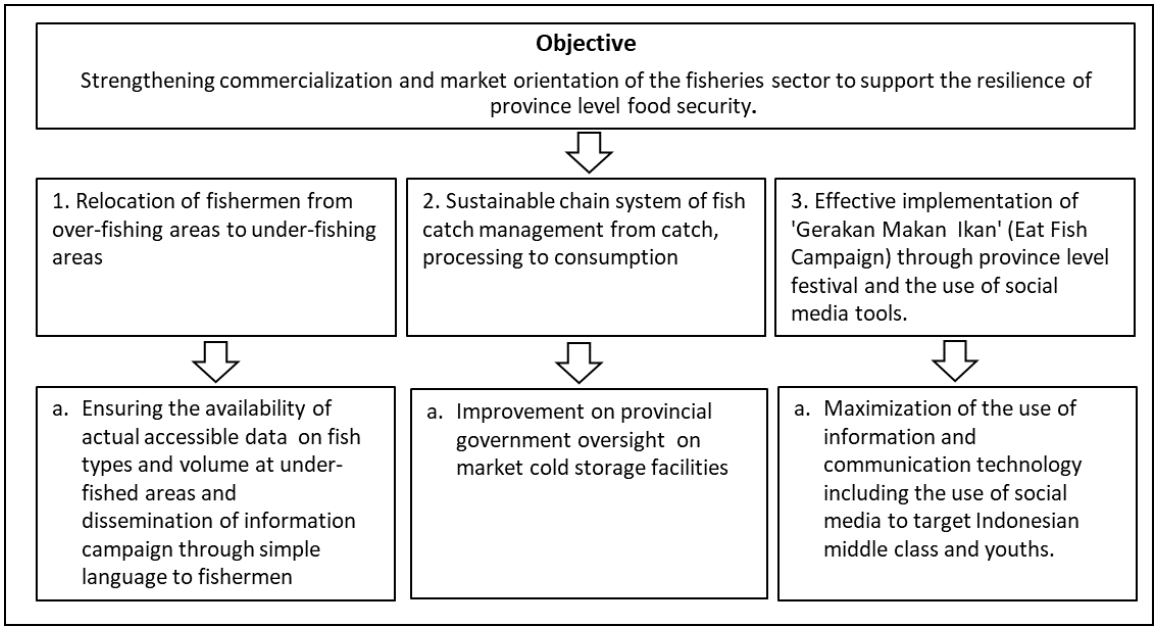
The most comprehensive instruments were the Strategic Plans for Lampung and Central Java, which were the only plans to clearly outline the actions required to meet the desired objectives as well as targets to measure progress. In the *Strategic Planning Document of the Maritime Fisheries Department of Central Java Province 2018-2023*, two out of the four objectives linked fisheries to FNS, an example of which is shown in Figure 4. This objective is focused on self-sufficiency with the activities identified to achieve this objective being quite diverse, including infrastructure development, certification, empowerment of women, and marketing. Each of these activities are conducted in a multi-year scheme (2018-2023) with quantitative indicators for each year.

*Figure 4: Example of integration of FNS into Strategic Planning Document of the Maritime Fisheries Department of Central Java Province 2018-2023*




Similarly, in the *Strategic Planning Document of the Maritime and Fisheries Department of West Java Province 2018-2023* four out of seven objectives linked fisheries and FNS with clear outputs and activities connected to each. Figure 5 below shows an example of one of these objectives which is focused on improving the resilience of provincial food security through market-based mechanisms. Once again, the activities identified are quite broad, with a strong focus on communication with fishers and consumers as well as improvements to government oversight or critical supply chain infrastructure.

*Figure 5: Example of integration of FNS into the Strategic Planning Document of the Maritime and Fisheries Department of West Java Province 2018-2023*




As can be seen in Figure 4 and Figure 5, the *Eat Fish Campaign* is identified as an activity in both the West and Central Java plans. This is part of the 'Gemarikan' (Gerakan Makan Ikan) or Eat Fish Movement national campaign initiated by the Ministry of Maritime and Fisheries Affairs (MMFA) with the aim to 'improve the human potential of Indonesia' which is one of nine priorities of the national development agenda (California Environmental Associates, 2018). As part of this campaign, the ministry established fish consumption promotion councils throughout the country, at the provincial, district, municipal, and sub-district levels. The extent to which this is integrated into the community varies between these geographical locations.

*Summary*

All of the documents reviewed, except the *Fisheries Law No.31/2004*, linked fisheries/aquaculture and FNS, predominantly in the context of developing fisheries for improving direct FNS, although a range of linkages were present in other contexts, most notable increasing consumption and education. The level of commitment across these instruments ranged from very low for the FNS document and one of the regional fisheries strategies, to very high for the majority of the regional fisheries strategies and the *National Plan of Action for Food and Nutrition 2011-2015*. The two main national governance documents for FNS promoted increased consumption of fish, while the national document for development promoted increased production. Regional plans demonstrated more diverse contexts of linking fish and FNS and these plans also more clearly outlined the actions required to meet the desired objectives as well as targets to measure progress.

## 5.6 Japan


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.6.1 Country Overview*

As an island nation with 29,751km of coastline and a highly productive exclusive economic zone (EEZ) that is twelve times larger than the national land area, fisheries have traditionally played an important role in Japanese FNS (FAO, 2019c). Japanese fishers target a wide range of species, in particular pelagic fish, such as anchovy, mackerel, and tunas and to a lesser extent shellfish and cephalopods (Popescu and Ogushi, 2013). Overall the marine capture industry accounted for 61% of seafood production in 2018, followed by marine aquaculture at 23% (MAFF, 2020) with seaweed, oysters and yellow tail kingfish the main products cultivated (Popescu and Ogushi, 2013).

Employment in the fisheries sector has declined by 60% over the past 30 years to 152,000 in 2018, which has been accompanied by a 20% decline in the number of large fishing vessels (MAFF, 2020) and a 70% decline in catch (FAO, 2018a). This downward trend is the result of a combination of overfishing (Sullivan, 2013), the global introduction of EEZs in the 1980s and a subsequent withdrawal from distant waters, an ageing fishing community and more recently the effects of the 2011 tsunami on the fishing sector (Popescu and Ogushi, 2013). This has led to an increased reliance on imports, with Japan the second largest importing nation of fisheries products in 2017 (ibid). In response to this, there has been an increased focus from the government on improving the national self-sufficiency rates for fish and fisheries products (Yamashita, 2019) which has steadily declined from its peak of 113% in 1964 to 59% in 2018 (MAFF, 2020).

Although seafood consumption in Japan is amongst the highest in the world, it has declined from its peak of 40.2kg/capita/annum in 2001 to 23.9kg/capita/annum in 2018 which is the same it was 50 years ago (MAFF, 2020). The decline in seafood and rice consumption in recent decades has in part been replaced by an increase in consumption of other animal-sourced foods, which now exceed the consumption of seafood at 33.5kg/capita/annum (ibid). Whilst the general nutritional status of the population is good with low levels of both under and over nutrition (Global Nutrition Report, 2020), these dietary shifts away from the traditional grain and seafood-based diet towards a more western diet are predicted to have negative health consequences in the future (Smil and Kobayashi, 2012).

### *5.6.2 Review of Governance Instruments*

Japan had a small range of relevant governance instruments covering nutrition (*Basic Act on Dietary Education (Shokuiku)* 2005), fisheries (*Fisheries Basic Act* 2001), aquaculture (*Sustainable Aquaculture Production Assurance Act* 1999), agriculture (*Basic Policy and Action Plan for the Revitalisation of*

*Japan's Food and Agriculture, Forestry and Fisheries 2011*), and climate change (*Climate Change Adaptation Plan of Ministry of Agriculture, Forestry and Fisheries 2015*). Further details of these five instruments can be found in *Appendix 1.*

Across all instruments there was very limited mention of a linkage between seafood and FNS and little to no commitment made. Many of these, including the *Climate Change Adaptation Plan of Ministry of Agriculture, Forestry and Fisheries 2015* and the *Basic Policy and Action Plan for the Revitalization of Japan's Food Agriculture, Forestry and Fisheries 2011* focused on food self-sufficiency rather than food security which reflects the focus of the government. In the climate change instrument there was an indirect reference to food security in regards to disaster management and the need to build the resilience of the agricultural and fisheries sectors to ensure they were fit to survive and respond to disasters, however, there were no specific references made to FNS.

The *Basic Law on Shokuiku 2005* (food education) had a clear focus on the role of fishers (and farmers) in educating people about the benefits of a healthy diet and to counteract the increasing tendency to devalue sensible eating. This includes a responsibility to offer opportunities for people to experience a variety of fishery related activities (e.g. supplying products for local school lunches, hosting educational tours, selling direct to consumers) with the aim to broaden their understanding of the importance of human activities in food production and distribution. It also stressed the need for fishers (and farmers) to collaborate with educators and other concerned parties to create such opportunities. This was linked to one of the four aims of the Ministry of Agriculture, Forestry and Fisheries in relation to Shokuiku which are shown in Figure 6. These are linked to the Japanese Dietary Guidelines which clearly promote the consumption of seafood as part of a healthy diet[1].

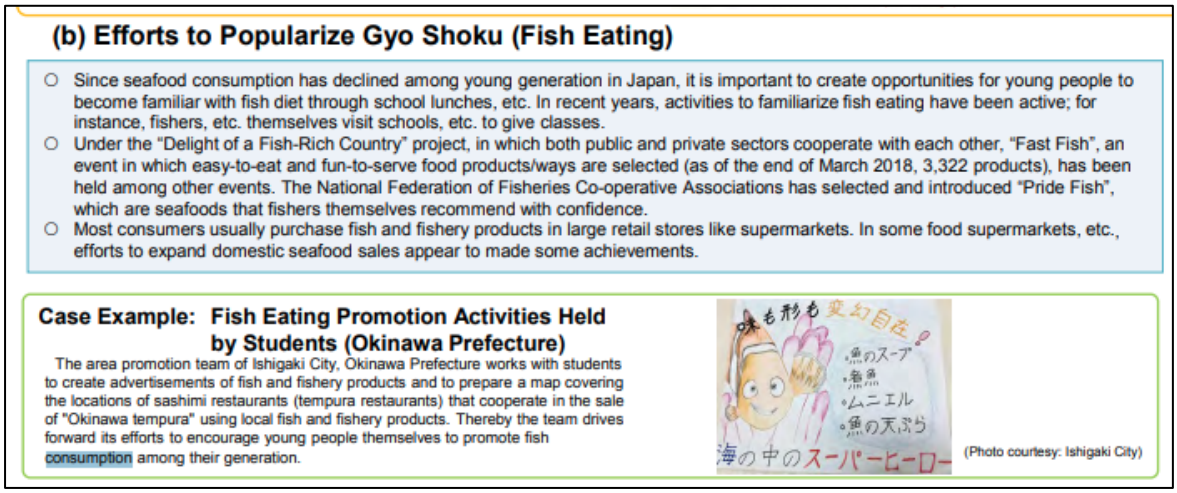
*Figure 6: Four aims of the MAFF in relation to Shokuiku*

1. Helping people to enjoy a healthy diet;
2. Promoting people's understanding on agriculture, forestry, fishery and food industry;
3. Perpetuation of traditional food culture; and
4. Providing information on food safety

In a review of Japanese fisheries policy undertaken by the Ministry of Agriculture, Fisheries and Forestry (2018) several initiatives were discussed which were not covered in any of the above-mentioned documents. The majority of these align with the approach to educate the population about the importance of seafood and increase consumption, in particular amongst young people who are shifting away from the traditional fish-based diet. An example of these initiatives can be found below in Figure 7.

[1] The Dietary Guidelines are not included in the review of governance instruments, but since they were referenced in the Shokuiku they are referenced here

*Figure 7: Examples of initiatives in Japan to encourage seafoodconsumption*




*Summary*

Across all instruments reviewed there was very limited linkage between seafood and FNS and little to no commitment made. The *Basic Law on Shokuiku 2005* (food education) took a unique approach to educate the population about the importance of seafood and increased consumption.

## 5.7 Mauritania


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.7.1 Country Overview*

From the mouth of the Senegal River to the tip of Cape Blanc, the Mauritanian coastline stretches over 720 km with a large continental shelf contained within its EEZ that is known for its abundance and diversity of marine life due to the nutrients carried by the Canary Current and the associated cold water upwelling (Sub regional Fisheries Commission, 2016). There are nearly 600 species of fish that have been listed in Mauritanian waters, 200 of which have a commercial value (Ministry of Fisheries and Maritime Economy, 2015).

The marine fisheries sector accounts for the majority of production, with small pelagics making up around 90% by volume and 40% of the value. Cephalopods (mainly octopus) constitute a further 30% of value and demersal fish around 20% (Marti, 2018). In recent years there has been a significant increase in the landings of pelagic species used to fuel the growing fishmeal industry (Corten, Braham and Sadegh, 2017). Most of the catch comes from the industrial sector which accounts for around 80%

of total catch (Ministry of Fisheries and Maritime Economy, 2015) and there is limited opportunity for added value to job creation compared to the artisanal sector (Marti, 2018).

The fisheries sector was one of the fastest growing economic sectors in the Mauritanian economy over the past decade and is one of the main drivers behind the strong and sustained economic growth of the country in recent years (Mele, 2014). It directly employs approximately 180,400 people and contributes around 6% to national GDP, the majority of which comes from export earnings with around 90% of total fish landed intended for the export market (FAO, 2020c). A significant portion of the catch is not landed in Mauritania, with only a small amount of the wealth generated staying in the local economy and foreign owned fishing fleets the main beneficiaries (Mele, 2014). Like many other West African countries, this lack of strong governance and high prevalence of IUU fishing has led to a decline in fish stocks, with the majority fully or over exploited (Belhabib, 2017).

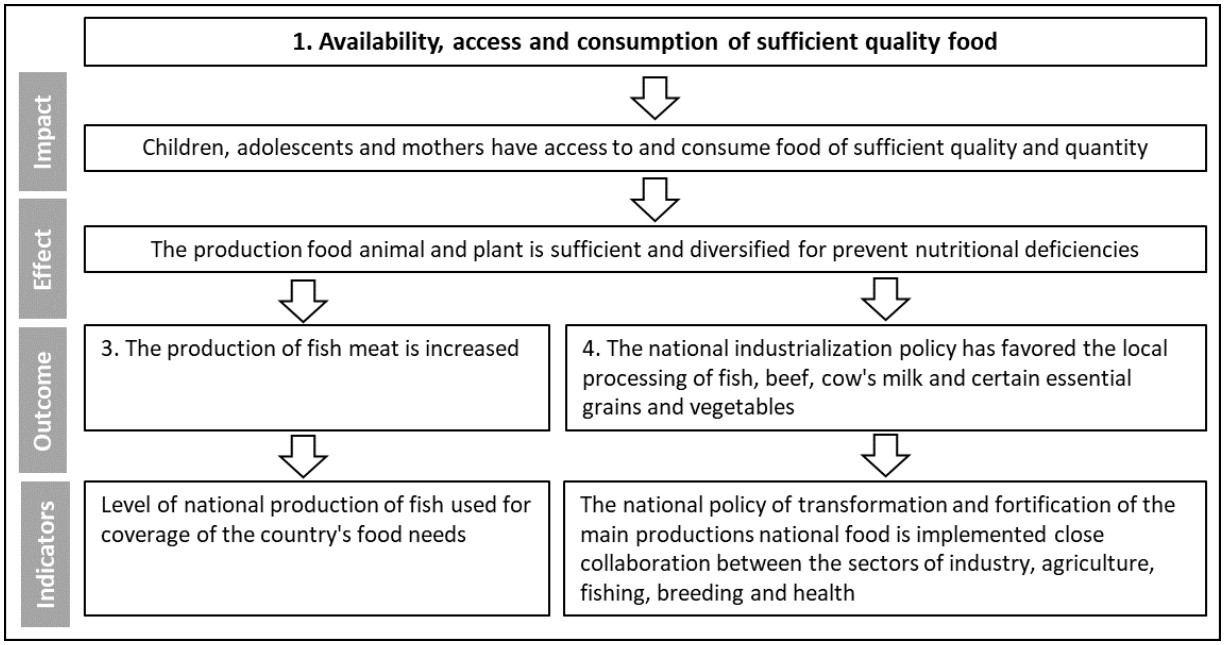
Seafood does not play an important role in the traditional diets of Mauritanians. Despite a shift toward increased consumption of seafood over the past decade, national consumption rates remain well below the global average at just 6kg/capita/annum (Ministry of Fisheries and Maritime Economy, 2015). A significant portion (21%) of the Mauritanian population live below the poverty line, and despite improvements over the past decade in reducing chronic malnutrition, its rapidly growing population still faces major challenges, including food insecurity, malnutrition, gender inequality and land degradation (WFP, 2020).

