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## **AFSPAN Work Package 3**

**Review and assessment of national and international  
cooperation**

**Final synthesis report including recommendations  
submitted and circulated by various stakeholders**

**Deliverable 3.4**



## Preparation of this document

This final report of Work Package 3 was prepared for the Aquaculture for Food Security, Poverty Alleviation and Nutrition (AFSPAN) project under the overall guidance of Rohana P. Subasinghe, Chief, Aquaculture Branch, Fisheries and Aquaculture Management Division, Fisheries and Aquaculture Department, FAO. This final report builds mainly on a preliminary desk study report (FAO, 2012), which was prepared by the 11 country partners of the AFSPAN project (Bangladesh, Brazil, Chile, China, India, Kenya, Nicaragua, Philippines, Uganda, Vietnam, and Zambia) and synthesized by the Food and Agriculture Organization of the United Nations (FAO). The preliminary report provided basic information and data regarding partner countries' aquaculture development projects and related regional and international cooperation activities, focusing on those promoting aquaculture in a food security and poverty alleviation context.

The findings of the preliminary report were shared and discussed amongst the AFSPAN project partners and an agreement was reached to gather detailed information and data to bridge knowledge gaps pertinent to Work Package 3. Subsequently, detailed responses to a questionnaire, developed by the Consultant, were provided by country partners and incorporated in this final report. This report also includes responses from FAO and the International Fund for Agricultural Development (IFAD) regarding their goals to contribute to food security and nutrition and poverty alleviation through aquaculture development support at national, regional and international levels. Similar information was gathered for the World Bank (WB), Asian Development Bank (ADB), World Fish (WF) and the European Commission (EC) from the internet.

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## Abbreviations and acronyms

ADB	Asian Development Bank
AFSPAN	Aquaculture for Food Security, Poverty Alleviation and Nutrition
AIT	Asian Institute of Technology
ANAF	Aquaculture Network for Africa
AUC	African Union Commission
ASFs	Animal -source Foods
CP	Country Partners
DFID	Department for International Development
EC	European Commission
FAO	Food and Agriculture Organization of the United Nations
GAAP	Global Aquaculture Advancement Partnership
HLPE	High Level Panel of Experts on Food Security and Nutrition
ICN2	Second International Conference on Nutrition
IFAD	International Fund for Agricultural Development
LIFDC	Low- Income Food- Deficit Countries
NACA	Network of Aquaculture Centres in Asia-Pacific
NEPAD	New Partnership for Africa's Development
NHDP	National Human Development Plan
OE	Office of Evaluation (FAO)
OECD	Organisation for Economic Co-operation and Development
RECOFI	Regional Commission for Fisheries
SSC	South-South Cooperation
TC	Triangular Cooperation
WFP	World Food Programme
WGA	Working Group on Aquaculture
WHO	World Health Organization
WP	Work Packages
WFC	World Fish Center

## Executive summary

Ensuring adequate food and nutritional security for all is a formidable development challenge that governments and international development communities need to address, given a global population that is projected to rise from 7 to 9 billion in 2050, much of it in developing countries prone to hunger. According to FAO estimates, to feed the world in 2050, agricultural output, originating from crops, livestock and fisheries, including aquaculture, must increase by 60 percent. Finding opportunities to increase food security and alleviate poverty through agriculture is vital and timely. It is widely acknowledged that aquaculture also has an important and increasing role to play in addressing food insecurity and malnutrition by enhancing the supply and consumption of fish and other marine and freshwater products, which are commonly rich sources of protein, essential fatty acids, vitamins and minerals, by generating higher incomes and employment opportunities and by enhancing trade, thereby reducing poverty and promoting social and economic development.

Despite the widely accepted importance of aquaculture's contribution to human development, and the recent initiatives in developing aquaculture policies and strategies, it is recognized that the current knowledge and understanding of aquaculture's contribution is still inadequate and that better tools and more systematic and quantitative assessments are needed. Better understanding of aquaculture's contributions is expected to assist developing countries and development partners to prepare and implement sustainable policies, strategies and plans for improving the livelihoods of millions of poor people. It is in this context that the AFSPAN project has been designed. The project is being implemented through a set of nine work packages (WP). This is the final report for WP 3, whose objective is to review past and ongoing national and international cooperation activities, focusing on those promoting aquaculture in a food security and nutrition context.

The following sections summarize the key findings of the responses provided by the 11 country partners and of the analyses of selected international and regional aquaculture development organizations' programmes to support aquaculture development, and then provides a set of recommendations for consideration by AFSPAN project partners. While the findings of partner countries and development organizations are reported separately, some are applicable to both since in most cases they jointly participate in aquaculture development initiatives. The same applies to the set of recommendations

## Findings

### Partner countries

**General.** There are significant differences among the 11 partner countries in terms of aquaculture's contributions to protein intake, national economic growth, species cultured, farming systems adopted and employment generated. The nature of regional and international cooperation activities also varied among the countries and depended on addressing common issues that would be of mutual benefit.

**Project profile.** A review of the profile of the aquaculture projects implemented by the partner countries shows that, while the primary objective of most projects is to reduce poverty and improve the livelihoods of fish farmers, the means to achieve it is diverse. The project support range includes, among others: technical research, gender empowerment, small-scale aquaculture development, climate change adaptation and mitigation measures, and policy, strategy and plan formulation. Further, in many cases, both funded from national and international sources, aquaculture is only a component of a fisheries or a rural development or an integrated water management project.

**Data.** Separate data on key nutritional and socio-economic parameters to establish aquaculture's contributions to food security, nutrition, employment and poverty alleviation are generally not available. In some cases, data on fisheries, i.e. including capture fisheries, as a whole is reported. However, in such cases, aquaculture's relative position could be gauged given that its share in total fisheries production has increased substantially in recent

years, reaching almost half globally. In some cases, aquaculture's contributions to food security, nutrition, employment and poverty alleviation are reported at project level. However, even then there are questions on the methodologies and robustness of such analyses and consequently the impact being attributable solely to the project. While aquaculture's contribution to GDP is small, its importance to the national economy in terms of poverty alleviation and nutritional benefits is significant, particularly in developing countries.

**Guiding documents.** It is encouraging that the majority of the participating countries generally have fisheries, including aquaculture, policies, strategies and plans. The documents emphasize the importance of ensuring food security, reducing poverty and increasing income through fisheries and aquaculture development programmes. Most of the documents were prepared during the past decade, reflecting the influence of major regional and international commitments and agreements, such as the UN Millennium Development Goals, MDGs, 2000, and Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000. Again, most participating countries include support to capture fisheries and aquaculture in their overall national development plans.

However, the current knowledge and understanding of aquaculture's contribution is still inadequate. Consequently, fisheries, including aquaculture, are often virtually absent in all global reports on food and food insecurity (e.g. FAO State of Food and Agriculture and the FAO food insecurity reports) and in aquaculture policy (e.g. the FAO Code of Conduct for Responsible Fisheries, CCRF). However, recently, the role of aquaculture in improving nutrition was reflected in FAO's 2014 State of World Fisheries and Aquaculture report, and a paper on the role of sustainable fisheries and aquaculture for food security and nutrition was presented at the 2014 Second International Conference on Nutrition.

**Impact of cooperation.** Regional and international development commitments and agreements influence partner countries in development of their policies, rules and regulations in relation to fisheries and aquaculture (examples are: UN Millennium Development Goals, MDGs, 2000; Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000). Regional and international development commitments and agreements generally stress on sustainable development, focusing on food security and poverty alleviation.

### International and regional development organizations

**Commitment.** All organizations are committed to sustainable development of aquaculture and recognize the importance of aquaculture's contribution to meet the growing demand for fish, alleviate poverty, and promote food security and nutrition. The organizations' commitment is reflected in their breadth and variety of investment and non-investment support, mostly to developing countries.

**Partnerships.** For all organizations, partnerships are a cornerstone of their work on sustainable aquaculture development. The organizations recognize that the magnitude and diversity of the aquaculture sector challenges call for a concerted, long-term global partnerships effort to effectively and efficiently channel their technical and financial resources to support prioritized global, regional and national initiatives. The importance of forging partnerships with all stakeholders is embedded in their development strategy and plan. For example, in FAO's revised Strategic Framework, facilitating "partnerships for food and nutrition security, agriculture and rural development between governments, development partners, civil society and the private sector" is one of the seven core functions.

Partnerships have led to establishing important milestones in the development of the aquaculture sector, for example the FAO-led 2010 *Global Conference on Aquaculture* in Phuket, Thailand, and the Global Partnership for Oceans (GPO), championed by the World Bank. Partnerships have also been instrumental in establishing Networks of Aquaculture Centers in various regions. These Networks serve as mechanisms through which governments, international and regional development organizations and other stakeholders work together towards the development of the sector. Further, many governments have benefitted from FAO's South-South and Technical Cooperation (SSTC) initiative, which is widely acknowledged as a complementary model of development

cooperation to the traditional North-South model, in addressing development challenges and achieving food and nutrition security, poverty reduction and sustainable management of natural resources.

## Recommendations

While the consolidated results, findings and recommendations of the AFSPAN project will provide a comprehensive framework for the aquaculture sector to promote food security and nutrition and poverty alleviation, the recommendations of this part of the AFSPAN project are mostly based on the reviews of national and international development organizations' aquaculture development initiatives. This section, in particular, take into account the recommendations of the seventh session of the Committee on Fisheries, Sub-Committee on Aquaculture in 2013, the recommendations presented in the 2014 fisheries and aquaculture report of the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, and the 2014 Rome Declaration on Nutrition and Framework for Action adopted at the Second International Conference on Nutrition.

**Provide greater exposure to fisheries' and aquaculture's role.** Governments and international development organizations should ensure that fisheries, including aquaculture, have a central position in inter-sectoral national food security and nutrition policies, strategies and programmes. National food security and nutritional programmes should recognize and build on the potential of fish for reduction of malnutrition and micronutrient deficiency. The important role of fish in improving the nutritional status of individuals, in particular those at risk of malnutrition such as children and pregnant women, should be underscored in nutritional programmes and promoted in international debates on food security and nutrition.

**Promote good aquaculture governance.** Good aquaculture governance must reconcile ecological and human well-being to ensure its sustainability (Hishamunda et.al., 2014). Governance broadly encompasses institutions, policies, legislations and processes. Among regulations affecting social well-being are minimum wages, prohibition of child labour, and conditions of work, factors that have an effect on food security and nutrition aspects. Governments should assess policies, interventions and investments that have direct and indirect links to fisheries and fishing communities to ensure positive impacts on the right to food of the affected communities.

**Address climate change impacts.** Governments need to mainstream climate change adaptation strategies relevant to fish and food security and nutrition into all fisheries and aquaculture policies, strategies and programmes. The fisheries and aquaculture sector should also interact with climate and weather research and prediction agencies and participate in specific studies.

**Promote safe genetic and other technical improvements in aquaculture.** While trade and commercial interests are generally major drivers of genetic improvement programmes, governments, international development organizations, research institutions and the private sector should consider food security and nutrition as a key factor. The successful example of the genetically improved farmed tilapia (GIFT) programme shows that a food and nutrition security approach to breeding programme can generate substantial growth in aquaculture development and benefit small-scale fish farmers. Other technical area relates to carrying out further research on the vitamin-rich small fish *mola* (*Amblypharyngodon mola*), which has shown encouraging results in Bangladesh.

**Improve quality and availability of feeds and alternative sources of feed.** Governments, international development organizations, research institutes and the private sector need to join hands to further reduce the use of fishmeal in fish feeds as much of the small pelagic fish used to produce fishmeal is edible and can contribute to food security and nutrition in developing countries. Further, low trophic level fish (herbivores and omnivores) need to be promoted.

**Promote gender equality.** Gender is a key determinant of the many different ways by which aquaculture affect food security and nutrition outcomes. While a large number of women work in the aquaculture sector, their

contributions are mostly unrecognized, unrecorded and undervalued, largely due to a major knowledge gap on gender and lack of routine collection of gender-disaggregated data. Governments need to address the shortcomings and mainstream gender in aquaculture. FAO should take the lead in preparing policy guidelines on gender equality, for example through technical guidelines on gender in aquaculture with in the Code of Conduct on responsible Fisheries.

**Encourage public-private partnerships.** Governments, with the support of regional and international development organizations, could engage local, regional and international aquaculture sector entrepreneurs to support Corporate Social Responsibility programmes focusing on food security and nutrition objectives to support small-scale fish farmers.

**Promote international, regional and local trade.** Governments, supported by international development organizations, should ensure that policies and mechanisms related to international, regional and local fish trade take into consideration food and nutrition aspects, particularly those that protect the large number of small-scale, informal producers and traders (mainly women), who are usually marginalized by the globalization of fish trade oriented to a small number of globally traded species.

**Focus on emerging regions.** International and regional development organizations, along with governments, should provide more resources to support emerging aquaculture development regions. Particular attention needs to be given to Africa, where many countries have reported significant growth rates. The aquaculture sector offers great potential to generate wealth and contribute to food security and poverty alleviation.

**Focus on new initiatives.** Recognizing the potential of aquaculture to meet the future demands for fish, the global community has been designing and developing new initiatives, such as the FAO-led Global Aquaculture Advancement Partnership (GAAP) and the World Bank championed Global Partnership for Oceans (GPO). Governments, International and regional development organizations, civil societies and the private sector need to ensure that such initiatives take into account food security and nutrition aspects based on the recent knowledge, including that provided by the AFSPAN project.

## Introduction

### Background

Hunger and malnutrition remain among the most devastating development problems facing the world today. Both are inextricably linked with poverty. According to FAO's most recent estimates, 842 million people—12 percent of the global population, or roughly one in eight—suffered from chronic hunger in 2011-13 (FAO, IFAD and WFP, 2013; WFP, 2014). Sub-Saharan Africa has the highest prevalence of undernourishment, with one in four people (24.8 per cent) estimated to be hungry. The vast majority of hungry people (98 percent) live in developing countries. Three-quarters of all hungry people live in rural areas, mainly in the villages of Asia and Africa, and are overwhelmingly dependent on agriculture for their food.

Ensuring adequate food and nutritional security for all is a formidable development challenge that governments and international development communities need to address, given a global population that is projected to rise from 7 to 9 billion in 2050, much of it in developing countries prone to hunger. According to FAO estimates, to feed the world in 2050, agricultural output, originating from crops, livestock and fisheries, including aquaculture, must increase by 60 percent. Finding opportunities to increase food security and alleviate poverty through agriculture is vital and timely. It is widely acknowledged that aquaculture also has an important and increasing role to play in addressing food insecurity and malnutrition by enhancing the supply and consumption of fish and other marine and freshwater products, which are commonly rich sources of protein, essential fatty acids, vitamins and minerals, by generating higher incomes and employment opportunities and by enhancing trade, thereby reducing poverty and promoting social and economic development.

There has been an impressive growth of global fish supply from aquaculture. In the past three decades (1982-2012), world farmed fish production has expanded by almost 12 times, registering an average annual growth of 8.6 percent, making it the fastest growing food production sector. Global aquaculture production achieved an all-time high in 2012 at 67 million tonnes (excluding aquatic plants and non-food products), with an estimated total value of USD 138 billion. Aquaculture accounted for 42 percent of the world's total fish production in 2012 (158 million tonnes), up from 26 percent in 2000. According to projections of future supply of fish, aquaculture production is expected to reach about 85 million tonnes in 2022, with an overall growth of 35 percent during the 2013-2022 period (OECD and FAO, 2013). Aquaculture derived products are estimated to contribute about 55 percent of total fish destined for human consumption. Recent projections by the World Bank (*Fish to 2030*, 2013) indicate that, by 2030, aquaculture production will equal global capture production. However, by 2030, aquaculture is projected to supply over 60 percent of fish destined for direct human consumption (about 49 percent in 2012).

Geographically, the growth patterns in aquaculture are not uniform. Aquaculture production is concentrated in Asia and will continue to do so (World Bank, 2013). China alone accounted for 63 percent of world aquaculture production in 2008, but it is projected to slightly decline to 57 percent in 2030. India is estimated to register the largest expansion (121 percent during 2010-2030). All regions are expected to expand their aquaculture production during the 2010-2030 period: Latin America and Caribbean (120 percent); Southeast Asia (107 percent); South Asia (excluding India, 91 percent); and Middle East and North Africa (76 percent). Sub-Saharan Africa will also show substantial growth, but compared to other regions it will start from much lower production levels. A recent study on *The value of African fisheries* reported that aquaculture is still developing in Africa and is mostly concentrated in a few countries but it already produces an estimated value of almost USD 3 billion per, or about 12.5 percent of the value added by the fisheries sector as a whole in 2011 (De Graaf and Garibaldi, 2014). Further, according to FAO, in 2012, ten of the fastest growing aquaculture sectors were in Africa (Egypt, Uganda, Kenya, Zambia, Ghana, Madagascar, Tunisia, Malawi and South Africa; AUC and NEPAD, 2014).

Aquaculture's increased contribution to food security in the regions, especially in many African and Asian countries, where majority of the small-farms are located, will require governments to more actively support growth of the sector through adoption of various measures, such as stimulating private sector investment, ensuring a suitable regulatory framework, encouraging more research, and promoting small-holders (Subasinghe,

2014). Recognizing Africa's diverse fish resources' potential and opportunities for contributing significantly to its socio-economic growth, improving food and nutritional security and enhancing livelihoods, the African Union Commission (AUC) recently developed the *Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa* (AUC and NEPAD, 2014). The Policy will address a key challenge of ensuring policy coherence and coordination in the management of the fisheries and aquaculture resources in the African Union countries.

Despite the widely accepted importance of aquaculture's contribution to human development, and the recent initiatives in developing aquaculture policies and strategies, it is recognized that the current knowledge and understanding of aquaculture's contribution is still inadequate and that better tools and more systematic and quantitative assessments are needed. Better understanding of aquaculture's contributions is expected to assist low-income food-deficit countries and development partners to develop and implement sustainable policies, strategies and plans for improving the livelihoods of millions of poor people.

## AFSPAN project

The objective of the AFSPAN project "is to better understand the current status of the contribution of aquaculture to food and nutrition security and poverty alleviation. In particular, the project will: (a) review the current knowledge on the contribution of aquaculture to food and nutrition security and poverty alleviation; (b) develop methodologies for better assessment of this contribution; (c) disseminate widely among countries, governments and civil society, the knowledge gained; and (d) elaborate strategies for improving the contribution of aquaculture to food security, nutrition and poverty alleviation".<sup>1</sup>

AFSPAN is a three-year project funded by the European Commission's 7<sup>th</sup> Framework Programme. The project commenced in January 2012 and will be completed by December 2014. The project is being implemented by 20 partners, including 11 from selected Low-Income Food-Deficit Countries (LIFDC), 3 European Union partners, and 3 international organisations. Project partner countries represent countries where aquaculture has made a major contribution to the national economy and involves large numbers of small-scale aquaculture farmers. FAO is responsible for, among others, overall coordination and management of the project.

## Work Package 3

The AFSPAN project is being implemented through a set of nine work packages (WP), which will contribute to the development of an integrated analytical framework for quantifying the contribution of aquaculture in a broad development context. This is the final report for WP 3 (*Review and assessment of national and international cooperation*) of the project. The objective of WP 3 is to review past and ongoing national and international cooperation activities, focusing on those promoting aquaculture in a food security context. The review will cover FAO projects, WorldFish Center projects, and projects supported/financed by other donors and development partners and/or implemented by national governments. The review will provide knowledge to the project and assist partners to refine their approach to cooperation.