### *5.7.2 Review of Governance Instruments*

Mauritania had a mix of governance instruments covering relevant topics including fisheries/aquaculture (*National Responsible Management Strategy for Sustainable Development of Fisheries and Maritime Economy 2015-2019; Law N° 2000-025 on the Fisheries Code*), nutrition (*Multisectoral Nutrition Strategic Plan 2016-2025*), food security (*National Food Security Strategy for Mauritania for 2015 and Vision 2030*), economic growth (*National Strategy for Accelerated Growth and Shared Prosperity (SCAPP 2016-2030), Volume II*), and social development (*National Strategy for Social Protection in Mauritania 2012*). Further details of these six instruments can be found in *Appendix 1.*

The *Multisectoral Strategic Plan for Nutrition 2016-2025,* unlike most instruments, took a broader outlook on the factors affecting the nutritional status of the population. It included objectives relating to the primary production of nutritious foods, including fish. Figure 8 shows the details of one of the five strategic objectives of the plan which directly addresses this topic. The focus of the objective is on increasing primary production and value adding of nutritious foods to improve availability, access and consumption for a diversified diet. However, there is no mention of measures used to increase consumption which is a key issue in Mauritania where seafood consumption is low. There is also a lack of clear actions on how these objectives will be met and none of the indicators used to measure the success of the interventions are directly linked to FNS.

*Figure 8: Details of Strategy Objective 1 of the Multisectoral Strategic Plan for Nutrition 2016-2025**




*Please note: This is an English translation taken from pages 25 and 39 of the original French version of the Plan.

The *National Responsible Management Strategy for Sustainable Development of Fisheries and Maritime Economy 2015-2019* clearly identifies the role of seafood in addressing food insecurity. It also focuses on how the sector can make a positive contribution to food security through one of six strategic areas focused on strengthening the integration of the fisheries sector into the national economy. Figure 9 shows the proposed actions for addressing this priority area which focus on a range of measures to improve food security including improvements to the supply chain, formation of public private partnerships, education and promotion of inland fisheries.

*Figure 9: Summary of proposed actions to strengthen contribution of fisheries sector to food security from the* National Responsible Management Strategy for Sustainable Development of Fisheries and Maritime Economy 2015-2019*

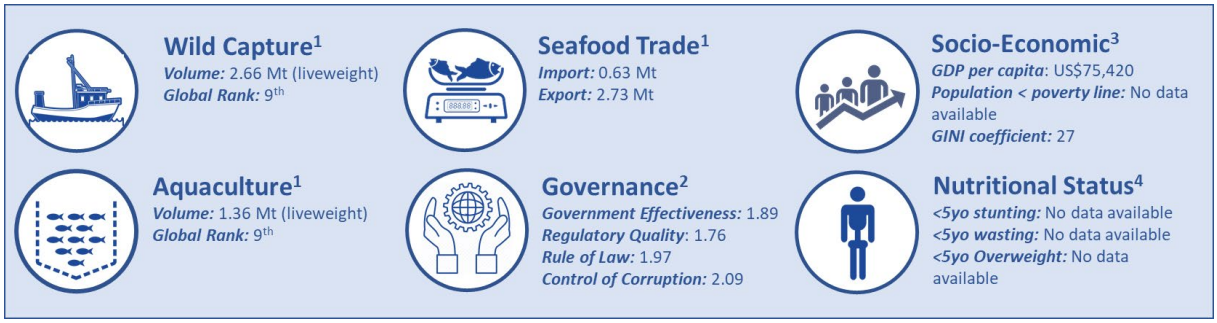
i. Consolidate the system for distributing fish on national territory
ii. Sustain this system by encouraging the development of Public Partnerships Private (PPP)
iii. Agree on approaches aimed at promoting and educating populations on consumption of fishery products
iv. Promote the population's access to inland fishery resources

*Please note: This is an English translation taken from page 26 of the original French version of the Strategy.

*Summary*

There was very limited linkage between FNS and fisheries/aquaculture made in the Mauritania instruments across sectors and minimal commitment to implement actions. Those instruments that did make a link tended to take a narrow focus on increasing production. The *National Responsible Management Strategy for Sustainable Development of Fisheries and Maritime Economy 2015-2019* was a good example of a policy supporting the contribution of fish to diets through improvements to the supply chain, formation of public private partnerships, and education.

## 5.8 Norway




[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.8.1 Country Overview*

Norway's rugged coastline stretches 101,400km, making it the second longest in the world due to a combination of its elongated shape, the fjords and inlets carved into it and the 50,000 plus islands that span the length of the coastline (Eurofish, 2016). These geographic features and climatic conditions have provided Norwegians with fertile fishing grounds they have historically harvested as a source of livelihood and export earnings (Johansen et al., 2019), with herring, cod, capelin, mackerel, saithe, blue whiting, and haddock the main species caught (FAO, 2013). Fishing is dominated by the industrial sector, with ongoing development resulting in the use of fewer and more efficiency boats (ibid). The sector employs 11,219 people (OECD, 2020) which is a relatively small number in relation to total production, however, it is an important source of livelihoods for remote fishing communities (Johansen et al., 2019).

The deep and sheltered fjords also provide the perfect environment for aquaculture development which developed commercially in the 1970s and has since grown to be the largest salmonid producer in the world (FAO, 2018a). Salmon and rainbow trout account for 93.9% of production, with the remainder made up of non-salmonids including cod, halibut and shellfish (Statistics Norway, 2020). The combination of the capture and aquaculture industry has made Norway one of the largest fish producers in Europe and the second largest exporter (by value) globally (FAO, 2018a). Whilst the sector is a significant contributor to GDP, the percentage share is relatively low (0.4%) due to the high value of oil and gas exports which represent a significant portion of export earnings (World Fishing & Aquaculture, 2015).

Norwegians enjoy one of the highest standards of living in the world (OECD, 2020) with the second lowest income inequality score globally (World Bank, 2020). Although they have high seafood consumption rates, at around 39.7kg/capita/annum (Norwegian Seafood Industry, 2017), this has declined in recent years, in particular amongst the younger generation, with meat consumption now 2.6 times that of seafood (Eurofish Magazine,2020). Like many other developed nations, the country has a high prevalence of overweight and obesity which affects 23.6% of men and 22.5% of women, with no data available to assess under-five nutritional status (Global Nutrition Report, 2020).

### *5.8.2 Review of Governance Instruments*

Norway had a very limited number of relevant instruments, with one for nutrition (*National Action Plan for a Healthier Diet 2017*), one for aquaculture (*Strategy for an Environmentally Sustainable*

*Norwegian Aquaculture Industry 2009*), and two fishery/aquaculture-related laws (*Marine Resources Act, 2008*; *Aquaculture Act 2005*). Further details of these two instruments can be found in Appendix 1. The majority of these made no linkage between FNS and fisheries/aquaculture, except for the nutrition document which demonstrated a very high level of commitment.

The *National Action Plan for a Healthier Diet 2017* recognises that despite improvements in national nutrition, a significant portion of the population does not eat the recommended amounts of healthy foods such as seafood, vegetables and fruits, and consumption of saturated fat, salt and sugar is too high. Although the plan itself did not contain any clear actions to reach the objectives and targets set, it did mention two national programs aimed to increase seafood consumption. The first was *Fiskesprell* (Fish Fun), an educational program the government is running to increase consumption of seafood amongst children and adolescents together with schools and preschools. The other was also educational, this time aimed at inspiring those who work in cafeterias or food service in lower secondary schools to prepare healthy food. Whilst seafood was not mentioned specifically, it was co-developed by the Agricultural offices and Norwegian Seafood Council. They also recognised that a diet containing these foods is more sustainable than one high in meat which is the only document reviewed that clearly makes this linkage with dietary sustainability, mentioning that the government will continue to make efforts to manage the fishing regulations to ensure it remains sustainable.

*Summary*

Despite their high consumption of seafood and good nutritional status of the population, Norway had a limited selection of relevant policies with only the *National Action Plan for a Healthier Diet 2017* making a clear linkage between fisheries/aquaculture and FNS in the context of increased consumption and long-term availability.

## 5.9 Peru


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.9.1 Country Overview*

The highly productive Humboldt Current system extends along the 3,080km coastline of Peru, which is abundant in pelagic species including anchoveta, sardine and mackerel (Heileman et al., 2009). The dominant species is the anchoveta which supports the world's largest single fishery in the world, accounting for approximately half the world production of fishmeal and one third of fish oil (Fréon et al., 2014). Peru is also endowed with abundant freshwater resources which together with the coastal environment provide favourable conditions for aquaculture production (Marín et al, 2018). Aquaculture is practiced in all regions of Peru, with shrimp and scallop the prevalent species along the

coast, trout in the highlands and tilapia and Amazon fish in the lakes and rivers of the Amazon jungle (van Herwijnen, 2020).

There are three distinct sub-sectors within the Peruvian fisheries, artisanal, small-scale and industrial, with the artisanal fleet accounting for approximately 90% of the vessels (van Herwijnen, 2020). Whilst only the latter is legally permitted to use their catch for indirect human consumption (CeDePesca, 2020), landings from all sub-sectors end up as fishmeal and oil with only one percent of anchoveta going to direct human consumption (Fréon et al., 2014). The majority of these products are exported for use in aquaculture and to a lesser extent agricultural feeds and are the second highest source of foreign income after mining products contributing 1-1.5% of GDP (van Herwijnen, 2020). Fisheries have always been, and continue to be, an important source of livelihood and food for the Peruvian population, providing approximately 232,000 full time jobs, 25% of which come from the artisanal purse seine fleet (Christensen et al., 2014).

The annual catch of Peruvian anchoveta is highly variable due to the inherent climatic variability and changes in water temperature driven by El Niño (Heileman et al., 2009) coupled with ongoing issues with overfishing (World Bank, 2017). This is projected to intensify as the fisheries are some of the most affected by interannual climate change due to the importance of the El Niño (Jara et al., 2020). Despite efforts made in recent years by the government and industry to improve stock management, overfishing also remains an issue for the Peruvian industry driven by the unregulated artisanal sub-sector (World Bank, 2017).

The small-scale and artisanal fleets are more diverse, targeting over 200 species including various fish, invertebrates and algae which are intended for direct human consumption (FAO, 2003), around one-third of which are exported (Fréon et al., 2014). Local seafood consumption is approximately 22kg/capita/annum which represents around 26% of total animal protein consumption (ibid). This has increased significantly in recent years, which has been in part driven by government initiatives aimed at promoting seafood in recognition of the important role it plays in addressing malnutrition (Marin et al., 2018). This initiative, together with other strategies employed by the government in the 2000s, have helped to significantly improve the nutritional status of the Peruvian population, with childhood stunting more than halved from 28% in 2008 to 13.1% in 2016, although this varies considerably between regions with the rates still high in many rural areas (World Food Program, 2020).

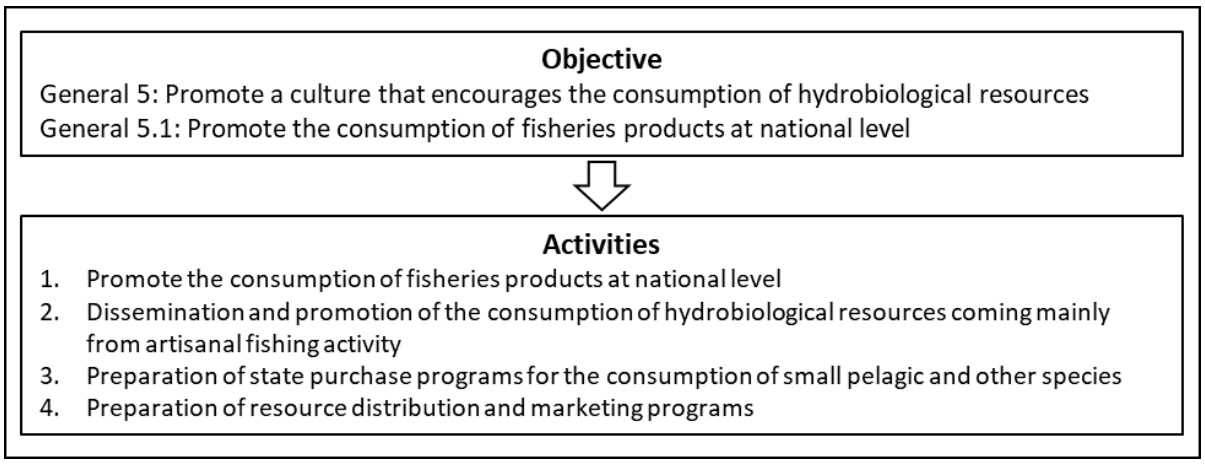
### *5.9.2 Review of Governance Instruments*

Peru had two laws (*Law for the Promotion and Development of Aquaculture 2001* and *General Fisheries Law 1992*) and a number of instruments covering artisanal fisheries (*National Plan for Development of Artisanal Fisheries 2004*), aquaculture (*National Aquaculture Development Plan 2010-2021*), food security (*National Plan for Food Security and Nutrition 2015-2021*) and agricultural development (*Multiannual Sector Strategic Plan 2015-2021*). Further details of these six instruments can be found in Appendix 1.

Peru was one of only two countries with a fisheries law that made a linkage between seafood and FNS, even though this was limited to the general aims of the Act. However, this is likely to have influenced the *National Plan for Artisanal Fisheries 2004* which is linked to this Act. In fact, this plan was the only document reviewed for Peru which clearly recognised the role of the artisanal fishing sector as a

source of food, employment and income in its overarching purpose. Of the six guiding objectives, one is focused specifically on increasing national seafood consumption with the aim to improve the national nutritional status. It then goes on to list activities that should be implemented by the government as shown in Figure 10 below, with further details and recommendations made in the supplementary text.

*Figure 10: Objective and actions linked to increasing seafood consumption in the Peruvian National Plan for Artisanal Fisheries 2004**



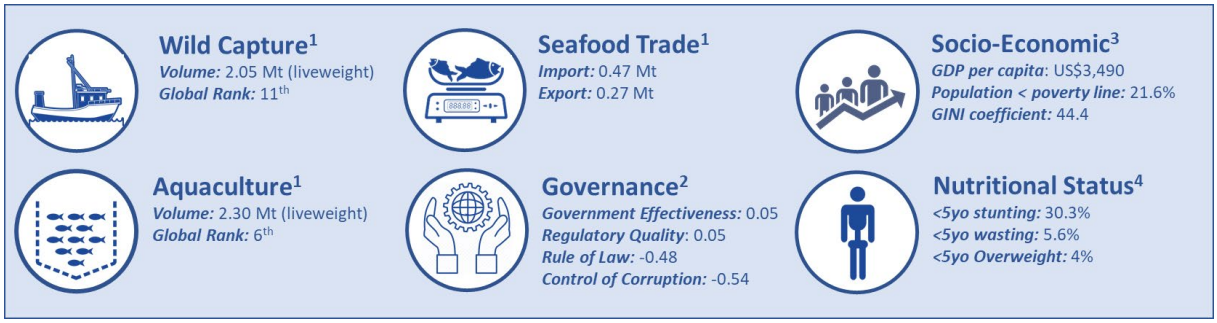

*Please note: This is an English translation taken from page 12 of the original Spanish version of the Plan.

One particularly interesting activity that was unique to this document was the consideration given to ensuring that state purchase programs (e.g. procurement departments from major ministries) supported the consumption of fish. It also stressed the importance of multi-stakeholder involvement from all relevant parts of society (government, private sector, education sector) in order to achieve the desired goal. Whilst improving livelihoods is mentioned as a key factor in the overall purpose of the document, there is no direct link made to improving food security but rather a set of comprehensive objectives that will boost the productivity and sustainability of the artisanal sector (e.g. modernization of infrastructure, technology transfer, zoning, selection of fishing gears).

*Summary*

Half of the instruments reviewed for Peru linked fisheries/aquaculture and FNS. The context of this linkage varied with two of the documents focusing on encouraging the development of the fisheries and aquaculture sector as a means to address direct and indirect FNS and another two on educating the national population on the benefits of eating seafood. The level of commitment was generally very low, with only the *National Plan for Artisanal Fisheries 2004* demonstrating a high level and the other two very low and low.

## 5.10 Philippines




[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.10.1 Country Overview*

The Philippines is an archipelago of over 7,600 islands located in the Western Pacific Ocean endowed with over 2.2 million km$^2$ of productive ocean and almost 500 000 ha of inland waterbodies (FAO, 2014a). The Philippines is amongst some of the world's largest producers of fish from both capture fisheries and aquaculture, with both marine and inland production which collectively contribute around 1.2% of GDP (Bureau of Fisheries and Aquatic Resources, 2019).

The capture sector is split into a commercial and municipal sub-sectors of which the latter accounts for 53% of production in terms of volume and 61% by value, with 85% coming from the marine fisheries (Bureau of Fisheries and Aquatic Resources, 2019). In total the capture sector employs 927,612 people (ibid) the majority of which are employed in municipal (FAO, 2014a). The commercial fisheries are based offshore with sardines and various tunas the most targeted species, whilst the municipal fisheries target a diversity of species including sardines, tuna and anchovies in the waters closer to shore (Salvador Lamarca, 2017). There is increasing competition between municipal and commercial fishers which together have led to the rapid decline of fish stocks and habitat degradation through destructive fishing methods in the municipal waters (ibid).

The aquaculture sector accounted for 53% of total production (by volume), and directly employed 209,058 people (Bureau of Fisheries and Aquatic Resources, 2019). A mix of marine, brackish and freshwater production systems are used, with milkfish, tilapia and seaweed the major species produced (FAO, 2014a). Production from aquaculture has increased steadily over the past couple of decades from 1,100,902 tonnes in 2000 to 2,304,361 in 2018 (FAO, 2018a). Whilst this has helped to meet increasing demand for seafood, the rapid development of the industry has led to some undesirable and unsustainable environmental outcomes which need to be addressed if it is to continue to grow in the future (WorldFish and Primex, 2007).

Filipinos have a strong tradition of eating seafood with a high average consumption of 37kg/capita/annum which represents 39% of total protein consumption and is the second most commonly consumed food after rice (Bureau of Fisheries and Aquatic Resources, 2019). High population growth and declining natural resources make poverty and FNS an ongoing challenge for the Filipinos (WorldFish and PRIMEX, 2007), with levels of childhood stunting 30.3% (UNICEF, WHO & World Bank, 2019).

### *5.10.2 Review of Governance Instruments*

The Philippines had a limited selection of relevant instruments focused on nutrition (*Philippine Plan of Action for Nutrition 2017-2022*), fisheries (*Fisheries Code 1998; Comprehensive National Fisheries Industry Development Plan 2006-2025*), and economic development (*Philippine Development Plan 2017-2022*). Further details of these four documents can be found in Appendix 1. Only two of these instruments made mention of the linkage between fisheries/aquaculture and FNS with a strong focus on improving direct and indirect FNS. However, both of these showed a very low level of commitment with reference made to these linkages only in the general aims of the document.

The Philippines was the only country (other than Peru) to make a linkage between seafood and FNS in their fisheries law (*Fisheries Code 2004*). This linkage was multidimensional covering direct and indirect food security as well as equity and conservation of resources in the general aims of the document. Similarly, their *National Fisheries Industry Development Plan 2006-2025* which makes reference to the *Fisheries Code 2004* clearly states food security as a key focus of their overall Vision, but does not have any specific objectives, actions or targets linked to FNS. However, in the explanatory text it explicitly links food security as a beneficial outcome of one fisheries management project relating to developing underutilized commercial fishing grounds within their EEZ.

*Summary*

Despite the importance of seafood to the economy and diet of the Filipino population, there was a limited number of relevant policy documents, most of which did not consider the link between fisheries/aquaculture and FNS. Of those instruments that did, there was a low level of commitment. The Philippines, however, was one of only two countries that mentioned the linkage in the fisheries law.

## 5.11 Samoa


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.11.1 Country Overview*

Samoa (also known as Western Samoa) is an archipelago of islands in the South Pacific Ocean which forms part of Polynesia. Its fishing sector is made up of two distinct sub-sectors, the offshore longline fishery and the coastal subsistence and commercial fishery (Gillet and Tauati, 2018). The former is based on tuna, with albacore making up the majority (70%) together with the remainder yellowfin, bigeye and skipjack (Fisheries Division, 2019). In contrast, a much more diverse range of species are caught for local consumption with one study (Zann, 1992) showing the subsistence fisheries made use

of around 500 species, with the most commonly consumed including surgeonfish, grouper, mullet, octopus, giant clams, and crab (Gillet and Tauati, 2018).

The tuna catch is predominantly caught by industrial offshore longline fisheries with the majority exported to American Samoa canneries for processing and the remainder sent fresh or frozen to markets in America, Japan and New Zealand (Fisheries Division, 2019). In recent years, efforts have been made by Samoa together with other Pacific nations to increase the portion of tuna going to local markets, with approximately 25% of the catch of locally based commercial fleets now going to local Samoan markets (Pacific Island Forum Fisheries Agency and Pacific Community, 2019). There is also a small amount of aquaculture production including the giant clam which has traditionally been farmed in Samoa and Nile tilapia which is a more recent introduction (FAO, 2018b).

Fish plays an important economic role accounting for around 3.5% of GDP (Gliiet, 2016), with over 30% of all exports consisting of products derived from fisheries, and one quarter of all households obtaining some form of income from fishing (FAO, 2018b). It is also an important part of the Samoan diet, with seafood (fresh, frozen and canned) eaten by most households on a daily basis (Gillet and Tauati, 2018). As such it is not surprising the annual consumption is well-above the global average, however, estimates vary considerably between various studies, ranging from 46.3kg to 73kg/capita per annum (FAO, 2018b). This variation may reflect the difference between rural and urban consumption in the Pacific region (Farmery et. al., 2020b).

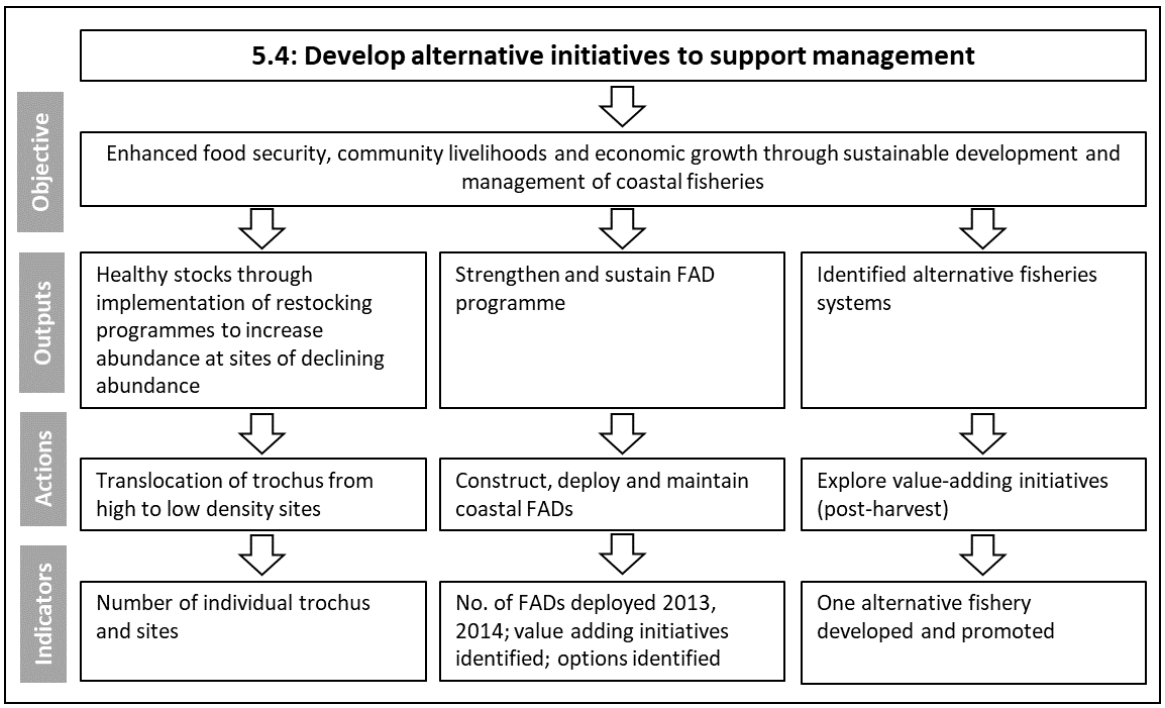
Together with many of their Pacific neighbours, Samoa ranks in the global top ten for prevalence of obesity with approximately 43% of all adults classified as obese (CIA, 2016). This has led to a rise in NCDs which are estimated to be responsible for around 75% of the total disease burden and over half of all premature deaths (Bollars et al., 2019). Whilst genetics is in part responsible for their predisposition to gain weight (Blair, 2018), the main culprit of this public health crisis is the replacement of their traditional diet with one that is heavily reliant on unhealthy imported foods (Parry, 2010).

### *5.11.2 Review of Governance Instruments*

Samoa had a very broad range of instruments addressing relevant topics including one on nutrition (*National Food and Nutrition Policy 2013*), fisheries (*Samoa Coastal Fisheries Management Plan 2013-2016*) and aquaculture (*Aquaculture Management and Development Plan 2013-2016*), as well as one law (*Fisheries Act 1998*) specifically focusing on fisheries. However, all instruments were relatively old with no updated versions available. More recent instruments existed for agriculture (*Agriculture Sector Plan 2016-2020 - Volume 1 and 2*) as well as development (*Strategy for the Development of Samoa 2016/17 - 2019/20*). Further details of these eight instruments can be found in Appendix 1.

The *Samoa Coastal Fisheries Management Plan 2013-2016* stated food security as the overall goal of the document, with one of the eight strategies outlined in the report directly focusing on fisheries management with the aim to improve food security, livelihoods and economic (Figure 11). The desired outputs and actions for this objective are somewhat obscure in relation to achieving food security, instead they are more focused on fisheries management (e.g. stock management, selection of gears).

*Figure 11: Details of FNS related strategy from the Samoa Coastal Fisheries Management Plan 2013-2016*




Similarly the *Aquaculture Management and Development Plan 2013-2016* states FNS as the overarching goal, and clearly identifies Tilapia as a key species to ensure food and nutritional security in rural and isolated communities, generate income from market sales, and provide an affordable and locally available source of protein throughout the year. However, there are no direct objectives, actions or targets linked to this.

There is a very strong focus on FNS in the two volumes of the *Agriculture Sector Plan 2016-2020*, the first of which details the governance, institutional and strategic framework and the second the implementation and monitoring framework. The overall goal of this plan is clearly linked to FNS, with various elements of FNS covered by the four sector specific objectives which form the basis of the plan as shown in Figure 12. Whilst other documents stated similar overarching aims, this framework articulated it very well which made the linkage very clear.

*Figure 12: Agriculture Sector Plan Strategic Framework*


The second volume of the plan contained explicit detail on the expected outcomes and outputs for each of the strategic objectives, as well as the indicators/targets that will be used to measure performance overtime. An example of this is shown below in Table 15 for sector plan outcome number two. In addition to the detail shown below, the plan also clearly identifies the source of the data that will be used to measure/verify progress against the targets, as well as which departments are responsible for each activity. As can be seen, the plan uses a broad range of activities from infrastructure development to school curriculum to achieve its overall goal to increase the production and consumption of local foods. However, none of the indicators or targets link directly to FNS.

*Table 15: Example of Performance Monitoring Framework for Samoan Agricultural Sector Plan Outcome 2*

| **Outcome 2: An increased supply and consumption of competitively priced domestically produced food.**<br>• Volume and price index of local food products (crops/livestock/fish) increased by 70% from 2014<br>• Share of local food products in top 10 household food purchases increased by 24.7% from 2013 | |
|---|---|
| **ASP Results** | **Performance indicator/target** |
| ***Outcome 2.1:*** *Increased farm production and productivity from adoption of improved sustainable and resilient farming practices* | • *Areas planted, yields & production of target food crops*<br>• *Livestock fecundity and numbers*<br>• *Number of fish farms and volume of production* |
| Output 2.1.1: Sustainable productivity enhanced and resilient technologies and farming systems tested available and ready for extension and scale up | • Number of relevant research activities implemented, and number of improved technologies/ systems developed ready for extension |
| Output 2.1.2: Rural farming communities have improved access to relevant information to increase farm productivity & food production | • Number of farmers using improved technologies/practices<br>• Farmer satisfaction with extension support services |
| Output 2.1.3: Timely farming and fishing information widely distributed/ communicated through appropriate media | • Increased number and quality of relevant publications, media activities/events |

| | |
|---|---|
| Output 2.1.4: Productivity enhancing farm inputs more readily available to rural farming communities | • Number of farmers accessing improved inputs<br>• Number of inputs (planting materials, livestock breeds; fingerlings etc.) distributed |
| ***Outcome 2.2:*** *Increased household income from increased commercial agriculture and fisheries activities* | • *Share of households with agricultural activities mainly for sale*<br>• *Proportion of income usually derived from agriculture*<br>• *Main purpose of fishing* |
| Output 2.2.1: School feeding program utilizing nutritious local foods piloted | • School feeding program planned, designed and implemented with at least 2 target schools by end 2018 |
| Output 2.2.2: Rural access roads improved | • At least 4 x 5km road access roads improved annually |
| ***Outcome 2.3:*** *Improved food quality throughout the domestic food chain* | • *80% of targeted farms using GAP & GHP*<br>• *Estimated post-harvest losses/wastage in priority food chains* |
| Output 2.3.1: Strengthened capacity among farmers and fresh food vendors to reduce food safety risks, improve post- harvest food quality and shelf life and reduce wastage | • Number of food chains evaluated for food safety risks and post-harvest constraints<br>• Number of farmers/food vendors and other service providers trained in GAP/GHP |
| ***Outcome 2.4:*** *Increased agriculture income and employment generating opportunities for women and youth* | • *Gender and age disaggregated data on employment/commercial activity in agriculture* |
| Output 2.4.1: Increased capacity among rural women to run successful chicken farming enterprises, producing for home consumption and sale | • Number of (new) successful chicken farming enterprises run by women |
| Output 2.4.2: Improved skill and knowledge among rural women and youth in fruit growing, processing, preservation and business enterprise and marketing | • Number of (new) successful fruit processing and marketing enterprises run by women and youth |
| Output 2.4.3: Increased capacity among rural women and youth to develop viable small-scale fisheries value added and marketing enterprises | • Number of (new) successful small-scale fisheries value added and marketing enterprises run by women and youth |
| Output 2.4.4: Increased number of women providing and receiving training and provision of extension services | • Number of women extension service providers<br>• Number of women attending extension training activities |
| ***Outcome 2.5:*** *Increased community awareness and understanding on production and consumption of local nutritious food* | • *Range of nutritious fruits and vegetables available on farms and in domestic markets*<br>• *Dietary diversity score* |
| Output 2.5.1: Agriculture extension service providers trained and knowledgeable to deliver | • Number of government and non-government extension service providers completing training on local food and good nutrition |

| | |
|---|---|
| appropriate messaging on local food and good nutrition | • Number of relevant extension materials (e.g. pamphlets, posters, video films etc.) |
| Output 2.5.2 Annual Agriculture Show in Upolu and Savaii used as a platform to encourage production and consumption of nutritious local foods | • A successful well attended annual Agriculture Show in Upolu and Savaii |
| Output 2.5.3: Appropriate curriculum materials focussed on local food production and good nutrition and health for primary schools | • Well designed and prepared primary school curriculum materials available by start of 2018 |

*Summary*

There was very limited mention of seafood in the Samoan nutrition instrument, which only addressed food safety issues, whilst the majority of fisheries, aquaculture and agriculture documents made clear links to FNS, predominantly within the context of developing fisheries to improve direct and indirect FNS, as well as improving the resilience of the system to protect FNS in the future. The agriculture documents were the most comprehensive, linking fish and FNS across a range or contexts. However, the level of commitment demonstrated amongst these instruments was relatively low.