## Structure of the report

This report consists of three Parts. Part 1 provides a synthesis of country partners' information on aquaculture development projects and cooperation activities, with a focus on poverty alleviation, food security and nutrition. Part 2 analyses international development organizations' (FAO, WF, WB, IFAD, ADB and EC) past and ongoing aquaculture development programmes and initiatives to combat poverty alleviation, food security and nutrition. Part 3 presents the key findings and provides a set of recommendations for consideration by AFSPAN project partners. Readers, who are interested in more details, are advised to review the supporting documents that are annexed to this report.<sup>2</sup>

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<sup>1</sup> [http://www.afspan.eu/modules/cms/start.php?start\\_id=1](http://www.afspan.eu/modules/cms/start.php?start_id=1)

<sup>2</sup> Supporting documents for Part 1 include: (1) Annex 1: AFSPAN Work Package 3. Preliminary report on desk study on Regional/International cooperation activities. Deliverable 3.1. 2012. European Commission's 7<sup>th</sup> Framework Programme . Rome. FAO. Referred to as FAO.2012 (a) in this report. Also available at

## Part 1: Country partners' aquaculture development review

This section presents a synthesis of the preliminary desk study report and the detailed responses to a follow-up questionnaire by the 11 participating countries with a focus on: trends in aquaculture production, aquaculture's contributions to human nutrition, national economic growth, employment creation, including involvement of women and poor farmers; and importance of aquaculture in national and sectoral development policies, strategies, plans and projects in the context of food security, nutrition and poverty alleviation. The synthesis lacks information on the historical total aquaculture programme and project costs as many participating countries could not readily provide it due to lack of a separate data base for aquaculture. In many cases, aquaculture is only a component of fisheries or a rural development or an integrated water management project. Unless otherwise stated, data for all tables in Part 1 were provided by the country partners.

### Production

Consistent with trends in global aquaculture production over the last two decades (1990–2012), the country partners' aquaculture production registered significant increases, particularly during the last decade. On the other hand, capture fishery production has recorded marginal increases, a pattern similar to global production. In 2012, the 11 countries together accounted for 68 percent of global aquaculture (food fish) production, with China alone contributing 62 percent (Appendix 1 and Tables 1 and 2 below).

Table 1 **Aquaculture production: quantity and value in 11 partner countries**

Quantity (tonnes) and Value (USD)	1990	2000	2012
Aquaculture production			
food fish quantity	6 461 118	26 029 017	45 599 427
aquatic plant quantity	561 180	1 839 240	3 524 401
Total aquaculture quantity	7 352 788	28 760 707	52 235 828
food fish value	429 476 000	2 238 491 425	8 764 903 280
aquatic plant value	n/a	53 800 905	231 714 768
Total aquaculture value	1 273 176 034	20 482 563 624	113 176 617 848
Capture fisheries production			
Total capture quantity	15 532 646	26 687 828	30 737 047
Total capture value	2 792 928 749	21 271 945 452	42 166 709 280
<b>Total quantity</b>	<b>26 721 434</b>	<b>61 104 535</b>	<b>82 972 875</b>
<b>Total value</b>	<b>4 075 304 783</b>	<b>41 878 629 076</b>	<b>155 478 727 128</b>

Notes: Rounded to the nearest whole number. Blank means data are not available, not applicable, or production volume and value are negligible. Philippines: average Peso-USD exchange rate. India: Annual data: 1990-91; 2000-01; and 2012-13. Nicaragua: Values correspond to exports.

<http://www.afspan.eu/modules/news/article.php> . (2) Annex 2: AFSPAN Work Package 3. Detailed responses to a questionnaire by country partners. 2014. European Commission's 7<sup>th</sup> Framework Programme . Rome. FAO. Supporting document for Part 2 includes: AFSPAN Work Package 3. Annex 3: International organizations' (FAO, ADB and EC) aquaculture development operations. 2014. European Commission's 7<sup>th</sup> Framework Programme . Rome. FAO.

**Table 2. Global production: quantity and value**

Quantity (tonnes) and Value (USD)	1990	2000	2012
Aquaculture production			
food fish quantity	13 074 780	32 418 582	66 655 656
aquatic plant quantity	3 765 325	9 306 042	23 776 449
Total aquaculture quantity	16 840 105	41 724 624	90 432 105
food fish value	24 877 260 000	48 165 226 000	137 953 905 000
aquatic plant value	1 800 420 000	2 914 338 000	6 369 639 000
Total aquaculture value	26 677 680 000	51 079 564 000	144 323 544 000
Capture fisheries production			
Total capture quantity	85 494 040	94 506 483	92 420 695
Total capture value	n/a	n/a	n/a
<b>Total quantity</b>	102 334 145	136 231 107	158 000 000
<b>Total value</b>	n/a	n/a	n/a

Notes: Data provided by FAO global fisheries and aquaculture statistics

## Nutrition

Except for one country (Bangladesh), separate data on aquaculture's contribution to annual per capita fish consumption could not be provided by the country partners. Overall, per capita fish (aquaculture and capture) consumption shows an increasing trend, similar to fisheries production. However, per capita fish consumption in most of the participating countries is significantly lower than world per capita apparent fish consumption. The overall lower per capita consumption of fish in the participating countries is likely due to exclusion of other major capture fisheries and farmed food fish producing countries. Only three partner countries---Bangladesh, China and Vietnam, all included in the world's top 15 producers list, with China topping the list--- have per capita fish consumption closer to world per capita apparent fish consumption of 19.2 kg per year in 2012 ( Table 3).

**Table 3. Per capita fish (aquaculture and capture) consumption (Kg/year)**

Country/Year	1990			2000			2012		
	Aqua	Cap	Total	Aqua	Cap	Total	Aqua	Cap	Total
Bangladesh			8.0	4.8	7.2	12.0	11.0	7.9	18.9
Brazil			5.6			6.6			9.5
Chile			4.6			6.0			6.9
China			7.7 (urban) 2.1 (rural)			11.7 (urban) 3.9 (rural)			14.6 (urban) 5.4 (rural)
India						4.9 (2004-5)			6.1 (2009-10)
Kenya			6.8			4.9			3.0
Nicaragua									
Philippines			36.1 (1993)			37.9 (2003)			
Uganda			10.0			7.0			12.0
Vietnam			15.4			16.6			21.8 (2000)
Zambia			8.9			7.2			6.8
Global									19.2

Notes: 1. Blank areas denote data is not available. 2. Global data is based on FAO, 2014 (a). The State of World Fisheries and Aquaculture: opportunities and challenges. FAO, Rome.

Data on contribution of aquaculture and capture fisheries to animal protein intake is not available for more than half of the participating countries. However, except for Bangladesh, separate data on aquaculture's contribution to animal protein intake is not available even for those countries that have reported total fisheries data. Contribution of aquaculture and capture fisheries to animal protein intake in three countries---Bangladesh, which has provided

separate data for both aquaculture and capture fisheries, Uganda and Zambia---is significantly higher than global population's animal protein intake (Table 4).

**Table 4. Contribution (%) of aquaculture and capture fisheries to animal protein intake**

Country/Year	1990			2000			2012		
	Aqua	Cap	Total	Aqua	Cap	Total	Aqua	Cap	Total
Bangladesh			79.0	25.0	38.0	63.0	34.9	25.1	60.0
Brazil			13.2			9.8			10.2
Chile			14.8			11.1			11.5
China									
India									
Kenya									
Nicaragua						5.7 (2004)			
Philippines									
Uganda			29.7			40.0-50.0			40.0-50.0
Vietnam									
Zambia									40
Global									16.7 (2010)

## Economy

Of the 11 participating countries, two countries (China and Chile) reported aquaculture's and capture fisheries' contribution to GDP separately. The participating countries' fisheries' contribution to GDP ranged from 0.5 percent to 4.9 percent in 2012. China's contribution to GDP was 16.2 percent in 2012, which registered a significant increase compared with 2000 (Table 5).

**Table 5. Contribution (%) of aquaculture and capture fisheries to GDP and agriculture sector's GDP (in brackets)**

Country/Year	1990			2000			2012		
	Aqua	Cap	Total	Aqua	Cap	Total	Aqua	Cap	Total
Bangladesh			4.9 (28.2)			5.9 (24.6)			4.4 (22.8)
Brazil									
Chile			1.5	0.5	0.8	1.3	0.2	0.4	0.6
China				1.9	1.9	3.8	12.3	3.9	16.2
India			0.9 (3.0)			1.1 (4.6)			0.8 (4.8)
Kenya			0.4			0.5			0.5
Nicaragua						4.0 (14.6)			
Philippines			4.3 (17.4)			3.7 (18.8)			2.1 (18.6)
Uganda			2.3			2.2			2.2
Vietnam			3.0			4.0			4.2
Zambia						1.24			4.9

*Note: Figures in brackets denote fisheries' contribution to agriculture GDP.*

## Employment

Complete data on people directly and indirectly employed in the capture fisheries and aquaculture sector is not available in the participating countries. The issues associated with collecting data on fisheries employment are well recognized, namely overlapping of employment between related activities, for example a person involved in farming could also be engaged in processing and marketing activities, or in other agricultural activities.

Limited data for the three reporting years showed significant variances among the countries. In 2012, 52.8 million people were employed in capture fisheries and aquaculture sector in the participating countries. The total number of people employed in the participating countries ranged from 32 000 in Nicaragua to 20.7 million in China. In the aquaculture sector, in 2012, only 1 295 people were employed in Chile compared with 14 million people in Bangladesh. Reported data also confirm involvement of a significant number of women in farming and other related activities.