## 5.12 Senegal


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.12.1 Country Overview*

The Senegalese EEZ is part of the Canary Current Large Marine Ecosystem (CCLME) and the associated upwelling phenomena which make it one of the world's most productive marine areas (Abdellahi and Diadhiou, 2014). This has provided Senegal with a diversity of species which form the basis of their fishing sector, with coastal pelagics accounting for more than 70% of all catches (Executive Secretariat National Food Security Council, 2015). Despite having potential for aquaculture development, growth of this sector has been slow with 1,108 tonnes produced in 2018 (FAO).

The fisheries sector is an important source of employment, engaging one in six Senegalese people (USAID, 2017). It also plays an important role in economic development, accounting for approximately 1.5% of GDP (FAO, 2017b). The artisanal sub-sector has grown over the past two decades and now makes up 90% of the workforce (Bank and Thiam, 2018) and 80% of the total catch (USAID, 2017). Unfortunately, this has overcrowded the fisheries which, together with poor governance, has resulted in serious overfishing of these resources and the majority of these stocks are currently fully or over

exploited (Bank and Thiam, 2018). This has had dire consequences on the livelihoods of the many households who depend on this resource as a source of livelihood (USAID, 2017).

Whilst seafood consumption is one of the highest in Africa, it has been steadily decreasing for the past couple of decades from 41 kg in 2003 (Ministry of the Environment and Sustainable Development and Ministry of Fisheries and the Maritime Economy, 2016) to 23.9 kg in 2013 which represents 43% of per capita animal protein intake (FAO, 2017b). This downward trend is linked to the strong internal demand for seafood due to population growth and the competition from the external market (Executive Secretariat National Food Security Council, 2015). The availability of seafood to satisfy demand is a problem for the Senegalese population given the importance of this highly nutritious food in the traditional diet (ibid).

Whilst malnutrition rates have declined over the past two decades, around ten percent of the population is malnourished, largely due to the lack of diversity in the diet and a reliance on cereals as the staple food (Ministry of the Environment and Sustainable Development and Ministry of Fisheries and the Maritime Economy, 2016). Senegal is considered to be one of the countries most vulnerable to climate change, with sea level rise an immediate threat to the 90% of the population who live in the coastal zones, with the majority of the country lying 100 meters below sea level (Zamudio and Terton, 2016). This issue, together with other impacts on food production systems including droughts, increased pests and a reduction in fish reproduction sites, will have significant implications for the livelihoods and FNS status of the Senegalese population (ibid).

### *5.12.2 Review of Governance Instruments*

Senegal had a small range of quite recent instruments focused predominantly on food security (*National Food Security and Resilience Strategy 2015-2035*) and nutrition (*National Nutritional Development Policy 2015-2025*) and more specifically investment needed to achieve FNS (*National Agricultural Investment Program for Food Security and Nutrition 2018-2022*) as well as fisheries (*National Strategy for Marine Resources 2013; Maritime Fisheries Code 1998*) and climate change (*National adaptation plan for fish and aquaculture in face of climate change 2035*). Further details of these six instruments can be found in Appendix 1.

The *National Agricultural Investment Program for Food Security and Nutrition 2 2018-2022* was one of the most comprehensive documents reviewed as part of this research. It clearly identified fisheries/aquaculture as one of the priority sectors requiring future investment to improve the FNS status of the population. Unlike many of the other documents that combined agriculture and fisheries, fisheries was frequently referred to as a separate sector throughout the document which made the linkage clearly identifiable. The Program had six strategic objectives, each with a clear rationale, list of concrete projects, expected outcomes and budget. These objectives covered a broad range of issues (Table 16), including infrastructure development, improvement of production practices, action against climate change, access to finance and training, with the expected outcomes including both production and FNS related results.

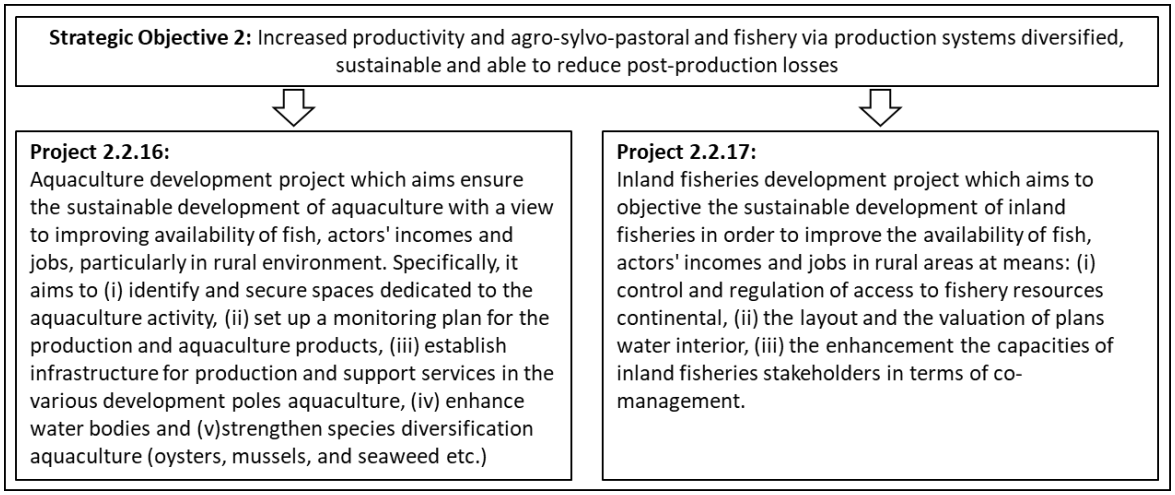
*Table 16: Objectives and expected results of National Agricultural Investment Program for Food Security and Nutrition 2 2018-2022*

| Specific Objectives | Expected Results |
|---|---|
| 1. Improving and securing the productive base | 1.1 Water control for agricultural production is ensured<br>1.2 The production and use of certified seeds are promoted<br>1.3 Sustainable land management is promoted<br>1.4 Rural infrastructure is built and rehabilitated<br>1.5 People's access to productive resources is secure |
| 2. Increased productivity and agro-sylvo-pastoral and fishery via production systems diversified, sustainable and able to reduce post-production losses | 1.1 Agro-sylvo-pastoral and fishery practices are improved<br>1.2 The production and productivity of strategic sectors are increased<br>1.3 Research, technology transfer and innovations are strengthened<br>1.4 The development of production sites is reinforced<br>1.5 The fight against climate change is stepped up<br>1.6 Post-harvest losses are reduced by 50% |
| 3. Development of chains agro-food and agro-value industrial, contractualized, inclusive and demand-oriented national, regional and international | 2.1 Integrated market information systems are promoted<br>2.2 Inclusive value chains, chains with high nutritional value and<br>2.3 High employment potential for young people and women are promoted<br>2.4 Access to the market for agricultural, animal and fish products and non-timber forest products (NTFPs) is facilitated |
| 4. Improved security food, the situation nutrition, resilience and social protection of households in poverty / vulnerability | 4.1 Safety and Food Safety is improved<br>4.2 The nutritional status of children under 5 and women of reproduction is improved<br>4.3 Social protection of vulnerable households is strengthened<br>4.4 The resilience of populations to shocks is strengthened |
| 5. Environmental improvement business, governance, financing of the agricultural sector and food security and nutrition | 5.1 The efficiency of services in the agro-sylvo-pastoral and fishery sector, food security and nutrition is improved<br>5.2 The monitoring and evaluation system and the statistical system of the agro-sector sylvo-pastoral and fishery, food security and nutrition are strengthened<br>5.3 Sustainable financing mechanisms for the agro-sylvo-pastoral sector and fisheries, food security and nutrition are promoted |
| 6. Strengthening human capital | 6.1 Training in trades in the agro-sylvo-pastoral and fishing sector, food and nutrition security is enhanced<br>6.2 The capacities of actors in the agro-sylvo-pastoral and fishery sector, food security and nutrition are strengthened<br>6.3 Youth employment in the agro-sylvo-pastoral and fishery sector is promoted<br>6.4 Empowerment of women farmers, breeders and processors agro-sylvo-pastoral and fishery products is reinforced |

*Please note: This is an English translation taken from page 33-34 of the Program

Many of the projects identified in this document made reference to fisheries and aquaculture, in particular two of them which focused on increasing production (Figure 13) with clear annual targets set to measure performance.

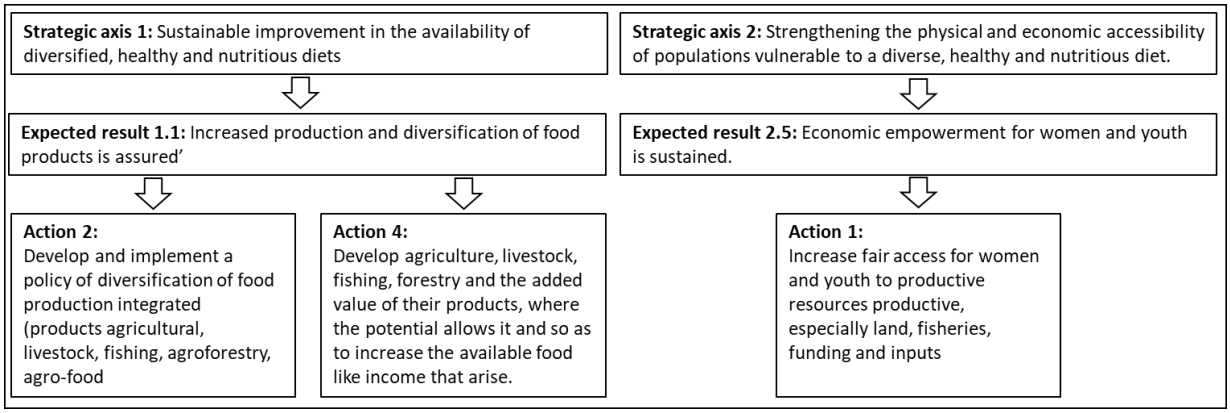
*Figure 13: Fisheries and aquaculture specific projects from the National Agricultural Investment Program for Food Security and Nutrition 2 2018-2022*




*Please note: This is an English translation taken from page 46 of the Program.

Similarly, the *National Food Security Resilience Strategy 2015-2035* covered a wide-range of topics relating to FNS and fisheries/aquaculture, however, the objectives and actions related to fisheries were more limited than the above-mentioned document. Of the four strategic objectives, one was focused on improving the availability of a diversified, healthy and nutritious diet, with two specific actions linked directly to fisheries (Figure 14).

*Figure 14: Fisheries and aquaculture related actions from the National Food Security Resilience Strategy 2015-2035*




*Please note: This is an English translation taken from page 49, 55 and 62 of the Strategy.

Of all the countries reviewed, Senegal had the strongest focus on climate change, with clear linkages made between the impacts of climate change on the food security status of their population in several instruments. This may reflect the high level of risk Senegal faces, and the strong focus taken by their government and/or the fact that the instruments reviewed were more recent than many others. The specific climate change instrument clearly articulated the role of fisheries/aquaculture and the food security status of the Senegalese population and identified the need for further research to better

understand the impacts of climate change on food security, however there was no actual objectives, actions or targets addressing this.

*Summary*

All but one instrument reviewed for Senegal made a linkage between fisheries/aquaculture and direct FNS. Other contexts for the links between sectors was indirect FNS, equity and a focus on vulnerable groups. However, the level of commitment was generally very low with only two instruments, the *National Agricultural Investment Program for Food Security and Nutrition in Senegal 2018-2022* and the *National Strategy for Food Security and Resilience (SNSAR, 2015-2035)*, setting objectives. While the *National Agricultural Investment Program for Food Security and Nutrition 2 2018-2022* was one of the most comprehensive documents reviewed as part of this research, it would benefit from baseline establishment as the expected results are vague.

## 5.13 South Africa


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.13.1 Country Overview*

The South African coastline spans more than 3,000km, linking the east and west coasts of Africa. The coastal ecosystem is particularly rich in biodiversity with the productive waters of the west coast supporting a variety of commercially exploited species including hake, anchovy, sardine and tuna, with squid, linefish[2] and a wide range of intertidal species providing a vital source of food and livelihoods for coastal communities on the east coast (South African Government, 2013). The South African fisheries sector is diverse both in regard to the species caught and the gears deployed to catch them (FAO, 2018c), with hake (40%) and pelagic fish (25%) making up the bulk of the commercial catch by value (SADP and EU, 2017).

South Africa also has freshwater resources which are fished by subsistence fisheries and small-scale aquaculture only (FAO, 2018c). The aquaculture sector is a young industry in South Africa with low scale production, however the government has flagged it as an area for potential future growth in line with other African countries (AgriSETA, 2018). The species produced include freshwater species such as trout, catfish and tilapa, whilst the marine sector produces higher-value species such as oysters, abalone, prawns and seaweed (ibid).

[2] Linefish is defined as fish that are harvested using a hook and line but excludes the use of set pelagic and demersal longlines. Species caught using this method include hake and tuna. Fishers within this sector generally consist of poor people living in close proximity to the coast (Mann, 2013)

The capture and aquaculture sector contribute only one percent to GDP, however, they are a very strategic sector that plays an important role in the livelihoods and FNS for coastal communities (SADP and EU, 2017). The capture sector employs more than 27,000 people in the commercial sector and 7,000 in the deep-sea trawling industry (Zokwana, 2018), with an additional 29,000 classified as subsistence (artisanal) fishers and 2,831 in aquaculture (SADP and EU, 2017). Historically there has been a lack of rights for the subsistence fishers, but during the transition to democracy in 1994, efforts were made to include this neglected sector in the post-apartheid policy with statements calling for improved access to marine resources (Sowman, 2006). However, translating these policy objectives into a workable right allocation and management system has proved to be a difficult task (ibid).

South Africa has a relatively low consumption of seafood which is estimated to be around 6-8kg/capita/annum which is well below the global average of 20kg/capita/annum (Zokwana, 2018). The country faces the dual burden of malnutrition with childhood stunting at 27.4% which is greater than the global average of 21.3% (UNICEF, WHO & World Bank, 2019) and around 30% of men and 60% of women classified as overweight or obese (Baleta and Mitchelle, 2014).