**Table 6. People employed in capture fisheries and aquaculture**

Country/Year	1990			2000			2012		
	Aqua	Cap	Total	Aqua	Cap	Total	Aqua	Cap	Total
Bangladesh					1 280 000		14 697 000	1 316 000	16 013 000 (21 960 000)
Brazil									
Chile						118 352	1 295	89 680	90 975
China			13 610 000			19 420 000			20 740 000
India									14 400 000
Kenya			(29 %)	5 860	48 850	54 710 (24 %)	54 731	62 528	117 265 (26 %)
Nicaragua			4 700 (441 500)			41 800 (711 800)			32 036 (1 134 831)
Philippines	74 540	732 390	806 930 (6 589 180)	226 195	1 388 175	1 614 370			
Uganda				12 000	700 000	712 000	26 000	300 000	326 000
Vietnam			(530 000)			988 900 (24 481 000)			(24 488 200)
Zambia							5 200		55 000 ( 3 000 000)

*Note: Figures in brackets denote total number of people employed in agriculture sector. Agriculture generally includes agriculture (crops), livestock and fisheries, and in some cases also forestry. Only directly employed people were counted, so associate employment will be higher than the reported values.*

### Definition of poor and poor fish farmers

All participating countries have an official definition of “poor” people, which is largely based on people who are unable to meet basic human needs, as defined by the countries. There is no official definition of “poor fish farmers”. Hence, there is no statistics on numbers as well. According to some participating countries, like “poor fishers”, “poor fish farmers” are loosely defined as those who “lack the skills to treat aquaculture as a business, net fish for own household consumption and/or sell small surpluses on farm to neighbours and/or small vendors”. They include “farmers with low investment, limited input and technology and mainly practice subsistence aquaculture”. Poor fish farmers are often associated with small-scale farmers (Table 7). Globally, between 70 and 80 percent aquaculture ventures are estimated to be small-scale.

**Table 7. Poor and poor fish farmers**

Country	Definition and number
Bangladesh	Officially defines “extreme poor” based on income, ownership of land, access to health facilities and other factors. No official definition of poor fish farmers. Also, no statistics on poor fish farmers.
Brazil	Officially defines “extremely poor”, “poor” and “vulnerable” people based on per capita income. No official definition of poor fish farmers. Also, no statistics on poor fish farmers.
Chile	Officially defines “poverty line” based on the cost of basic food basket per person. No official definition of poor fish farmers. Also, no statistics on poor fish farmers. On the other hand, Salmon culture involves large scale operations.
China	Officially defines “poor farmer” based on annual income. No official definition of poor fish farmers. Also, no statistics on poor fish farmers.
India	Officially defines “poor” based on poverty line. No official definition of poor fish farmers. Also, no statistics on poor fish farmers. Generally, employees associated with aquaculture in processing and feeding activities and receiving daily wages are considered as poor.
Kenya	Officially defines “poverty” as inability to access the basic needs of life. No official definition of poor fish farmers. Also, no statistics on poor fish farmers.
Nicaragua	Officially defines “poverty” based on annual per capita consumption (basic food and essential nonfoods and services). No official definition of poor fish farmers. Also, no statistics on poor fish farmers. However, poor fish farmers are related to small cooperatives with incomes below the monthly minimum wage in the primary sector.
Philippines	Officially defines “poor” based on per capita income/expenditure less than the per capita poverty threshold (minimum income/expenditure required to meet the basic food and non-food requirements). No official definition of poor fish farmers. Also, no statistics on poor fish farmers.
Uganda	Officially defines “poor” as those who live on less than a USD 1 a day. No official definition of poor fish farmers. Also, no statistics on poor fish farmers. However, poor fish farmer is loosely defined to include farmers with low investment, limited input and technology and mainly practice subsistence aquaculture.
Vietnam	Officially defines “poverty” as a condition that some parts of the population do not enjoy and satisfy the basic needs. Poor households (rural and urban) are determined on the basis of an average income per person per month. No official definition of poor fish farmers. Also, no statistics on poor fish farmers.
Zambia	Officially recommends measuring poverty using a holistic approach: poor are those who live on USD 1 a day and lack human basic needs, including food, clothing and shelter. Rural poor were estimated at 6.4 million (49.6% of population). No official definition of poor fish farmers. Also, no statistics on poor fish farmers. However, small-scale/poor fish farmers lack the skills to treat aquaculture as a business. They net fish for own household consumption and/or sell small surpluses on farm to neighbours and/or small vendors.

## Policies, strategies and plans

With the exception of Brazil, all participating countries generally have national fisheries, including aquaculture, policies, strategies and plans (Table 8). The documents emphasize the importance of ensuring food security, reducing poverty and increasing income through fisheries and aquaculture development programmes. Most of the documents were prepared during the past decade. Again, with the exception of Brazil, all participating countries include support to capture fisheries and aquaculture in their overall national development plans (Table 9).

**Table 8. National fisheries policy/strategy/plan**

Country	Specific references
Bangladesh	<ol style="list-style-type: none"> <li>1. National Fisheries Policy (1998): objectives include, among others: enhancement of fisheries production, poverty alleviation through creating self-employment opportunities and improvement of socio- economic conditions of the fishers, and meeting the demand for animal protein.</li> <li>2. National Fisheries Strategy (2006): has specific text on ‘pro-poor’, which recognizes the need to ‘ensure that the poor retain their traditional rights to the resources through community leasing (inland) or allocation of fishing rights (marine)’.</li> <li>3. Wetland and Waterbody Management Policy (2014) : waterbody leasing principles stand on three pillars : i) pro-poor use rights, ii) fair lease values, iii) secured tenure.</li> </ol>
Brazil	No defined or clear fisheries and aquaculture policy, strategy and plan.
Chile	<ol style="list-style-type: none"> <li>1. Policy Development for Artisanal Fisheries (1995)</li> <li>2. Policy Development for Artisan Fishing (2001)</li> <li>3. Proposed National Fishery Policy (2007)</li> <li>4. National Aquaculture Policy (2003): aims to promote the highest possible growth within a framework of environmental sustainability and equitable access.</li> </ol> <p>*. While there have been several policy-related initiatives, the first three have yet to be implemented. There is no specific reference in the national aquaculture policy to assist poor fish farmers, provide food security and reduce poverty as such farmers do not exist in the sector.</p>
China	<ol style="list-style-type: none"> <li>1. Twelfth Five Year Plan of Fisheries: aims to increase fish farmers’ income by adopting aquaculture practices and technologies that are environmental friendly. Aquaculture has become an alternative for reducing poverty and increasing income of local people. For example, in the Western Region of China, fish culture was introduced to rice farmers to generate extra income (10<sup>th</sup> Five Year Plan of Fisheries).</li> </ol>
India	<ol style="list-style-type: none"> <li>1. XII Five Year Plan (2012-17) :touches upon the incremental growth of fish production through aquaculture sector for ensuring food security and reducing poverty; encourages ancillary industries associated with aquaculture sector such as marketing, pre processing, processing and other value added services.</li> </ol>
Kenya	<ol style="list-style-type: none"> <li>1. National Oceans and Fisheries Policy (2008) and Ministry of Fisheries Development Strategic Plan 2008- 2013, which are both currently being reviewed to be in line with Kenya’s Constitution (2010).</li> <li>2. The Fisheries Management and Development Bill (2014): awaiting Parliament approval.</li> </ol>
Nicaragua	<ol style="list-style-type: none"> <li>1. National Plan for Sustainable Development of Small Scale Aquaculture (2009): the objective is to strengthen small-scale aquaculture and ensure food security of vulnerable families.</li> </ol>
Philippines	<ol style="list-style-type: none"> <li>1. Philippine Fisheries Code (1998) and Agriculture and Fisheries Modernization Act (1997): laws specifically support fish farmers and the country’s poor fishery sector; laws focus on poverty alleviation, provision of social equity, food security, rational use of aquatic resources, people empowerment and sustainable development.</li> <li>2. Comprehensive National Fisheries Industry Development: provides strategic directions for 20 years (2006-2025)</li> </ol>
Uganda	<ol style="list-style-type: none"> <li>1. National Fisheries Policy, 2004.</li> <li>2. Draft National Policy on Fisheries Management and Development of small Fishes.</li> <li>3. National Investment Policy for Aquaculture Parks, 2013. There are no specific provisions in the policy to cater to poor farmers.</li> </ol>
Vietnam	<ol style="list-style-type: none"> <li>1. Program for aquaculture development (1999 – 2010).</li> <li>2. Aquaculture development strategy (2010- 2020).</li> <li>3. Master plan of fisheries development to 2020 with a vision to 2030. Effective in 2013.</li> <li>4. Fisheries Sector Restructuring Proposal. Effective in 2013.</li> </ol>
Zambia	<ol style="list-style-type: none"> <li>1. National Agricultural Policy (2004-2015): includes fisheries sector; overall objective is to increase fish production and promote sustainable utilization of fisheries resources (generate income and employment).</li> <li>2. National Aquaculture Strategy (2006).</li> <li>3. National Aquaculture Development Plan (2008-2013): participation of women in aquaculture can contribute to family income, ensure constant supply of needed family nutrition, generate opportunity for self employment; uplift the overall socio-economic conditions and become more skilled.</li> <li>4. Draft National Fisheries and Aquaculture Policy (2013, yet to be approved): pave way for food and nutrition security, employment and wealth creation; measures to recognize roles of women, youth and vulnerable groups (poor fish farmers).</li> </ol>

**Table 9. National development policy/strategy/plan**

Country	Specific references to support fish farmers
Bangladesh	1. Poverty Reduction Strategy Paper (PRSP), 2005: “The overall strategy of fishery sector development will envisage intensification of aquaculture by species and ecosystems, addition of export oriented species, ensuring bio-diversity and preserving natural breeding grounds, product diversification and value addition, and development of appropriate marketing infrastructure.” 2. Vision 2021: Towards a Better Future: The fisheries sector’s objectives include, among others: supporting poor and women in shrimp and fish culture, bringing all homestead ponds under fish culture, and creating employment opportunities for poor and extreme poor.
Brazil	There is no such references
Chile	The only current policy in Chile to support fish farmers in the country is the National Aquaculture Policy (Table 8).
China	Specified in National Five Year Plans (Table 8).
India	Specified in National Five Year Plans (Table 8).
Kenya	1. Medium Term Plan II 2013-2017 (Vision 2030): support to fish farmers is embedded in the Plan, whose theme is “Transforming Kenya: pathway to devolution, socio-economic development, equity and national unity” under the Economic Pillar; the Vision of the Ministry of Agriculture, Livestock and Fisheries is an “ <i>Innovative, Commercially Oriented and Modern Farming Livestock and Fisheries Sector</i> ”
Nicaragua	1. National Human Development Plan (NHDP, 2011): defines policy guidelines for generating wealth, reducing poverty, and fighting hunger, malnutrition and poverty, with attention to small and medium producers. The NHDP’s Strategy for overcoming poverty is oriented toward ensuring food and nutrition security through development of, among others, fisheries and aquaculture.
Philippines	1. The Philippine Development Plan (2011-2016): an overall goal of achieving high growth that is sustained, generates mass employment, and reduces poverty. Chapter 4 of the document (Competitive and Sustainable Agriculture and Fisheries Sector; pages 113-119) specifically describes the Strategy Framework of the country’s agriculture and fisheries sector. It is expected that within six years, through prudent use of resources, the agriculture and fisheries sector shall have attained the following: (a) improved food security and increased rural incomes; (b) increased sector resilience to climate change risks; and (c) enhanced policy environment and governance.
Uganda	1. The Uganda National Development Plan (NDP, 2010/11-2014/2015): makes specific reference to support fish farmers. The NDP indicates intervening strategies to improve agriculture sector policy formulation, and regulatory and institutional framework to facilitate agricultural development for which fisheries is part and parcel.
Vietnam	As in Table 8
Zambia	1. Fifth National Development Plan (FNDP). The objective of FNDP with regards to fisheries and aquaculture is to increase fish production and promote sustainable utilization of fisheries resources, thereby contributing to the economy through the generation of employment, income and improved availability of fish. 2. Sixth National Development Plan (SNDP, 2011-2015). The SNDP emphasizes on development of capture fisheries aquaculture through investment promotion and research.

## Commitments and agreements

Regional and international development commitments and agreements influence participating countries in development of their policies, rules and regulations in relation to fisheries and aquaculture. Some examples are: UN Millennium Development Goals, MDGs, 2000; Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000; Central American Regulatory Harmonization, Code of Ethics for Responsible Fisheries and Aquaculture, 2011; ASEAN-SEAFDEC Resolution and Plan of Action on Aquaculture, 2001; and Codex Alimentarius Commission (CAC) standards on food safety (Table 10). Regional and international development commitments and agreements generally stress on sustainable development, focusing on food security and poverty alleviation.

**Table 10. Regional and international development commitments and agreements**

Country	Impact on capture fisheries and aquaculture
Bangladesh	UN Millennium Development Goals (MDGs, 2000): fisheries sector has been identified as an important sector for poverty alleviation, employment generation and pro-poor economic development (Bangladesh Poverty Reduction Strategy Paper, PRSP).
Brazil <sup>3</sup>	
Chile	Regional and international development commitments (example, <i>Asia-Pacific Economic Cooperation, APEC</i> , and FAO) influence development of plans and policies in relation to fisheries and aquaculture. However, there is no explicit evidence of their level of influence.
China	Using international experiences, Code of conduct on environment friendly aquaculture practices was published by the Chinese government. Farms were encouraged to be registered and evaluated as environmental friendly, leading to higher prices of products in the market.
India	The government in general takes into consideration the development goals set in international meetings, while drawing up plans, which mainly focus on livelihoods and food security.
Kenya	UN Millennium Development Goals (MDGs, 2000): as part of the government's programme to achieve the MDGs, Millennium Villages were established in two counties to assist poor farmers, including fish farmers, who benefitted from provision of inputs and capacity building.
Nicaragua	<ol style="list-style-type: none"> <li>1. Regional Program for the Support of Fisheries Development in Central America, PRADEPESCA (1990-96): develop a regional framework for sustainable development of the sector. Central American countries represented by the Latin American Organization for Fisheries Development, OLDEPESCA. An important output: aquaculture development in the Estero Real river.</li> <li>2. FAO (2009): Ecosystem Approach to Fisheries (EAF) and Ecosystem Approach to Aquaculture (EAA). Development of guidelines focusing on the Estero Real river. Contribute to Objective C of FAO's Strategic Framework (2000-15).</li> <li>3. Regional Fisheries and Aquaculture Unit, 1999 (Central American Integration System, SICA/ Organization of the Fisheries and Aquaculture Sector of the Central American Isthmus, OSPESCA)</li> <li>4. OSPESCA (2005): Integration Policy for Fisheries and Aquaculture in the Central American Isthmus</li> <li>5. Central American Regulatory Harmonization, Code of Ethics for Responsible Fisheries and Aquaculture (2011).</li> </ol>
Philippines	<ol style="list-style-type: none"> <li>1. Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000: key strategies of the Bangkok Declaration are being implemented in the aquaculture industry through the Aquaculture and Fisheries Management Act (1997) and the Fisheries Code (1998).</li> <li>2. FAO Code of conduct for responsible fisheries (1995) and the ASEAN-SEAFDEC Resolution and Plan of Action on Aquaculture (2001), <i>ASEAN-SEAFDEC Conference on sustainable fisheries for food security in the new millennium</i> ("Fish for the people" conference): the country's aquaculture programs, projects and activities since 2002 have been developed and implemented consistent with the principles that focus on sustainable aquaculture development as agreed upon in the resolution.</li> <li>3. UN Millennium Declaration : one of the significant impacts of MDG declaration is that the fisheries sector has been identified as a resource-based vehicle to achieve sustained social and economic development and ensure the contributions of the fisheries sector to achievement of the goals of MDG, particularly in alleviating poverty. The Government has recognized the need to channel the resources to help the most vulnerable segments of the population which includes, among others, the poor fisherfolk and fish farmers.</li> </ol>
Uganda	Most of the aquaculture development projects are aimed at poverty reduction and improvement of food security and nutrition. They are therefore aligned with MDG goal 1. All outcomes stipulated in the National Aquaculture Development Plan are aligned with MDGs, covering MDGs 1, 3, 4, 5, 6, 7 and 8.
Vietnam	1. Vietnam Fisheries Development Strategy (2010): funds were mobilized from internal (state budget and businesses) and external (ODA and FDI) sources.
Zambia	<ol style="list-style-type: none"> <li>1. Draft National Fisheries and Aquaculture Policy: one of the guiding principles in the policy is cognizance of international treaties, protocols and agreements (example MDGs).</li> <li>2. Zambia's legislative and regulatory framework: largely complies with the three main international standards for food safety and quality, plant health and animal health (example, the Food and Drugs Act is in line with the Codex Alimentarius Commission (CAC) standards on food safety</li> <li>3. NEPAD fish for all – Action Plan for Development of Fisheries and Aquaculture (2005) and FAO's Code of Conduct for Responsible Fisheries.</li> </ol>

<sup>3</sup> No information was provided.

## Profile of projects

A review of the profile of the aquaculture projects implemented by the partner countries shows that, while the primary objective of most projects is to reduce poverty and improve the livelihoods of fish farmers, the means to achieve it is diverse. The project support range includes, among others: technical research, gender empowerment, small-scale aquaculture development, climate change adaptation and mitigation measures, and policy, strategy and plan formulation. In addition to implementation of national projects, country partners are also involved in implementation of intra and inter-regional projects that address common aquaculture-related issues and provide mutual benefit. A case in point is testing the viability of integrating fish cages into small water bodies in Kenya, Ethiopia and Uganda.

## Impact of aquaculture projects

The results from a number of case studies conducted in partner countries contradict the view that aquaculture is inappropriate for landless, socially marginalized and extremely poor communities by demonstrating its relevance to improving livelihoods, food security and nutrition, provided that a diversified approach is followed and interventions are tailored to needs and capabilities of target households (Box 1). However, it also needs to be stressed that not all the impacts could be solely attributable to the project.

A DFID-funded study (DFID, 2013) carried out an in-depth assessment of the existing evidence regarding the contribution of fisheries and aquaculture in developing countries to economic growth, food security and nutrition. On the debate whether aquaculture help the poorest, the study reported that few isolated case studies indicate the possibility that income and employment created by aquaculture can benefit low-income households that participate in specific, often rural, aquaculture activities in both Asia and Africa. The study added that it seems peri-urban fish-farmers are more likely to benefit due to access to both inputs and higher value markets. For the sustainability of aquaculture, the study highlights the importance of access to urban markets for both sales of fish as well as access to key inputs such as credit, feed and seed. The study noted that there are, however, few rigorous analyses to make these findings generic.

Applying portfolio theory as a conceptual framework, Troell *et.al.* (2014) examined whether aquaculture could add resilience to the global food system considering the close interconnections between the aquaculture, crop, livestock, and fisheries sectors in the face of increased competition for scarce resources, including land, water and terrestrial crops and wild fish for feeds, and potential impacts of climate change. They conclude that “aquaculture can potentially enhance resilience through improved resource use efficiencies and increased diversification of farmed species, locales of production, and feeding strategies.” Troell *et.al.*, however, emphasize that government policies should provide adequate incentives for resource efficiency, equity, and environmental protection. As shown in the *Green Growth and Aquaculture* report, it is encouraging that many developing and developed countries are developing improved policy frameworks and governance where addressing aquaculture production externalities is central ( OECD, 2012).

## **Box 1. Case Studies**

### **Bangladesh Adivasi Fisheries Project**

The Adivasi Fisheries Project, aimed at diversifying livelihood options for poor, marginalized and disadvantaged Adivasi (ethnic) communities in the North and Northwest of Bangladesh, was implemented during 2007–9. The project was financed by the European Union and implemented by WorldFish, in collaboration with Caritas (NGO), Bangladesh, and the Bangladesh Fisheries Research Forum (BFRF). Following adaptive research aquaculture and related technologies (fish culture in ponds, rice fields and fingerling production through cages in ponds, netting, fingerling sale, foodfish sale) were introduced to a total of 3 594 resource-poor Adivasi households. Baseline and end-line surveys were applied to assess the changes in their livelihoods following intervention. Household incomes of project participants rose significantly, which was attributed to the increased share of aquaculture and related enterprises. By contrast, the contribution of aquaculture to household incomes remained virtually unchanged among non-project participants.