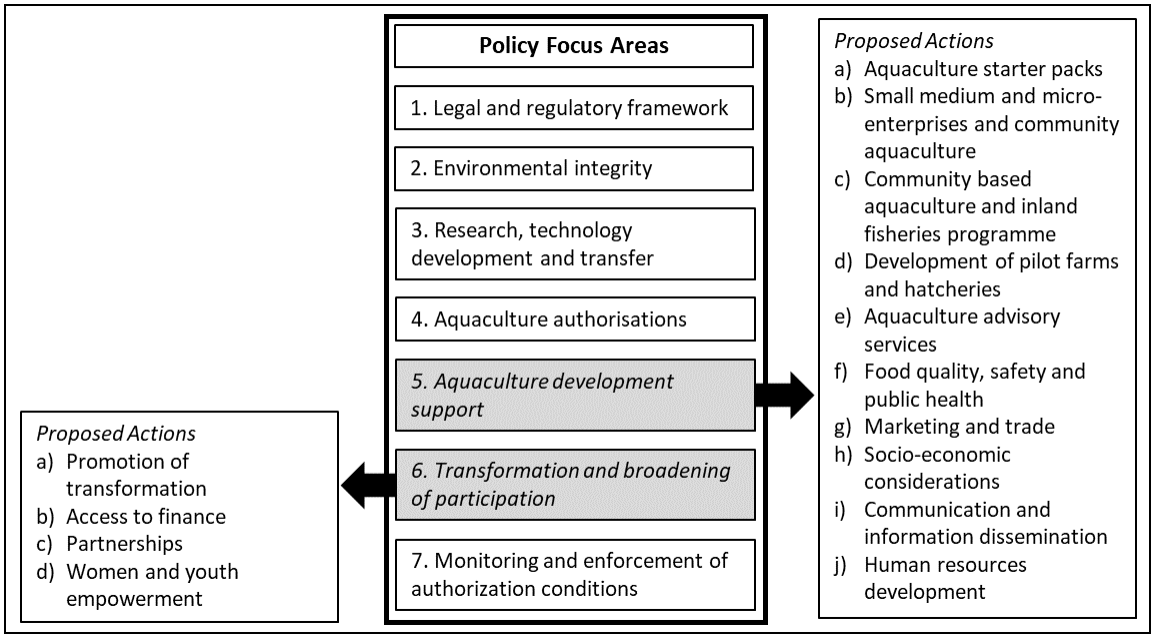
### *4.13.2 Review of Governance Instruments*

South Africa had a range of documents covering nutrition (*National Policy on Food and Nutrition Security, Roadmap for Nutrition in South Africa 2013-2017*), fisheries (*Marine Living Resources Act No 18 of 1998, Policy for the Small-Scale Fisheries Sector in South Africa 2012*), aquaculture (*National Aquaculture Policy Framework for South Africa 2013; Aquaculture and Economic Development Awareness Strategy for South Africa 2012-2016*), agriculture (*Agricultural Policy Action Plan 2015-2019; Strategic Plan for the Department of Agriculture, Forestry and Fisheries 2013/14-2017/18*) and economic development (*National Development Plan 2030*). Further details of these nine instruments can be found in Appendix 1.

The *Policy for the Small-Scale Fisheries Sector in South Africa 2012* provided a very clear distinction between the role that fisheries played in direct and indirect food security. It had a strong focus on ensuring equitable allocation of fisheries resources and the recognition of the rights for small-scale fishers which it identifies was missing from previous fisheries governance documents. Despite the well-articulated discussion of these issues and the complex socio-economic and political factors that contributed to the problems being addressed by the instrument, only one of the 18 principles and one of the 15 objectives were directly linked to FNS, with no clear action plans or targets identified at all. Regardless, the document was structured in such a way that it was clear that the intention of many of the objectives was to improve the food security and rights of small-scale fishers and women.

Similarly, the *National Aquaculture Policy Framework for South Africa 2013* identified food security and poverty alleviation as one of 11 principles and one of 18 objectives of the document. It addresses these through the policy focus areas, of which two make direct reference to either food security or poverty alleviation as shown in Figure 15. It is clear from this document that the government sees the potential for the aquaculture industry to grow and provide positive food security outcomes, however, the success of the policy is questionable when considering the low production volumes coming out of South Africa seven years after the policy was developed.

*Figure 15: Policy focus areas addressing FNS from National Aquaculture Policy Framework for South Africa 2013*




The *Strategic Plan for the Department of Agriculture, Forestry and Fisheries 2013/14-2017/18* seeks to create vibrant, equitable and sustainable rural communities through contributing to food security as one of three desired outcomes of their work. The plan identifies six programme areas, one of which deals specifically with food security and agrarian reform and another dedicated solely to fisheries. Whilst the first of these made no direct reference to fisheries/aquaculture (focused on agriculture), the sector specific one made a very clear link to food security in the desired objectives/outcomes, two of which are shown in Table 17. Whilst the focus of these tends to be more on indirect food security (improved livelihoods), it is clear from the linkages made to other government instruments earlier in the document that it is also focused on improving access of the local people to locally produced food (including fish).

*Table 17: Relevant strategic outcomes, goals and objectives for fisheries programme of the Strategic Plan for DAFF 2013/14-2017/18*

| Strategic Outcome | Goal Statement | Strategic Objective | Objective Statement | Baseline | Justification |
|---|---|---|---|---|---|
| Sustained agrarian reform | Increase profitable production of food, fibre and timber products by all categories of producers | Coordinate government food security initiative | To promote sustainable agrarian reform initiatives through the support of fish farms, aquaculture development zones and hatcheries | 11 fish farms supported | This objective will enhance the efficiency, effectiveness and economy of production and maximise the economic potential of the agriculture, forestry and fisheries sector |
| More labour- | Increase contribution | Increase growth, income and | To enhance the ability of the | 1 000 job opportunitie | This objective will contribute |

| | | | | | |
|---|---|---|---|---|---|
| absorbing growth | of the sector to economic growth and development | sustainable job opportunities in the value chain; and increase market access for South African agricultural, forestry and fisheries products domestically and internationally | sector to maximise job opportunities and wealth creation; and minimise poverty levels and infrastructure dilapidation | s created annually through the Working for Fisheries Programme | towards the promotion of sustainable economic livelihoods for previously disadvantaged communities and rural job creation |

*Summary*

Approximately half of the instruments reviewed for South Africa acknowledged a linkage between fisheries/aquaculture and FNS, most of which were focused on direct and/or indirect FNS, with only the *Policy for the Small-Scale Fisheries Sector in South Africa 2012* taking a broader approach to the linkage by covering multiple contexts. The level of commitment was varied across the instruments, ranging from very low for the *National Development Plan 2030* to high for the *National Aquaculture Policy framework for South Africa 2013*.

## 5.14 Tanzania


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.14.1 Country Overview*

With a coastline of 1,450 km2 and richly endowed with natural water bodies, Tanzania is one of the greatest fishing nations in Africa (Ministry of Livestock and Fisheries Development, 2015). The fisheries are divided into inland and marine, with inland comprising 85% of total production (Ministry of Agriculture, Livestock and Fisheries, 2016). The inland sub-sector is dominated by small-scale fishers who target a variety of finfish including Nile perch, Dagaa and Tilapia, whilst the marine sector is a mixture of industrial and artisanal fisheries which target prawns in the territorial sea and offshore fishing for tunas and other pelagics in the EEZ (Ministry of Livestock and Fisheries Development, 2015).

The wild-capture sector an important contributor to livelihoods, FNS and export earnings (Ibengwe and Sobo, 2016) contributing approximately 2.2% to GDP in 2014 and employing around 183,800 fishers (Ministry of Fisheries, 2016). Majority of fishers rely on a portion of their catch to feed their own families, with the remainder absorbed by local markets or exported (Breuil and Grima, 2014).

Despite this, seafood consumption is well-below the global average at just 5.6kg/capita/annum, representing 19.7% of the country's animal protein intake (WorldFish, 2020).

Whilst there is a lack of accurate fisheries data available for Tanzania, it is widely accepted that overfishing in inshore areas has continued to cause a decline in fish catches, and for marine the pelagics are considered to be moderately to fully-exploited and the demersals fully or over-exploited (Breuil and Grima, 2014). This makes it challenging for the sector to keep up with the population growth (Ministry of Livestock and Fisheries Development, 2015).

Aquaculture has grown significantly in the past two decades from 1,210 tonnes in 2000 to 16,852 tonnes in 2018 (FAO, 2018a), with untapped potential for future growth (WorldFish, 2020). The main species produced are Nile perch from Lake Victoria, sardines from Lake Tanganyika as well as shellfish and seaweed from marine waters (Government of the United Republic of Tanzania, 2016). The sector is an important source of livelihoods and FNS for people living along the coast and inland areas (Ibengwe and Sobo, 2016), employing approximately 14,750 fish farmers in inland aquaculture and another 3,097 in mariculture (Ministry of Livestock and Fisheries Development, 2015).

Although significant improvements have been made to address the underlying causes of undernutrition in Tanzania over the past 25 years, one in three children below the age of five remains stunted and the prevalence of overweight and obesity has more than doubled amongst women of reproductive age (Sunguya, Mpembeni and Huang, 2019).

### 5.14.2 *Review of Governance Instruments*

Fisheries/aquaculture and FNS were referenced in a number of instruments from Tanzania including fisheries based documents (*National Fisheries Policy 2015; Fisheries Act 2010*), nutrition (*National Nutrition Strategy 2011/12-2015/16; National Multisectoral Nutrition Action Plan 2016/17-2020/21*), agriculture (*Agricultural Sector Development Programme Phase Two 2015/16-2024/25*; *Agricultural Sector Development Strategy II 2015/16 - 2024/25*), economic development (*National Five Year Development Plan 2016/17-2020/21; National Strategy for Growth and Reduction of Poverty 2010*) and financial investment (*Tanzania Agriculture and Food Security Investment Plan 2011/12 - 2020/21*). Further details of these nine instruments can be found in Appendix 1.

This issue was particularly relevant for the *Agricultural Sector Development Programme 2 2016* which was a very comprehensive document with the term food security appearing more than 100 times and fish more than 300, however the lack of clear structure made it difficult to follow. The overarching objective and preliminary indicators shown in Figure 16 very clearly link FNS and fisheries, however the linkages made throughout the document are not so clear. Most references to fisheries were linked to initiatives that focused on matters such as increasing productivity, access to natural resources, infrastructure, training and inputs, as well as climate resilience with no direct mention of the linkage to FNS in many instances. However, given the clear linkage made in the overarching objective and indicators, it is clear these actions are intended to improve livelihoods and food security for Tanzanians.

*Figure 16: Overarching objective and indicators for the Tanzanian Agricultural Sector Development Programme 2 2016*

**Programme Development Objective**
Transform the agricultural sector (crops, livestock & fisheries) towards higher productivity, commercialization level and smallholder farmer income for improved livelihood, food security and nutrition.

**Preliminary indicators:**
(i) Agricultural sector growth (crops, livestock and fisheries)
(ii) Variation in annual average yield of target commodities (crops, livestock/fish products)
(iii) Variation in crop, livestock/fisheries income of beneficiaries (men/women/youth)
(iv) Average share of the consumer price kept by farmer or average farm gate (real) prices for selected commodities
(v) Variation in volume and value of total output marketed for selected CVC
(vi) Variation in number of food (and nutrition) insecure households in PAs (average Household Dietary Score) compared to other areas
(vii) Number of beneficiaries (or per cent by social groups and gender);
(viii) Increase in volume of agricultural exports
(ix) Increase in farm incomes (by different rural household types)

The *National Strategy for Growth and Reduction of Poverty 2010* clearly identified the important role fisheries played in improving food security and livelihoods. The framework was broken up into three priority clusters, one of which focused on growth and reduction of income poverty[3] which was clearly linked to food security outcomes. Under this cluster there was one specific goal set for fisheries, together with somewhat vague actions to achieve this goal as shown in Figure 17.

*Figure 17: Fisheries related goals, activities and targets from Tanzania Agriculture and Food Security Investment Plan 2010*

**Cluster I:** Growth and Reduction of Income Poverty focusing on equitable growth, sustainable development principle, food security and affordable and reliable energy and adequate infrastructure for production purposes

**Goal 2:** Reducing income poverty though promoting inclusive, sustainable, and employment-enhancing growth

**Operational Target:** Growth of fisheries sub-sector increased from 3.00% in 2009 to 5.3% by 2015.

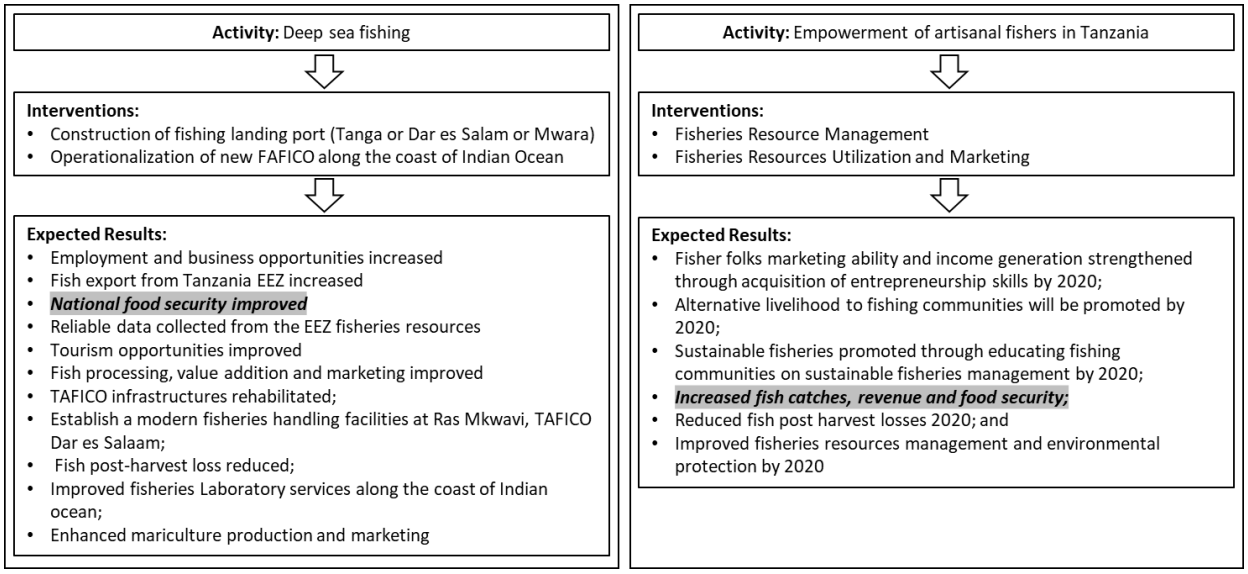
**Cluster Strategy:** Implement measures that ensure sustainable harvesting of fishery resources

**Intervention Packages:**
- Good management of revenue received from fishing licenses
- Promotion of investment in deep-sea fishing
- Promotion of fish farming

*The National Five-Year Development Plan 2016/17-2020/21* had a strong focus on improving FNS, however none of the interventions aimed at improving FNS mentioned seafood. The Plan did, however, state improved food security as a desired outcome of seafood related activities as can be seen in Figure 18 which shows the details of two of the sector specific interventions for fish.

[3] A relative measure of poverty in which household income is compared to an acceptable threshold

*Figure 18: Fisheries interventions from the National Five-Year Development Plan linked to FNS outcomes*




The Tanzania Agriculture and Food Security Investment Plan (TAFSIP) made a very good overview of the challenges facing food security. It also broadly discussed the role of increasing fisheries/aquaculture production, improving value-adding of fisheries products, strengthening the resilience of fisheries to challenges posed by climate change and the importance of supporting small-scale fishers. However, there were no clear objectives, targets or activities set for these.

The *National Multisectoral Nutrition Action Plan 2016/17-2020/21* provided a comprehensive overview of the nutritional challenges faced by Tanzania and identified seven priority areas, including one focused on the scaling up of multisectoral nutrition sensitive interventions. Whilst there was no clear objectives, targets or actions linked to seafood, the Plan clearly identified responsibilities for the Ministry for Agriculture and Fisheries (Figure 19) which included multiple references to seafood and nutrition as well as general references to nutrient dense foods which could be assumed to include seafood. Further to this, attention was drawn to the need to implement concrete adaptation measures to reduce the vulnerability of livelihoods and economy of the coast communities of Tanzania, with fisheries dependent communities identified as one group of people that are at most risk due to their dependence on climate sensitive resources and livelihoods. Once again, no clear objectives, actions or targets were identified.

*Figure 19: Responsibilities identified for Ministry for Agriculture, Livestock and Fisheries in the National Multisectoral Nutrition Action Plan* 2016/17-2020/21

- Ensure that national food security plans and programs have explicit objectives to improve household food and nutrition security
- Promote and support increased production and consumption of diverse high dense food crops
- Promote increased agro-processing, preservation and storage of food crops to reduce post-harvest losses and contamination and preserve nutritional quality
- Enhance research on food crops with high nutrient value
- Ensure mainstreaming of nutrition in agriculture training programmes
- Ensure good agricultural practices and food safety along the production chain
- Promote increased production and consumption of high nutrient value livestock, dairy and fisheries products

- Enhance training and research for small scale production and processing of livestock, dairy and fisheries products to increase nutritional outcomes in households
- Facilitate good marketing of livestock, dairy and fisheries products across the country
- Ensure the safety of livestock and fisheries food products along the production chain

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*Summary*

All instruments except the *Fisheries Act 2010* linked fisheries/aquaculture and FNS, with the primary focus being on improving direct FNS. A number of instruments from agriculture and FNS sectors went beyond this context to cover a broader range of linkages. There was, however, a clear lack of commitment with the majority of instruments mentioning linkages only in the general aims of the document. Unfortunately, some of these documents were very lengthy and poorly structured which made them difficult to follow.

## 5.15 Vanuatu


[1]FAO, 2018a; [2]World Bank, 2019a; [3]World Bank, 2020; [4]UNICEF, WHO and World Bank, 2019

### *5.15.1 Country Overview*

Vanuatu is an archipelago of approximately 80 islands located in the Pacific Ocean (Gillet and Tauati, 2018). It is the smallest nation within the Melanesia region, with its EEZ representing 99% of its total land mass and maritime area (Léopold et al., 2017). Their marine capture fisheries has two distinct components; the offshore fisheries are undertaken by industrial fleets who target predominantly tuna and tuna-like species for export, and the much smaller coastal fisheries which are carried out primarily for local markets (Gillet and Tauati, 2018). The species caught include finfish such as groupers, wrasse and snapper which are consumed locally as well as ornamental species and invertebrates including trochus, lobsters and sea cucumbers which are exported and an important source of income (FAO, 2018d).

Whilst fisheries were once important to their economy, today it plays a less important role contributing between 1-1.5% to GDP (Gillet, 2016). The small-scale fisheries continue to play an important role in the livelihoods and FNS of the local population (Gillet and Tauati, 2018), with more than three quarters of the adult population in 2010 involved in at least one form of fishing (Pacific Community, 2012). The industry is highly vulnerable to cyclones which have historically destroyed much of the country's fishing infrastructure (Gillet and Tauati, 2018).

There is a small aquaculture sector which in the past has been limited to feasibility studies and unregulated active interests in specific niches, such as growing oysters for the tourism sector (Vanuatu Department of Fisheries, 2008). However, there is increasing interest from investors and the government to commercialise this sub-sector with a focus on tilapia for local consumption and trochus and ornamentals for export (ibid).

Seafood consumption in Vanuatu is generally lower compared to some of its pacific island neighbours (Charlton et al., 2016). This can be partially explained by the limited availability of coral reef capable of supporting coastal fisheries compared to other islands as well as the availability of beef and yams in some parts of the country which displaces the need for fish (ibid). There is also significant variation between rural and urban areas and as a result the estimates of national consumption vary from 15.9 kg/capita/annum to 25.7kg/capita/annum, with majority around 20kg/capita/annum which is the global average.

Obesity and NCDs pose significant challenges for Vanuatu with 49.5% of women and 35.8% of men classified as overweight or obese (Vanuatu National Statistics Office and Secretariat of the Pacific Community, 2014) and a high prevalence of NCDs including cardiovascular disease, diabetes and hypertension (Donald, 2018). At the same time, micronutrient deficiencies are common including iodine which could be addressed by increasing fish consumption (Charlton et al., 2016). These nutritional trends are largely driven by a change in diet and a growing reliance on unhealthy food imports including tinned fish and instant noodles (Dancause et al., 2013).

### *5.15.2 Review of Governance Instruments*

Vanuatu has a range of documents covering fisheries (*Vanuatu National Fisheries Sector Policy 2016-2031; Fisheries Act No 10*), aquaculture (*Vanuatu Aquaculture Development Plan 2008-2013*), nutrition (*National Plan of Food and Nutrition Security 2013-2015*) and Sustainable Development (*National Sustainable Development Plan 2016-2030* and the associated *Monitoring and Evaluation Framework 2016-2030*). Further details of these seven instruments can be found in Appendix 1 .

The *National Fisheries Sector Policy 2016-2031* provides a good example of how food FNS can be fully integrated into a fisheries-based policy. Not only is FNS mentioned in the overarching aim of the document, but this is clearly translated into principles, strategic objectives, actions and targets. Of the eight strategic objectives, one is focused specifically on FNS and the alleviation of non-communicable diseases (NCD). This consideration of the role of seafood to both food security and NCD is unique amongst the various governance instruments reviewed for this research, most of which focused on one or the other. The actions identified to help achieve this objective (Table 18) cover a wide range of issues ranging from the establishment of local fish markets and co-ops, to the use of by-catch and value-adding.

*Table 18: Details from Strategic Objective 3 of the Vanuatu National Fisheries Sector Policy 2016-2031*

| Objective 3: Increase food and nutrition security and alleviation of NCD Risk | | | |
|---|---|---|---|
| **Priority Actions** | **Target** | **Proposed Activities** | **Indicators** |
| ***15: Increase production of seafood at the national level*** | • By 2020, all islands have 3–5 anchored FADS deployed<br>• Fishers supported with fishing gear; Fish preservation system operating and fishing operations<br>• By 2020, all provinces will have rural fisheries markets and rural fishing gear shops established<br>• Central fish market completed in 2017 in Port Vila, 2018 in Santo<br>• By 2026, alternative duty exemptions or subsidy by VFD completely supporting local fishers<br>• By 2020, fishers and fishers' associations are operating commercially as fisheries cooperatives. | • Increase availability of fish for domestic consumption<br>• Establish marketing system to rural areas to support fish production<br>• Establish fish markets in towns, provinces and villages<br>• Encourage landing of fish by industrial fishing fleet in domestic ports<br>• Channel tuna and bycatch fish to the local market<br>• Provide funding support to fishers to increase fish production | • Progress reports on livelihood programmes<br>• Assessment and technical reports<br>• Price of fish affordable in Port Vila and Santo markets<br>• Central fish markets in Port Vila and Santo established<br>• Rural fisheries markets and rural fishing gear shops established in all provinces<br>• Local fish availability is increased in Port Vila and Santo markets<br>• Importation of fish is reduced. |
| ***16: Improve access to sufficient and adequately safe seafood*** | • Standards for seafood for local markets established and enforced by 2017<br>• New markets in 2016 are built based on standards<br>• Training on seafood standards development<br>• Seafood preparation and safety awareness conducted<br>• Implement seafood regulations by 2017 | • Establish domestic seafood quality standards<br>• Apply standards to seafood markets<br>• Train fishers and fish receivers on proper handing and processing methods<br>• Inform consumers of risk of eating certain reef fish species<br>• Demonstrate safe handling and preparation of seafood<br>• Improve value-adding of fish<br>• Enhance sustainability of seafood supply at national level<br>• Develop value-adding of fish products | • Fish markets in Port Vila opened, and development of fish market in Santo commenced<br>• More seafood available at markets<br>• Transport of seafood to urban market improved by 2017<br>• Affordable price of fish in Port Vila and Santo markets<br>• Local fish available in hotels and restaurants |
| ***17: Sustain production of*** | • Sustainable FAD program established<br>• Associations strengthened<br>• Association activities are cost recovery | • Production of fish is sustainable to meet growing demand<br>• Sustain fishing activities at all levels | • Continue fishing activities<br>• Move to larger fishing vessels |

| | | | |
|---|---|---|---|
| ***fish at national level*** | • Support provided to industrial fishing industry to increase landing of fish to domestic market | • Sustain production of farmed fish<br>• Promote good aquaculture practices<br>• Minimise wastage of resources<br>• Practice value-adding of fish to improve value | • Fish quality and value-adding improved<br>• Fishers' activities profitable. |

The *Vanuatu Aquaculture Development Plan 2008-2013* clearly identifies the role of fisheries in the rural economy by providing nutrition and income-earning opportunities and with the overarching aim to optimise fisheries sector production to alleviate food security. However, none of the objectives, strategies or indicators that form the basis of the plan make any reference to FNS. One interesting and unique feature of this instrument was the clear identification of priority species which were selected based on their ability to deliver the maximum return in terms of livelihoods, food security and the environment. These were identified during a workshop based on two criteria; the potential for the commodity to make an impact (i.e. potential benefits and suitability), and the feasibility (i.e. deliverability and capacity to utilise aquaculture 'tools') of the commodity to deliver the results envisioned. A list of these can be found in Figure 20.

*Figure 20: Priority aquaculture commodities identified in the Vanuatu Aquaculture Development Plan 2008-2013*

| High Priority | Medium Priority | Low Priority |
|---|---|---|
| • Marine shrimps<br>• Marine ornamentals (giant clams, corals and aquarium fish)<br>• Tilapia<br>• Freshwater prawns<br>• Trochus<br>• Green snail | • Edible oysters<br>• Sea cucumbers<br>• Mud crab<br>• Freshwater eels<br>• Pearl oyster<br>• Sponge<br>• Milkfish<br>• Cottonii seaweed | • Tropical abalone<br>• Live reef fish (e.g. grouper) |

The *National Plan of Action of Food and Nutrition Security 2013-2015* aims to establish a holistic approach to address all elements of food security, taking into account all stages in the value chain. To achieve this goal, they have identified six strategic objectives, one of which directly relates to enhancing the sustainable production, processing, trading, marketing and use of safe nutritious foods (objective 4). It also sets very clear outcomes and activities (Table 19) which involve a range of different departments and encourage cross-departmental collaboration. An interesting point to note was the focus on traditional farming systems and traditional local foods which was not seen in any of the other documents reviewed.

*Table 19: Outcomes and activities for Key Objective Area 4 of the National Plan of Action of Food and Nutrition Security 2013-2015*

| **Key Objective Area 4: To enhance the sustainable production, processing, trading, marketing and use of safe and nutritious foods** | |
|---|---|
| Expected Outcomes | Activities |
| 4.1 Increased productivity and production in the agricultural, livestock and fisheries sectors | 4.1.1 Advocate and support reviews of legislation to secure access to land and water for subsistence food and cash crop production |
| | 4.1.2 Advocate for duty exemptions on food production equipment |
| | 4.1.3 Build knowledge base of farmers on diversity and tradition farming systems |
| | 4.1.4 Improve access of farmers and rural communities to rural finance credits and savings |
| | 4.1.5 Improve access of rural communities to fuel including harnessing of solar energy to assist with the production, storage, preservation and transportation of food |
| 4.2 Improved resilience of agriculture, livestock and fisheries production systems | 4.2.1. Support use and conservation of traditional food crops genetic material that are resilient to pests and climate change impact |
| | 4.2.2 Build capacity of small holder farmers to identity, analyse and implement cost effective mitigation and adaptation responses to climate change and other natural disasters |
| 4.3 Enhanced processing and value adding of agricultural and fisheries products | 4.3.1 Support research and development of appropriate value adding technologies for local foods, including identifying local foods that are appropriate for processing. |
| 4.4.1 Advocate for resources to upgrade and maintain the market facilities in Port Vila and rural centres. | 4.3.2 Hold annual local food expos to promote income generating opportunities for innovative value adding technologies and ideas |

The National Sustainable Development Plan and the associated monitoring and evaluation framework also referred to the importance of traditional diets and food production practices, with a strong focus on increasing household production of their own food. The connection to the natural environment was also quite strong in this document, with food and nutrition security falling under the environmental pillar. For this pillar a total of five goals were identified, the first of which was *a nation that ensures our food and nutrition security needs are adequately met for all people through increasing sustainable food production systems and improving household production*. Like majority of the other

governance instruments for Vanuatu, they translated this ambition into clear targets and indicators, however there was not a lot of detail on the actions they would take to achieve these.

*Summary*
All documents examined for Vanuatu clearly linked fisheries/aquaculture and FNS, with a strong focus on improving direct and indirect FNS as well as building the resilience of the system to ensure FNS in the future. There was also a relatively high level of commitment across the instruments with over half of them translating their ambitions into a solid framework to achieve the desired outcomes.

## 6.0 Discussion

The link between seafood and food and nutrition security within governance instruments is generally considered in a narrow context and actions to support the link tend to lack commitment for implementation. Despite this finding, many of the governance instruments examined, in particular more recent policies, revealed novel approaches to link seafood with food and nutrition security. While an assessment of 'best practice' policy in this field requires consideration of the impact of the policies examined on fisheries management or on food and nutrition outcomes, an assessment of what constitutes current 'good practice' is possible. Good policy practice for seafood and food and nutrition can be defined by the extent to which instruments demonstrate linkages between seafood and food and nutrition across multiple contexts, rather than within a single context, as well as the level of detail and evidence of commitment to implement actions. Results revealed that the majority of instruments examined linked seafood and food and nutrition security, although in terms of good practice, only a third made links across three or more different contexts and a quarter had low to very low levels of commitment to implement actions. The policies that demonstrated a clear link between seafood and FNS across a range of different contexts, with a high level of support for implementation, provide insight into best practice policy in this field.

### 6.1 General findings

In general, with the exception of Peru and the Philippines, fisheries laws did not link fisheries management with FNS. However, establishing this link within a law did not translate into a high level of commitment to implement actions across instruments in Peru or the Philippines. An exception was the *Peruvian National Plan for the Development of Artisanal Fishing 2004* which demonstrated a high degree of commitment to the development of artisanal fishing as a source of food. Conversely, countries that generally displayed a high degree of commitment to actions linking seafood and FNS in their policies made no mention of it in their laws. Best practices for linking fisheries management and associated public health policies are, therefore, operational at the level of policies, strategies and plans, rather than laws. The extent to which enshrining the link between seafood and FNS in law facilitates improved health outcomes is an area requiring further research.

When looking specifically at the fisheries/aquaculture and FNS instruments, as opposed to other sectors, the linkage between fisheries management and FNS was more commonly made in the dedicated fisheries/aquaculture instruments, with 80% of the instruments reviewed from this sector

(excluding laws) linking seafood and FNS, compared to 67% of the dedicated FNS instruments. However, the level of commitment to implement actions was the same for both sectors, with around 29% demonstrating a high to very high level of commitment and the primary focus for both sectors on improving direct and/or indirect FNS.

It was clear from the results of the review that when identifying public policies that explicitly tie fisheries management to food security outcomes, a focus on the governance instruments of these specific sectors only is too narrow. Fisheries and FNS both have inter-sectoral implications and are often dealt with in a comprehensive manner in multisectoral instruments, such as those relating to economic development, agriculture and climate change. For example, Bangladesh, Ghana and Tanzania had dedicated agricultural investment plans which made reference to the linkages between seafood and FNS to varying degrees. In the case of Bangladesh and Ghana, the plans covered a range of linkages, and in addition to specifying relevant objectives and actions they also assigned a budget to the actual objectives and/or actions. This additional step clearly demonstrated their commitment to taking action to address the matters identified and clarifying how targets will be met and actions implemented should be encouraged to strengthen the governance process.