- Income from the various aquaculture and related activities averaged 15% of total household income, against a baseline of 3% and target of 8%.
- Foodfish production from ponds increased from 0.7 tonnes/ha in 2007 to 2.7 tonnes/ha against a target of 2.0 tonnes/ha.
- Frequency of fish consumption, with baseline of 6 meals per month and target of 12, reached about 22 times per month and studies confirmed improved nutrition

A study on sustainability in 2012 found that the majority of *Adivasis* were continuing with the activities they had adopted during the project period, and that some had even expanded their operations. Others in the community had also adopted the new aquaculture practices.

### **Philippines: Seaweed Production Development Project**

Seaweed is considered a top priority for farming in the country as it has many attributes which make it pro-poor. The Philippine Seaweed Production Development Project was initiated by FAO in 1991 through funds provided by UNDP with a counterpart contribution from the Philippine Government. The Bureau of Fisheries and Aquatic Resources, as the implementing agency, served as the government's counterpart in terms of manpower inputs and facilities. The project's main objectives were to establish farming and processing technologies for *Gracilaria* sp. and provide alternative livelihood for fishermen.

This project led to subsequent development of a country-wide Program which is now assisting the seaweed industry in many aspects such as gathering information about the seaweed industry and addressing its needs, undertaking research and development and facilitating technology transfers to seaweed farmers and processors (Ferrer, 2002; BFAR 2011). FAO's review of the social and economic dimensions of seaweed farming in the Philippines and other countries in Asia revealed that the seaweed industry has resulted in positive socio-economic impacts through improvement of livelihoods and generation of jobs in coastal communities. (Valderrama, 2012). In 2010 alone, it was reported that the country's seaweed industry employed between 100,000-120,000 people of whom 90% were seaweed farmers and the rest were seaweed processors and traders (BFAR, 2011b). Hurtado (2013) confirmed that in the Philippines, seaweed culture could offer higher returns than alternative activities. Surveyed farmers reported that income from seaweed farming had increased their annual income by USD632–1,895, helping them to meet daily needs, including children's education.

One of the significant lessons learned is the important role played by different stakeholder groups in scaling up and sustaining the program/industry. From the initial project in 1991, it now operates as the National Seaweed Culture Center and has expanded its scope to include other commercially important seaweed species and its coverage area has expanded to all other seaweed producing areas in the Philippines. To sustain the seaweed industry, there is a need to link strongly the institutional research and development (R&D) programmes to address the recent problems of diseases and further improve productivity.

**Source:** Partner country reports of Bangladesh and Philippines.

## Part 2: International aquaculture development organizations

The AFSPAN project has identified FAO, WF, WB, IFAD, EC and ADB as major aquaculture development donors for review under WP3. While the scope of the AFSPAN WP 3 calls for a review of such international aquaculture development organizations' programmes and projects and international cooperation activities, given the magnitude and diversity of such organizations' involvement globally, it would be too onerous to discuss all of them in this report. This section, therefore, provides a summary of major initiatives, focusing on contributions to poverty reduction, food security and nutrition. Another point that needs to be highlighted here is that, while efforts have been made to analyze the organizations' aquaculture development initiatives separately at global, regional and national levels, there have been overlaps in some cases due to the joint nature of such initiatives.

### FAO

As the largest autonomous agency within the UN, mandated to eradicate hunger, raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy, FAO's Fisheries and Aquaculture Department has been contributing significantly to the achievement of the mandate by supporting development of a sustainable global aquaculture sector. FAO's support has been wide-ranging: facilitating conferences and meetings on emerging global, regional and national aquaculture topics, developing and disseminating technical guidelines, providing technical advice to member countries, promoting regional networks and partnerships, and funding projects and programmes.

FAO's continued support has also influenced the international development community to widely acknowledge that aquaculture has the capacity to contribute towards achievement of several of the international-level development goals, such as the 2000 Millennium Development Goals (MDGs), especially those related to poverty reduction and food and nutrition security, environmental protection and biodiversity, the 2002 World Summit on Sustainable Development goals, the 2009 World Food Summit goals, the 2009 Copenhagen Climate Change Meeting goals, the 2014 Second International Conference on Nutrition ,and the post 2015 Sustainable Development Goals.

FAO's present support to the aquaculture sector is guided by its revised Strategic Framework for the next decade, which includes as one of its goals "eradication of hunger, food insecurity and malnutrition, progressively ensuring a world in which people at all times have sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". According to Graziano da Silva, FAO Director-General: *"The Strategic Framework defines a way of working for FAO and will require considerable changes in the way we operate: to be more focused in our priorities; to work more as a corporate team; and to have greater impact through partnerships. As such, it is a compact with the FAO membership to work together to achieve our common vision of a world free from hunger and malnutrition"*. Towards that end, the aquaculture sector is expected to make significant contributions to assist FAO in achieving its goals of ending hunger and poverty.

FAO's support to the aquaculture sector will shortly enter its fourth decade. A summary of FAO's range of support during this long period of time at the global, regional and national levels is presented below.

### Global level

#### Conferences

FAO has been organizing global conferences on aquaculture development, which have been appreciated as of immense value to the sector. Acknowledged as the **first of three major milestones**, FAO sponsored the 1976 *Technical Consultation on Aquaculture* in Kyoto, Japan, which led to the formulation of a "World Strategy for the Development of Aquaculture", also known as *Kyoto Strategy*. The *Strategy* enabled the transformation of aquaculture from a mostly traditional subsistence-oriented to a science-based economic activity in many developing countries. The *Strategy* was instrumental in the establishment of regional networks of aquaculture, which aim to develop and test aquaculture technologies, train staff, and prepare and disseminate information (Box 2).

## Box 2 Establishment of regional networks

Recognizing aquaculture's vital role in the promotion and better use of fishery resources, the FAO-convened Kyoto Conference on Aquaculture of 1976 proposed the establishment of regional networks of aquaculture centres in Asia, Africa and Latin America. The first network ---Network of Aquaculture Centres in Asia-Pacific (NACA), the region which has been contributing the bulk of global aquaculture production --- started as a UNDP/FAO regional project and became operational in 1980. Its development objectives were to: increase production of fish; improve rural income and employment; diversify rural farm production; and enhance foreign exchange earnings and savings. NACA has been making important contributions in a number of areas: namely capacity building, collaborative research, information and communications, policy guidelines, aquatic animal health and disease management; and genetics and biodiversity. These contributions are directed towards improving livelihoods, particularly of resource poor fish farmers. Various studies have rated NACA as a successful regional intergovernmental organization on aquaculture development (FAO, 2010). There have been reiterated acknowledgements from governments of the benefits from NACA, broad agreements among NACA's partners of the advantages of collaborating with NACA and an expectation from other regions to emulate a NACA-like arrangement or model.

Encouraged by NACA's performance and supported technically and financially by FAO, a number of networks have been established in other regions as well. The Committee for Inland Fisheries and Aquaculture (CIFAA) endorsed the establishment of the Aquaculture Network for Africa (ANAF) in 2006. With the participation of 21 countries from Latin America and the Caribbean, the Aquaculture Network for the Americas (RAA) was established in 2010 based on an FAO study and on additional information from other similar initiatives such as those reported by the Asia-Pacific Economic Cooperation (APEC) and the Latin American Organization for Fisheries Development (OLDEPESCA). RAA aims to promote sustainable development of aquaculture in the region, reduce poverty and inequality and contribute to food security. In mid-2013, the FAO Regional Office for Latin America and the Caribbean, together with the Aquaculture Network of the Americas (RAA), published a report on small-scale aquaculture policies in Latin America. The report presents an overview of the policies, programs and public instruments for the support of limited resource aquaculture producers (ARELs) and micro and small-scale aquaculture enterprises (AMYPEs) in Latin America and the Caribbean (FAO, 2014b).

In the Persian Gulf Region, the Regional commission for Fisheries (RECOFI) established its Working Group on Aquaculture (WGA) in 2003. The tasks of the RECOFI WGA include: advise RECOFI on technical and policy matters related to aquaculture, encourage technical cooperation and coordination among the member countries; and organize training courses, seminars and workshops (FAO, 2010). To facilitate information sharing among member countries, the WGA has established a Web-based Regional Aquaculture Information System. The Network of Aquaculture Centres in Central-Eastern Europe (NACEE) was established in 2004 to facilitate the integration of R&D institutions in Central and Eastern Europe into the European Research Area and promote partnership between science and practice, especially with regard to small and marginal enterprises and other producers associations (FAO, 2010)

The **second milestone** is the organization of the 2000 *Conference on Aquaculture in the Third Millennium* in Bangkok, Thailand.<sup>4</sup> The *Bangkok Declaration and Strategy* adopted at the Conference articulated 17 strategic elements, one of which focused on *Improving Food Security and Alleviating Poverty* through, among others, promoting poor-people-centered development focus in aquaculture sector policies, supporting systems to farm low-value fish affordable to the poor, and disseminating information about the nutritional advantages of fish to vulnerable groups of people, including pregnant and lactating women.

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<sup>4</sup> <http://www.fao.org/3/a-ad351e.pdf>The Conference was organized with NACA (the Network of Aquaculture Centres in Asia-Pacific).

The **third and the most recent milestone** illustrating FAO's role in promoting and supporting aquaculture development is organization of the 2010 *Global Conference on Aquaculture 2010- farming the waters for food and people* in Phuket, Thailand.<sup>5</sup> The *Conference* adopted the *Phuket Consensus*, which reaffirmed participants' commitment to implement the 2000 *Bangkok Declaration and Strategy* and recommended, among others, conducting accurate assessments of the progress and contributions of aquaculture (including aquatic plants) to national, regional and global economies, poverty alleviation and food security, and intensifying assistance to the small farmers.

### Secretariat to the Committee on Fisheries (COFI) Sub-Committee on Aquaculture

Another important contribution of FAO towards promotion of international cooperation in aquaculture is the establishment of the Committee on Fisheries (COFI) *Sub-Committee on Aquaculture* (AQ) in Rome, Italy, in 2001. The Rome Declaration on the Implementation of the Code of Conduct for Responsible Fisheries, adopted by the FAO Ministerial Meeting on Fisheries (1999), emphasized that: "FAO is the most appropriate forum for addressing vital global fisheries issues" and agreed that a COFI/AQ would significantly assist COFI and FAO to fulfil their responsibilities.<sup>6</sup> Accordingly, the FAO Council established the COFI/AQ to provide a global inter-governmental forum for consultation and discussion on aquaculture and to advise COFI on technical and policy matters related to aquaculture and on the work to be performed by FAO. COFI/AQ, among others, determines issues and trends of international importance requiring action to increase the sustainable contribution of aquaculture to food security, economic development and poverty alleviation.<sup>7</sup>

Acting as the Secretariat to COFI/AQ, FAO has been making major contributions to promoting sustainable development of aquaculture. For example, at the seventh session (2013) of COFI/AQ in St. Petersburg, Russia, the COFI/AQ commended the Secretariat for the preparation of a paper on the role of aquaculture in improving nutrition. The COFI/AQ noted that the farming of fish species with low dietary fish oil and fish meal requirements provides healthy food for human consumption and therefore could be one of the ways of addressing the challenge of limited availability of fishmeal and fish oil for aqua feeds. Further, as recommended by the COFI/AQ, the FAO Fisheries and Aquaculture Department actively participated in the 2014 "Second International Conference on Nutrition (ICN2)", jointly organized by FAO and World Health Organization (WHO) in Rome <sup>8</sup>(FAO, 2013a). The focus of the ICN2 was to address the multiple challenges of malnutrition in all its forms, including under nutrition and micronutrient deficiencies, and identify opportunities for tackling them.

Endorsing the two main outcome documents of the ICN2, the Rome Declaration on Nutrition and the Framework for Action, the participating governments recognized that "food and agriculture systems, including crops, livestock, forestry, fisheries and aquaculture, need to be addressed comprehensively through coordinated public policies, taking into account the resources, investment, environment, people, institutions and processes with which food is produced, processed, stored, distributed, prepared and consumed."<sup>9</sup> For developing sustainable food systems, the ICN2 recommended: "Review national policies and investments and integrate nutrition objectives into food and agriculture policy, programme design and implementation, to enhance nutrition sensitive agriculture, ensure food security and enable healthy diets." It went on to further recommend that organizations ought to "implement nutrition education and information interventions based on national dietary guidelines and coherent policies related to food and diets, through improved school curricula, nutrition education in the health, agriculture and social protection services ,community interventions and point-of-sale information, including labelling."

The ICN2 acknowledged the important role of fisheries, including aquaculture, in improving human nutrition. The joint FAO and WorldFish ICN2 paper emphasized the importance of fish, especially nutrient-rich small fish, from

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<sup>5</sup> <http://www.fao.org/docrep/015/i2501e/i2501e00.htm> The Conference was organized with NACA and the Royal Thai department of Fisheries.

<sup>6</sup> <http://www.fao.org/docrep/MEETING/003/X8971E.HTM>

<sup>7</sup> <http://www.fao.org/fishery/about/cofi/aquaculture/en>

<sup>8</sup> <http://www.fao.org/about/meetings/icn2/en/>

<sup>9</sup> <http://www.fao.org/3/a-at764e.pdf>

the wild and from aquaculture, in improving nutrition. The paper pointed out that such improvements would require, among others, changes to government policies, investment in infrastructure and encouragement of research (Thilsted *et al.*, 2014).

### **Strategic Framework initiatives**

In the context of its revised Strategic Framework, FAO has identified a number of global aquaculture development initiatives, including the two highlighted below.

#### **Blue Growth**

Emerging from the 2012 Rio+20 Conference, the concept of a “blue growth” emphasizes the premise that healthy ocean ecosystems are more productive and a must for sustainable ocean-based economies. The Blue Growth initiative focuses on increasing sustainable contribution from the aquatic environment.<sup>10</sup> With increasing global demand for fish and leveling off of the growth of capture fisheries production, the potential for mariculture to grow in many developing countries remains significant. The aim is to promote policies and good practices for farming of fish, shellfish and marine plants in a responsible and sustainable manner (Hall, 2014a). At the 2014 Global Oceans Action Summit for Food Security and Blue Growth in The Hague, the Netherlands, organized by the government of the Netherlands, in close collaboration with FAO and other institutions and governments, aquaculture’s potential role to enhance Blue Growth was acknowledged (International Institute for Sustainable Development, 2014).<sup>11</sup>

The Summit proposed to invest in small- and medium-sized enterprises and local communities as effective agents for delivering broad-based blue growth and aquaculture production, and to enhance private and public investment in research and development to increase the knowledge base on aquaculture to capture the potential of new technologies to secure benefits from oceans. FAO plans to assist countries in developing and implementing blue economy and growth agendas.

#### **Global Aquaculture Advancement Partnership (GAAP)**

The GAAP initiative was presented by FAO’s Fisheries and Aquaculture Department at the seventh session (2013) of COFI/AQ. The GAAP initiative aims to promote and enhance strategic partnerships for implementing prioritized global, regional and national-level projects that would lead to increased and sustainable aquaculture production and contribute to elimination of poverty, food insecurity and malnutrition. The COFI/AQ expressed strong support of the GAAP (FAO, 2013b, FAO2013c) and underlined the need to adequately involve producers, regional bodies and networks, and to take good account of gender. Sri Lanka’s offer to initiate the establishment of a Global Aquaculture Fund as a tool for implementing GAAP was endorsed by other Members.

#### **Secretariat to the United Nations Committee on World Food Security**

Serving as the Secretariat to the United Nations Committee on World Food Security (CFS), the foremost intergovernmental and international platform dealing with food security and nutrition, FAO, along with the World Food Programme (WFP) and the International Fund for Agricultural Development (IFAD), has been contributing to improving the quality, effectiveness and coherence of food security and nutrition policies from local to international levels.<sup>12</sup> In October 2012, the CFS requested the High Level Panel of Experts (HLPE) on food security and nutrition, which keeps CFS up to date with worldwide knowledge and abreast of emerging trends in food security, to conduct a policy oriented, practical and operational study on the role of sustainable fisheries and aquaculture for food security and nutrition (HLPE, 2014a and HLPE, 2014b).<sup>13</sup>

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<sup>10</sup> <http://www.fao.org/zhc/detail-events/en/c/233765/>

<sup>11</sup> The World Bank and the governments of Grenada, Indonesia, Mauritius, Norway and the US

<sup>12</sup> <http://www.fao.org/cfs/cfs-home/cfs-about/en/>

<sup>13</sup>

[http://www.fao.org/fileadmin/user\\_upload/hlpe/hlpe\\_documents/HLPE\\_S\\_and\\_R/HLPE\\_2014\\_Sustainable\\_Fisheries\\_and\\_Aquaculture\\_Summary\\_EN.pdf](http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_S_and_R/HLPE_2014_Sustainable_Fisheries_and_Aquaculture_Summary_EN.pdf)

## Regional level

At the regional level as well, with FAO's support, experts and policy makers have adopted several agreements and made declaratory statements that stressed the importance of regional collaboration in enhancing aquaculture's contribution to address food security and nutritional issues. Some examples of such collaboration are discussed below.

### *Framework on sustainable intensification of Asian aquaculture*

In 2012, a regional consultation in Bangkok, jointly convened by FAO, the Asia-Pacific Fishery Commission (APFIC) and the Network of Aquaculture Centres in Asia-Pacific (NACA), adopted a new framework based on the premise that intensified aquaculture requires an increasingly robust regulatory framework to limit the potential impacts of overcrowding, environmental pollution, unregulated movements, biosecurity, food safety and the need for quality assurance on inputs.<sup>14</sup>

Another example of collaboration at the regional level is the 2005 *Fish for All Summit*, jointly organized by FAO, WorldFish and the New Partnership for Africa's Development (NEPAD). The *Summit* adopted the *Abuja Declaration on Sustainable Fisheries and Aquaculture in Africa*, which recommended, among others, empowering fish farming communities, reflecting fisheries and aquaculture adequately in the national and regional economic policies, strategies, plans and investment portfolios, and fostering sustainable small, medium and large-scale aquaculture production.<sup>15</sup> Subsequently, in 2010, African Ministers for Fisheries and aquaculture held their first conference (CAMFA) in Banjul, Gambia. The Conference recommended that the African Union (AU) support Member States to strengthen policy coherence in national fisheries and aquaculture sector within the framework of the Comprehensive African Agricultural Development Programme (CAADP). These recommendations were endorsed by the African Union Heads of State in 2011.

A third example of FAO's sponsoring aquaculture development events at the regional level is the 2011 first *Asia Regional Ministerial Meeting on Aquaculture for Food Security, Nutrition and Economic Development* in Colombo, Sri Lanka. The *Colombo Declaration* adopted at the *Meeting* is a commitment by political leadership to regional cooperation in aquaculture development for food security, nutrition and economic development. In particular, the *Declaration* emphasised that "cooperation can be sustained, economic linkages reinforced, and capacities to achieve potentials and meet future needs for food and livelihood security be enhanced by political leadership".<sup>16</sup>

## National level

Using its own funds as well as funds provided to it by bi-lateral and multi-lateral donor organizations, FAO has assisted Member States in preparation, implementation and evaluation of national sustainable aquaculture development projects and programmes that aim to achieve the objectives of social equity, economic efficiency and environmental responsibility. For the attainment of the objectives, a number of inter-related approaches are used, such as developing policies, strategies, plans and legislations, and building technical capacities.