In some countries there was a clear focus on a particular topic that spanned across multiple documents, reflecting the nutritional, socio-economic, political, or environmental challenges that country faced. Taking a nutritional example, Chile has a relatively low per capita seafood consumption, therefore, increasing consumption was the focus of the seafood and FNS linkages made in several of their documents. From an environmental perspective, Senegal has a large coastal population employed in primary production that is predicted to be negatively affected by climate change. As a result, there was a strong focus on the impacts of climate change on FNS and actions were adopted to improve the resilience of the fisheries sector to avoid serious problems in the future. From a political perspective, in South Africa which has had a historical lack of rights for artisanal fishers, there was a strong focus on equitable access to fisheries resources in several documents. This novel approach to developing governance arrangements that reflect the unique situation of the country and/or region and ensuring these themes occur across a range of governance instruments shows a high degree of commitment to achieving the intended outcomes.

A key observation from the results was the importance of having a well-written and structured document. This not only assisted in the general readability of the document, but also helped to identify the linkage between seafood and FNS. For example, in many cases the governance instruments made a linkage between FNS and seafood in the general aims of the document, but were not deemed to show a high level of commitment as the link was not supported by clear objectives, actions and targets. However, a number of instruments contained similar objectives and targets to those that were deemed to show a high level of commitment, however, they were not clearly linked to seafood and/or FNS. This was particularly relevant for documents that focused on the role of fisheries/aquaculture in improving the livelihoods and employment opportunities of the local people (indirect food security). In many cases instruments failed to articulate this link or set targets directly relating to FNS. Further efforts are required to clarify how improving fish-based livelihoods and employment opportunities will contribute to FNS, and set appropriate targets to measure performance from a FNS perspective, rather than purely production focused metrics. Below is a

summary of the interesting trends and approaches taken to the tying seafood to FNS with references made to best practice examples where applicable.

## 6.2 Linkages with direct vs indirect FNS

The role of fisheries and aquaculture in providing employment opportunities and improving the livelihoods of rural workers was highlighted in the vast majority of fisheries and aquaculture instruments. Whilst this approach has enormous potential to improve the FNS status of these vulnerable populations, many of these documents did not make direct reference to this linkage. As such, these documents were not identified as making this linkage in the analysis regardless of how strong the focus was on improving livelihoods. As mentioned above, further work is required to better articulate the link between employment opportunities, livelihood improvement and FNS outcomes, and to set appropriate targets to measure performance to ensure that the benefits reach vulnerable groups.

For those fisheries/aquaculture documents that did make connections to FNS, the actual activities set tended to be more production focused and in many cases the indicators used to measure the success of these activities focused predominantly on production or economic based metrics. For example, the *Vanuatu National Fisheries Sector Policy 2016-2031* set a clear objective to improve food security and livelihoods through investment in fisheries and economic growth. There was a broad suite of actions selected to achieve this, including the development of new infrastructure (e.g. wharf, processing facilities), the provision of fishing gears and the training to fishers and reducing the barriers to investment. The metrics used to assess progress included the completion of infrastructure projects, the number of licences issued and the export of frozen and fresh fish from the new onshore facilities. Given this strong focus on production based measures, it is difficult to determine the legitimacy or likely impact of activities aiming to improve FNS since increased production is also highly desirable from a trade perspective. As such, further work is needed to ensure the actions and indicators for production are more clearly aligned with FNS outcomes (Belton et al., 2020, Bogard et al., 2018, Farmery et al., 2021).

A number of activities were identified in the instruments aimed specifically at increasing the availability of seafood (e.g. providing better access to affordable feed and seed; providing value-adding opportunities; improved fisheries management; reducing waste), improving access to seafood (e.g. establishing local co-ops; investing in cold chain infrastructure), increasing the utilization of seafood (e.g. marketing seafood consumption, educating people about the health benefits and how to cook it) and stability (e.g. building resilience to climate change, improving fisheries management). However, few instruments included activities that were directly related to affordability of seafood. Greater attention is needed on affordability to ensure that any increases in production reduce the cost of seafood rather than producing products solely for higher value markets (Farmery et al., 2021).

## 6.3 Nutrition sensitive seafood production

The focus on nutrition sensitive production in Bangladesh (*National Nutrition Policy 2015, Perspective Plan of Bangladesh 2010-2021, Second Country Investment Plan (2016-2020)*), Ghana (*National nutrition Policy 2013-2017, Medium term Agricultural Sector Investment Plan II 2014-2017*) and to a

lesser extent Tanzania (*National Multisectoral Nutrition Action Plan 2016/17-2020/21*) is promising as it shows an understanding of the need to focus on foods that deliver the best nutritional outcomes from the use of limited resources, especially when coupled with education to improve understanding of how to prepare such foods. This concept appeared to be more commonly applied to crops rather than fisheries/aquaculture, but it is certainly an area that requires further attention in regards to seafood, especially for aquaculture where there is more control over the nutritional characteristics of the food product grown.

### 6.4 Improve resilience to protect long term food security and livelihoods

Given the reliance of fisheries and aquaculture on natural resources and climatic conditions, it is not surprising that resilience to environmental threats and resource sustainability was a feature of numerous documents. In particular, many instruments linked seafood and FNS with mention of climate change and sustainable stock management. In many cases the document clearly identified the associated risks of these environmental issues on fisheries/aquaculture and laid out measures to address the issues, which would undoubtedly indirectly improve FNS. However, the instruments did not clearly articulate this linkage. Further work is needed to ensure the actions and indicators relating to climate change and stock management, in particular, are more clearly aligned with FNS outcomes.

### 6.5 Equitable and fair allocation of resources

In addition to an overarching fisheries instrument, several countries also had sub-sector instruments which made it easier to distinguish between those of relevance to seafood destined for local consumption and those for export. For example, Samoa had a tuna specific instrument which focused on export and the equitable allocation of resources. Similarly, Bangladesh had one for shrimp which was focused on the indirect food security benefits of improving livelihoods as well as various governance instruments based on the location of the fisheries (e.g. inland, marine). Both South Africa and Peru had separate instruments that focused on small-scale/artisanal fisheries (*Policy for the Small-Scale Fisheries Sector in South Africa 2012, National Plan for Development of Artisanal Fishing 2004*) which had a much stronger focus on direct food security and equitable allocation of resources. Whilst other policies mentioned equitable access in their general fisheries instruments, this more focused approach of sub-sector instruments clarified the linkage.

### 6.6 Increase seafood consumption to enhance nutritional status

Increasing consumption was targeted by numerous documents, with actions relating to marketing, education and improvement in markets and cold chain infrastructure the most common pathways to achieving this. For example, the Tanzanian *National Multisectoral Nutrition Action Plan 2016/17-2020/21* identified the need for the Ministry for Agriculture, Livestock and Fisheries as well as the private sector to invest in the marketing of high-value nutritious and healthy products (including seafood) as a means to improve the nutritional status of the Tanzanian population. It also encouraged a multisectoral approach to nutrition education starting from childhood to address nutrition related issues which included input from the agriculture/fisheries sector as well as others including climate change/environment and education. Others took a more creative approach, including Peru in the

*National Plan for Artisanal Fisheries 2004* which had one initiative requiring the state purchase programs (e.g. procurement departments from major ministries) to support the consumption of fish.

It was interesting to note the significant difference between the developed countries (Japan and Norway) and the less developed countries that made up the remainder of those reviewed in regards to the rationale behind why seafood was important for human nutrition. In the developed countries, the focus tended to be on the health benefits of nutritional compounds such as DHA in reducing depression, as well as on ensuring a balanced diet to prevent NCDs and obesity. In contrast, less developed countries considered protein, minerals and nutrients that promoted optimal growth and prevented malnutrition. Interestingly, the only country that simultaneously addressed the role of seafood in addressing NCDs and food insecurity was Vanuatu, despite several countries reviewed facing the dual burden of over and under nutrition.

## 6.7 Importance of seafood to vulnerable groups

In regards to identifying vulnerable groups, the FNS sector documents tended to focus on women and the role of seafood in improving their nutritional status (e.g. Bangladesh *National Aquaculture Development Strategy and Action Plan 2013–2020*), whereas those from food production sectors (fisheries, aquaculture, agriculture) focussed more on the direct and indirect role of fisheries in improving the livelihoods of rural (often poor) households and fisherfolk (e.g. Tanzanian *Agricultural Sector Development Programme Phase Two 2016*), with some (e.g. *National Agricultural Investment Program for Food Security and Nutrition in Senegal 2018-2022*) specifically including women and youth employed in fisheries and aquaculture.

## 6.8 Educate population on health benefits of fish

There was a clear difference in the approach taken in the developed countries reviewed in comparison with developing countries regarding the focus of educational initiatives. The developed countries (Japan and Norway) highlighted the role of school-based education, whilst in the developing countries the focus was on the general population (e.g. Peru *National Plan for the Development of Artisanal Fishing 2004*) or more specifically on women and children (e.g. Tanzanian *National Plan for the Development of Artisanal Fishing 2004*). Japan demonstrated a truly integrated approach to education in their *Basic Act on Dietary Education (Shokuiku) 2005* by encouraging the collaboration between educators and farmers/fishers to provide educational opportunities for the general population to better understand the importance of human activities in food production and distribution.

## 6.9 Standout examples of instruments linking fisheries management and FNS

Taking into account all of the above-mentioned issues, the standout examples of best practice from this review were the *Second County Investment Plan 2016-2020* from Bangladesh, the Samoan *Agriculture Sector Plan 2016-2020 (Volume 1 and 2)*, and the *National Fisheries Sector Policy 2016-2031* for Vanuatu. Not only did they cover a comprehensive range of linkages between fisheries management and FNS across different contexts (≥4), but they also showed a high level of commitment by translating these into actions and targets that were clearly linked to the overarching

aims/objectives of the policy and were well-written. These instruments provide examples of potential 'best practice' policy that can be revised to suit different country contexts in future policy development and review.

## 7.0 Limitations

One of the draw backs of the study approach was the way in which fisheries and fish are included in governance instruments, as they are often considered within agriculture sector policy, especially in cases where the same ministry or department is responsible for both sectors (e.g. Samoan Ministry of Agriculture; South African Department of Agriculture, Forestry and Fisheries). In some cases, this grouping of fisheries within agriculture made it difficult to determine the specific linkage made between FNS and fisheries/aquaculture as they were combined with other livestock or agricultural products (or in some cases grouped together with other foods classified as *highly-nutritious)*. This matter could have implications for the findings of this research as some linkages were potentially missed. The *National Agricultural Investment Program for Food Security and Nutrition in Senegal 2018-2022* was one exception as it specifically mentioned fisheries as a separate sector throughout the document. We note that fish should contribute to FNS as part of a healthy and diverse diet, so consideration of fish within agricultural policy is not inherently bad policy practice. However, fisheries and aquaculture have their own unique benefits and costs and clearly articulating objectives and targets for these sectors will aid policy implementation.

Another potential limitation of the study was that some instruments did not make a clear distinction between fisheries and aquaculture, which meant the objectives and actions set did not address the inherent differences between these two diverse sub-sectors. In contrast, nine of the 15 countries included had totally separate instruments for aquaculture, with over half of these identifying the link between FNS. The best-case examples of this were Bangladesh and South Africa which identified specific objectives, actions and in the case of Bangladesh also targets specifically for aquaculture.

The method used to select the countries to include in the study was intended to identify those that would potentially represent world best practice in linking fisheries management and FNS. However, the approach taken resulted in the inclusion of some countries that had poor linkages between seafood and FNS. The reason for their inclusion was that the database used to identify countries with strong linkages between fisheries and FNS governance instruments (Koehn, 2019) based its scoring on only one instrument for fisheries/aquaculture and another for FNS. This reliance on a small selection of documents meant that some countries scored high based on just one document, which was not an accurate indication of their overall performance. It is also highly likely that this approach excluded other countries that were better examples of best practice, especially given that many of the best practice examples came from documents that were not primarily focused on fisheries/aquaculture or FNS (e.g. agriculture, climate change). Regardless, the selection of countries provided a good overview of different approaches taken around the world as well as interesting examples for discussion.

The governance instruments reviewed for this research came from a search conducted in the FAOLEX database. It is possible that other relevant polices not included in this database were excluded from this review. For example, the *National Aquaculture Policy Framework for South Africa 2013* was

identified through a reference in a separate policy document, although it did not appear in the FAOLEX search.

Whilst every effort was made to select a representative list of keywords to use as the basis of the search, some less-common terms could have been missed. For example, one document had an objective related to a *well-nourished population,* which although closely related to nutrition, was not included in the keywords used. In addition, in cases where fisheries were combined with agriculture it was more difficult to ascertain the linkage between seafood and FNS using a keyword search as the search often did not pick up on instances where seafood was grouped together with other agricultural products (e.g. Multisectoral Nutrition Plan for Tanzania).

The keywords were translated into Indonesian, Spanish and French by native or bilingual speakers within the research group. However, for the majority of the French and Spanish documents Google Translate was used to translate the actual documents. This approach could have potentially limited the extent to which the context of the document was fully understood.

Regarding the linkages with other governance documents and partners in policy development, it is highly likely the results shown in the analysis table are incomplete. This is because this review did not involve an in-depth analysis of the entire document, but rather a check for keywords and the associated context of these in relation to fisheries/aquaculture and FNS. As such, only the linkages and partners that were obvious in the introductory text were picked up, with some likely to have been missed.

## 8.0 Recommendations

This research provides insight into current best practice for linking fisheries management and associated public health policies, including tying food security objectives into fisheries management. While it is difficult to assess best practice from existing governance instruments, as this would require evidence of policy implementation and evaluation of impact which is beyond the scope of this study, we can recommend some key attributes that stand out as determinants of 'good' practice for linking fisheries management and associated public health policies.

1. Broaden the context of links between fisheries/aquaculture and FNS articulated in policies beyond developing fisheries/aquaculture to increase production. Considering the link between these sectors across a range of different contexts, for example ensuring equitable and fair allocation of resources and distribution of benefits, is critical to supporting the role of fisheries/ aquaculture in improving food security and livelihoods.
2. Support the link between fisheries/aquaculture and FNS across a range of both sectoral and multisectoral policies. This approach will help facilitate greater incorporation of fisheries and aquaculture into national food systems and food security dialogues and encourage cross-sectoral collaboration, which is necessary to manage the contribution of fisheries/aquaculture to a broad range of social, economic and environmental goals.
3. Include clear goals, targets and actions as well as information on how the policy impact will be monitored and evaluated.

4. Strengthen support for nutrition sensitive fisheries/aquaculture which considers the nutrient composition of different species and prioritises nutrition alongside economic and environmental objectives.

Examples of these 'good' practices were evident in many policies, however, further investigations are needed to ground truth the extent to which the goals stated in these instruments have been implemented, the challenges associated, and the outcomes achieved. Future research in this field could further examine a select group of countries and undertake a more in-depth assessment, with a focus on the following:

- Status of the targets set in the various governance instruments;
- If the target has been achieved, identify what helped to enable the actions, and if the target has not been met, identify what the challenges were to achieving the desired outcomes;
- Governance and accountability for the various initiatives in terms of national commitment and resource allocation;
- Assessment of the linkages between the different governance instruments for each country to better understand the cross-collaboration that happens between the various sectors linked to fisheries/aquaculture and FNS

Based on the results of this assessment, Bangladesh and Vanuatu would provide interesting case studies for further investigation since a number of their documents made linkages between fisheries/aquaculture within a range of different contexts (≥4) as well as demonstrated a high level of commitment by accompanying their aspirations with a strong supporting implementation framework. Other countries for potential further investigation include Samoa, Senegal and Tanzania, all of which contained documents linking fisheries/aquaculture within a range of different contexts (≥4) although they did not demonstrate a high level of commitment to taking action. Greater understanding of how commitment enables or limits implementation would be valuable research.

In addition, the concept of nutrition sensitive fisheries and aquaculture has a lot of potential to address multiple issues relating to direct and indirect FNS. Further investigation of the implementation of related activities in Bangladesh, Tanzania or Ghana, who made mention of this in their governance instruments, would be valuable to gain insights into what is involved, and the associated outcomes, so that other countries that are seeking to improve FNS via expansion in aquaculture can ensure this is done in the most effective way. Further understanding of nutrition sensitive fisheries would also highlight the important role of wild-capture fisheries for nutrition.

Finally, it would be valuable to identify suitable metrics to assess FNS outcomes of fisheries/aquaculture related activities as there was a clear lack of these in the documents reviewed. The assessment should consider which metrics provide the most meaningful insights into the actual impacts of changes to fisheries management, and related activities, on FNS as well as the practicalities associated with collecting the necessary data. For example, new efforts such as the Food Insecurity Experience Scale (FAO, 2020d) is seeking to address the lack of consistency of tools to measure food security more generally and may be useful for future policy development in this field.

## 9.0 Conclusion

Seafood plays a vital role in providing healthy diets and livelihoods to millions of people around the world. Whilst numerous national and regional governments have articulated the link between seafood and FNS in their governance approach, further work is required to ensure adequate action is taken and appropriate measures are put into place to assess performance overtime. There is also a need for further research to determine the efficacy of the approaches currently taken in the various governance documents described in this research. Expanding the scope of the actions and targets used to achieve and measure performance against the desired goals of these instruments will help ensure they address the varied ways in which seafood contributes to public health, including improved FNS outcomes.

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## Appendix 1: Summary of governance instruments and the linkages between fisheries/aquaculture and FNS

| Country | Source document | Sector | Linkage between fish and FSN | Context of Linkage[i] | Level of Commitment |
|---|---|---|---|---|---|
| Bangladesh | National Fisheries Strategy 2006 | Fisheries | Yes | B,I | Very low |
| Bangladesh | National Fisheries Policy 1998 | Fisheries | Yes | A | Very low |
| Bangladesh | Inland Capture Fisheries Sub-Strategy 2006 | Fisheries | No | NA | None |
| Bangladesh | Marine Fisheries Sector Sub-Strategy 2006 | Fisheries | No | NA | None |
| Bangladesh | Shrimp Sub-Strategy 2006 | Fisheries and Aquaculture | Yes | B | Very low |
| Bangladesh | Coastal Development Strategy 2006 | Natural Resource Management | Yes | A,B,D,E | Moderate |
| Bangladesh | National Aquaculture Development Strategy and Action Plan 2013–2020 | Aquaculture | Yes | A,B,D,E,G | Very high |
| Bangladesh | National Nutrition Policy 2015 | Nutrition | Yes | A,C,H,I | Moderate |
| Bangladesh | National Food Policy 2006 | Food security | Yes | A,B | High |
| Bangladesh | National Food Policy Plan of Action 2008-2015 | Food security | Yes | A,B,F,H,I | Very high |
| Bangladesh | Protection and Conservation of Fish Act 1950 | Fisheries | No | NA | None |
| Bangladesh | Perspective Plan of Bangladesh 2010-2021 | Agriculture | Yes | A,C,H | Moderate |
| Bangladesh | Second Country Investment Plan (2016-2020) | Financial investment | Yes | A,B,C,D,E,F,J,H,I | Very high |
| Bangladesh | Seventh Five Year Plan (2016-2020) | Food security and nutrition | Yes | A,B | High |
| Chile | National Fisheries Policy 2007 | Fisheries | No | NA | None |
| Chile | Chilean Action Plan for Sustainable Consumption and Production 2017-2022 | Sustainable Development | Yes | F | Very high |
| Chile | National Health Strategy 2011-2020 | Health | No | NA | None |
| Chile | NA | Aquaculture | No | NA | None |
| Chile | Climate Change Adaptation Plan for the Health Sector 2016 | Climate change | No | NA | None |
| Chile | Climate Change Adaptation Plan for Fisheries and Aquaculture 2015 | Climate change | Yes | F | High |

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|---|---|---|---|---|---|
| Chile | General Law of Fishing and Aquaculture 1998 | Fisheries and aquaculture | No | NA | None |
| Ghana | Fishery Management Plan of Ghana 2015-2019 | Fisheries | Yes | A,D | Low |
| Ghana | National Nutrition Policy 2013-2017 | Nutrition | Yes | A,C,I | Moderate |
| Ghana | Ghana National Aquaculture Development Plan 2012 | Aquaculture | Yes | A | Low |
| Ghana | National Climate-Smart Agriculture and Food Security Action Plan 2016-2020 | Climate change | Yes | B,D | High |
| Ghana | The Coordinated Programme of Economic and Social Development Policies 2017-2024 | Social development | No | NA | None |
| Ghana | Medium-term National Development Policy Framework 2018-2021 | Economic Development | No | NA | None |
| Ghana | Medium-term Agricultural Sector Investment Plan II, 2014-2017 | Financial investment | Yes | C,H,G, | High |
| Ghana | National Medium-Term Development Plan of Ministry of Food and Agriculture 2014-2017 | Economic Development | Yes | A | Very high |
| Ghana | Ghana Shared Growth and Development Agenda 2014-2017 | Financial investment | Yes | A,B | Moderate |
| Ghana | Fisheries Act 2002 | Fisheries | No | NA | None |
| India | National Policy on Marine Fisheries 2017 | Fisheries | Yes | A,B,G | Low |
| India | National Policy for Farmers 2007 | Agriculture | Yes | A,B,E | High |
| India | National Nutrition Strategy 2017 | Nutrition | No | NA | None |
| India | The National Food Security Law 2013 | Food security | No | NA | None |
| India | The Indian Fisheries Act 1897 | Fisheries | No | NA | None |
| Indonesia | Bill of the Republic of Indonesia Number 18 Year 2012 Concerning Food by the Mercy of God Almighty | Food security and nutrition | Yes | D,F | Low |
| Indonesia | National Plan of Action for Food and Nutrition 2011-2015 | Nutrition | Yes | A,F | Very high |
| Indonesia | Strategic Planning Document of the Maritime and Fisheries Department of Central Java Province 2018-2023 | Fisheries | Yes | A,H | Very high |
| Indonesia | Strategic Planning Document of the Maritime and Fisheries Department of Lampung Province 2019-2024 | Fisheries | Yes | A,H | Very high |
| Indonesia | Strategic Planning Document of the Maritime and Fisheries Department of South Kalimantan Province 2018-2023 | Sustainable Development | Yes | B,E | Moderate |

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|---|---|---|---|---|---|
| Indonesia | Strategic Planning Document of the Maritime and Fisheries Department of West Java Province 2018-2023 | Fisheries | Yes | D,F,H | Very high |
| Indonesia | Strategic Planning Document of the Maritime and Fisheries Department of Riau Province 2018-2023 | Fisheries | Yes | A,D,F | Moderate |
| Indonesia | Strategic Planning Document of the Maritime and Fisheries Department of Nusa Tenggara Barat Province 2018-2023 | Fisheries | Yes | D,F | Low |
| Indonesia | National Mid-term Development Planning 2020-2024 | Social development | Yes | A,B,D | Moderate |
| Indonesia | Fisheries Law No.31/2004 | Fisheries | No | NA | None |
| Japan | Basic Act on Dietary Education (Shokuiku) 2005 | Nutrition | Yes | H | Low |
| Japan | Climate Change Adaptation Plan of Ministry of Agriculture, Forestry and Fisheries 2015 | Climate change | No | NA | None |
| Japan | Basic Policy and Action Plan for the Revitalization of Japan's Food Agriculture, Forestry and Fisheries 2011 | Agriculture | No | NA | None |
| Japan | Sustainable Aquaculture Production Assurance Act 1999 | Aquaculture | No | NA | None |
| Japan | Fisheries Basic Act 2001 | Fisheries | No | NA | None |
| Mauritania | National Responsible Management Strategy for Sustainable Development of Fisheries and Maritime Economy 2015-2019 | Fisheries and Aquaculture | Yes | A,H | High |
| Mauritania | Multisectoral Strategic Nutrition Plan 2016-2025 | Nutrition | Yes | A | Moderate |
| Mauritania | National Strategy for Accelerated Growth and Shared Prosperity (SCAPP 2016-2030), Volume II | Economic Development | Yes | H | Low |
| Mauritania | National Food Security Strategy for Mauritania for 2015 and Vision 2030 | Food security | No | NA | None |
| Mauritania | National Social Protection Strategy in Mauritania 2012 | Social development | Yes | A | Very low |
| Mauritania | Law N ° 2000-025 / on the Fisheries Code | Fisheries | No | NA | None |
| Norway | Marine Resources Act 2008 | Fisheries | No | NA | None |
| Norway | National Action Plan for a Healthier Diet 2017 | Nutrition | Yes | D,F | Very high |
| Norway | Strategy for an Environmentally Sustainable Norwegian Aquaculture Industry 2009 | Aquaculture | No | NA | None |
| Norway | Aquaculture Act 2005 | Fisheries | No | NA | None |
| Peru | National Aquatic Development Plan 2010 - 2021 | Aquaculture | Yes | A,B,E | Very low |
| Peru | National Plan for the Development of Artisanal Fishing 2004 | Fisheries | Yes | F,H,I | High |

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|---|---|---|---|---|---|
| Peru | The Multiannual Sector Strategic Plan 2015-2021 | Agriculture | No | NA | None |
| Peru | The National Plan for Food and Nutrition Security 2015-2021 | Food security and nutrition | No | NA | None |
| Peru | Law No. 27460 - Law for the Promotion and Development of Aquaculture 2001 | Aquaculture | No | NA | None |
| Peru | Decree Law No. 25977 - General Fishing Law 1992 | Fisheries | Yes | A,B | Low |
| Philippines | Comprehensive National Fisheries Industry Development Plan 2006-2025 | Fisheries and Aquaculture | Yes | A,B | Low |
| Philippines | Fisheries Code 1998 | Fisheries and Aquaculture | Yes | A,B,D,E | Low |
| Philippines | Philippine Plan of Action for Nutrition 2017-2022 | Nutrition | No | NA | None |
| Philippines | Philippine Development Plan 2017-2022 | Economic Development | No | NA | None |
| Samoa | Samoa Tuna Management and Development Plan 2011-2015 | Fisheries | Yes | E | Low |
| Samoa | National Food and Nutrition Policy 2013 | Food security and nutrition | No | NA | None |
| Samoa | Samoa Coastal Fisheries Management Plan 2013-2016 | Fisheries | Yes | A,B,D | High |
| Samoa | Aquaculture Management and Development Plan 2013-2016 | Aquaculture | Yes | A,B,D | Low |
| Samoa | Agriculture Sector Plan 2016-2020 - Volume 1 | Agriculture | Yes | A,B,D,F,G | Very high |
| Samoa | Agriculture Sector Plan 2016-2020 - Volume 2 | Agriculture | Yes | A,B,D,F,G | Very high |
| Samoa | Strategy for the Development of Samoa 2016-2020 | Economic Development | Yes | A,B,D | Moderate |
| Samoa | Fisheries Act 1988 | Fisheries | No | NA | None |
| Senegal | Maritime Fisheries Code 1998 | Fisheries | No | NA | None |
| Senegal | National Agricultural Investment Program for Food Security and Nutrition in Senegal 2018-2022 | Food security and nutrition | Yes | A,D,G,I | High |
| Senegal | National Nutrition Development Policy, 2015-2025 | Nutrition | Yes | A,H | Low |
| Senegal | National Strategy for Marine Protected Areas (MPAs) of Senegal 2013 | Fisheries | Yes | A | Low |

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|---|---|---|---|---|---|
| Senegal | National Strategy for Food Security and Resilience (SNSAR, 2015-2035) | Food security | Yes | A,B,D,G,I | Moderate |
| Senegal | National adaptation plan for the fisheries and aquaculture sector in the face of climate change by 2035 | Climate change | Yes | A,B,D | Low |
| South Africa | Policy for the small-scale fisheries sector in South Africa 2012 | Fisheries | Yes | A,B,D,E,I | Moderate |
| South Africa | Aquaculture and Economic Development Awareness Strategy for South Africa 2012-2016 | Aquaculture | No | NA | None |
| South Africa | National Aquaculture Policy Framework for South Africa 2013 | Aquaculture | Yes | A,B,E | High |
| South Africa | National Policy on Food and Nutrition Security 2013 | Food security and nutrition | No | NA | None |
| South Africa | Agricultural Policy Action Plan 2015-2019 | Agriculture | Yes | A,B | Low |
| South Africa | Strategic Plan for the Department of Agriculture, Forestry and Fisheries 2013/14-2017/18 | Agriculture | Yes | A,B | High |
| South Africa | National Development Plan 2030 | Economic Development | Yes | A | Very low |
| South Africa | Roadmap for Nutrition in South Africa 2013-2017 | Food security and nutrition | No | NA | None |
| South Africa | Marine Living Resources Act No 18 of 1998 | Fisheries | No | NA | None |
| Tanzania | National Fisheries Policy of 2015 | Fisheries | Yes | A,B | Low |
| Tanzania | National Nutrition Strategy 2011/12-2015/16 | Nutrition | Yes | A | Very low |
| Tanzania | Agricultural Sector Development Programme Phase Two 2016 | Agriculture | Yes | A,B,D,G,H | Low |
| Tanzania | National Multisectoral Nutrition Action Plan 2016/17-2020/21 | Nutrition | Yes | A,C,D,F,G,H,I | Low |
| Tanzania | National Five-Year Development Plan 2016/17-2020/21 | Economic Development | Yes | A | High |
| Tanzania | Agricultural Sector Development Strategy II 2015/16 - 2024/25 | Agriculture | Yes | A | Moderate |
| Tanzania | National Strategy for Growth and Reduction of Poverty 2010 | Economic Development | Yes | A,B | Moderate |
| Tanzania | Tanzania Agriculture and Food Security Investment Plan 2011/12 - 2020/21 | Financial investment | Yes | A,B,D,G | Low |

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|---|---|---|---|---|---|
| Tanzania | Fisheries Act 2010 | Fisheries | No | NA | None |
| Vanuatu | Vanuatu Aquaculture Development Plan 2008-2013 | Aquaculture | Yes | A,B | Low |
| Vanuatu | Vanuatu National Fisheries Sector Policy 2016-2031 | Fisheries and Aquaculture | Yes | A,B,D,F | Very high |
| Vanuatu | National Plan of Action on Food and Nutrition Security 2013-2015 | Food security and nutrition | Yes | A,B,D,E,G,I | High |
| Vanuatu | Overarching Productive Sector Policy 2012-2017 | Agriculture | Yes | A,B,D,E | Moderate |
| Vanuatu | National Sustainable Development Plan NSDP 2016 to 2030 | Sustainable Development | Yes | A,D | High |
| Vanuatu | National Sustainable Development Plan 2016 to 2030 - Monitoring and Evaluation Framework | Sustainable Development | Yes | A,D | High |
| Vanuatu | Fisheries Act No 10 | Fisheries | No | NA | None |

[i] ***Legend for Context of Linkage***

| | |
|---|---|
| A | Develop the fisheries/aquaculture sector to improve availability, access and affordability of seafood (direct improvement of food security) |
| B | Develop the fisheries/aquaculture sector to create jobs, alleviate poverty and improve livelihoods (indirect improvement of food security) |
| C | Support nutrition sensitive fisheries/aquaculture production to improve availability of nutritious foods |
| D | Improve resilience of the system to protect long term food security and/or livelihoods |
| E | Ensure equitable and fair allocation of production resources and distribution of benefits to improve food security and/or improve livelihoods |
| F | Increase seafood consumption to enhance nutritional status |
| G | Specific focus on vulnerable groups within society (children, women, rural, poor) |
| H | Educate national population about the nutritional benefits of eating seafood and/or provide guidance on how to prepare |
| I | Encourage cross-departmental collaboration to develop nutrition sensitive fisheries/aquaculture production |