FAO, FIRA, recently carried out a review of the profile of its closed and ongoing aquaculture-related projects and programmes in five regions: Asia and Pacific; Sub-Saharan Africa; Near East and North Africa; Europe and Central Asia and Latin America. The review also covered global projects. The review provides information on, among others, project costs and thematic focus areas or components, particularly with regards to food security and poverty reduction. The overall findings of the review show that the bulk of the project support has been provided to the Asia and Pacific region and the Sub-Saharan Africa region. Many projects supported development of aquaculture strategies and legislations (Box 3).

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<sup>14</sup> [http://www.fao.org/asiapacific/rap/home/news/detail/en/?news\\_uid=162142](http://www.fao.org/asiapacific/rap/home/news/detail/en/?news_uid=162142)

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<http://www.dlist.org/sites/default/files/doclib/The%20Abuja%20Declaration%20on%20Sustainable%20Fisheries%20and%20Aquaculture%20in%20Africa.pdf>

<sup>16</sup> <http://www.fao.org/docrep/017/am784e/am784e.pdf> Meeting was organized jointly with NACA.

### Box 3. FAO project support to five regions

- The total ongoing and closed project cost amounts to USD 144.9 million, of which 40 percent constitute ongoing projects. Of the total ongoing project cost, 82 percent constitute projects that are above USD 1 million.
- The Asia and Pacific Region constitutes 34 percent (USD 49.1 million) of the total closed and ongoing project cost. The ongoing project costs constitute 21 percent, of which 64 percent constitute projects that are above USD1 million.
- Sub-Saharan Africa constitutes 32 percent of the total closed and ongoing project cost. The ongoing project costs constitute 45 percent, of which 83 percent constitute projects that are above USD1 million. The higher ongoing project costs indicate that, relative to the Asia and Pacific Region, more resources are being provided to Sub-Saharan Africa. This shift is recognition of the vast potential of Africa's fisheries to grow and contribute to food security and nutrition.
- Among the other three regions, Europe and Central Asia also shows potential as the ongoing project costs constitute 68 percent of the total project costs.
- In the Asia and Pacific region, ongoing projects above USD 1 million mainly support emergency interventions (for example support for the typhoon-affected small-scale fishers and farmers in the Philippines). East Asia and South Asia received almost equal funds for ongoing projects below USD 1 million. In South Asia, projects support development of aquaculture strategies (for example, Bangladesh and Sri Lanka). In terms of thematic focus areas, livelihood strategies and food security and nutrition figure prominently. There is no ongoing project support in China.
- In Sub-Saharan Africa, projects support development of aquaculture policies and legal framework, improvements in production and technology and livelihoods.
- In the Near East and North Africa region, the relative investment support is the lowest, with Saudi Arabia and Iraq being the only two recipient countries. The support is increase production, enhance technology and build capacity.
- In Latin America, Brazil's only aquaculture project provides support to enhance small-scale farming systems, build capacity and increase production.

Many Member States have also benefitted from FAO's South-South and Technical Cooperation (SSTC) initiative, which is widely acknowledged as a complementary model of development cooperation to the traditional North-South model, in addressing development challenges and achieving food and nutrition security, poverty reduction and sustainable management of natural resources. South-South Cooperation (SSC) is a cost-effective means to share development solutions-knowledge, experiences and good practices, policies, technology and resources - between and among countries in the global South. Triangular Cooperation (TC) promotes partnerships between two or more countries of the global south, with a third partner- typically a traditional donor, emerging economy or multilateral organization- facilitating SSC exchanges through the provision of resources.

FAO has worked with close to 100 partners during its more than 20 years of SSC and TC facilitation. FAO has facilitated fielding of over 1800 experts and technicians in more than 50 countries in Africa, Asia and the Pacific, Latin America and the Caribbean, and the Near East. China has been one of the first countries to engage in SSC with FAO. It has provided more than 1000 experts and technicians in 25 countries for nearly two decades. In 2009, a USD30 million FAO-China Trust Fund was established, allowing for the funding of knowledge and experience exchange in various technical areas, including aquaculture, between China and other countries in the global South. Viet Nam has also been engaged with FAO's SSC programme since 1996. In total, 392 Vietnamese experts and technicians have been fielded in Benin, Chad, Republic of Congo, Laos, Madagascar, Mali, Namibia and Senegal, focusing on aquaculture and rice production. Both China's and Vietnam's programmes have resulted in successful outcomes in terms of increasing aquaculture production and providing food security and nutrition in many countries (Box 3). At the seventh session of COFI/AQ, the COFI/AQ recognized the important role of FAO in facilitating SSC arrangements by liaising between the beneficiary countries and donors. The invaluable role of FAO

providing coordination and technical backstopping services in the implementation of SSC projects was also acknowledged.

### **Box 3 South-South and Triangular cooperation programmes**

**Nigeria:** A traditional Chinese farming technique that cultivates rice and fish together was successfully introduced. Nigeria supported the project through which eight Chinese experts were fielded to implement pilot activities and provide training in over 30 states. The Rice-fish culture (RFC) expert exchange in Nigeria not only introduced new technologies, but also demonstrated sustainable solution to strengthen food and nutrition security. Rice-fish culture (RFC) proved to be an effective way to increase rice production and farmers' income, reduce rural poverty, improve living standards and provide high quality, fresh protein for local consumers. Rice yields reportedly increased by 22 to 100 percent and net income of smallholder famers increased by 29 to 96 percent. Following the project's success in Nigeria, RFC has since been replicated in Sierra Leone and Mali.

**Namibia:** Under a Triangular cooperation programme, an FAO-facilitated and Government of Spain-funded exchange was initiated to improve the aquaculture sector in Namibia through aquafeed production, species diversification and the development of aquaculture in dry lands. Viet Nam supplied three long-term experts and five technicians to support the programme. The results highlighted a substantial improvement in African catfish survival rates, by increasing feeding frequency and the use of live food and artificial feed. Success has also been recorded in the breeding and rearing of catfish as well as three-spotted tilapia. The exchange strengthened the Department of Aquaculture's capacity to identify and promote improved aquaculture practices and technologies at the national level, through effective extension services, which led to their uptake by the local fish farmers.

**Source:** Adapted from FAO. South-South and Triangular Cooperation

[http://www.fao.org/fileadmin/user\\_upload/themes/img/south-south\\_cooperation/SCC\\_TC\\_Brochure\\_EN.pdf](http://www.fao.org/fileadmin/user_upload/themes/img/south-south_cooperation/SCC_TC_Brochure_EN.pdf)

## **Impact**

FAO's diversified aquaculture development support at the global, regional and national levels are guided by the provisions of various mandatory and voluntary instruments. The use of two voluntary instruments by Member States and other stakeholders---FAO's Code of Conduct for Responsible Fisheries (COCRF) and technical guidelines (TGs) on emerging aquaculture-related issues--- are of particular importance to achieving the sector's sustainable development goal. FAO's Office of Evaluation (OE) recently conducted an evaluation of FAO's support to the implementation of the COCRF (FAO, 2012b). The OE reported that the TGs for aquaculture are generally of high relevance to the COCRF and of a high technical quality and that the aquaculture projects evaluated showed a number of successes and shortcomings.

The OE recommended two main areas that required further work: dedicated guidance on disease management and drug/chemical use; and further consideration of and guidance related to the use of fish and fishmeal in aquaculture feeds. Both the areas are important for achieving FAO's goals of food insecurity and poverty alleviation. Further, in its assessment of FI's role and work in human dimensions, gender mainstreaming for equality, social inclusion and poverty alleviation, the OE indicated that there has been a lack of focus on the primary objectives of FAO- food security and poverty alleviation- and an over-emphasis in FAO's work on narrowly defined technical issues. With FAO's revised strategic framework in place, this imbalance is being addressed.

## **WorldFish**

WorldFish, a member of the Consultative Group on International Agricultural Research (CGIAR) Consortium, is dedicated to reducing poverty and hunger and increasing food and nutrition security through sustainable

development of fisheries and aquaculture in developing countries.<sup>17</sup> According to the WorldFish Strategy (2011), its two strategic objectives are: to improve the livelihoods of poor and vulnerable people, and to achieve large-scale environmentally sustainable increases in supply and access to fish at affordable prices for poor consumers.<sup>18</sup>

### Partners

Partnerships are central to WorldFish's operating strategy. Collaboration with a diverse range of institutions, including universities, non-governmental organizations, civil society forums and private sector associations, allows WorldFish to combine its complementary skills and resources to help achieve impact at scale. WorldFish nurtures and sustains its existing partnerships and seeks to develop new ones that will increase its impact on poverty and hunger. World Fish engages with its partners at three levels:

- Local and national: design and deliver programmes;
- Regional: rapid dissemination of information to inform and influence the policies and practices of regional bodies and to address regional and transboundary issues; and
- Global: leverage the achievements of national and regional partnerships and help change development thinking and policy.

### Investors

WorldFish's investors include: governments, private foundations, and international and regional organizations, most of which are members of the CGIAR. Financial information on aquaculture-related research projects and programmes are not readily available.

### Research locations

WorldFish's research activities are focused primarily on three regions: Africa, Asia and the Pacific. Africa and Asia have large absolute numbers of poor people, and in the Pacific many countries have high levels of poverty and few alternatives to providing livelihoods from aquatic resources. Specific areas and priorities in the regions are determined on the basis of how well fisheries interventions can best contribute to alleviating poverty, hunger and environmental degradation.

WorldFish's research products of global utility are generally executed in regional contexts so that it can:

- engage closely with national partners and their regional collaboration mechanisms;
- adapt its approaches to the differing conditions and priorities of regions; and
- serve the desires of the investment and partner communities for targeted focus on key needs and opportunities.

### Research programmes

WorldFish contributes to six of the 15 CGIAR Research Programs, and takes the lead in the CGIAR Research Program on Aquatic Agricultural Systems. WorldFish's focal areas for research include:<sup>19</sup>

- **Climate change:** effect of climate change on fisheries and aquaculture in developing countries and building adaptive capacity
- **Improved value chains:** input and output value chains improvements to increase the value of aquaculture and fisheries
- **Gender and equity:** strengthen the rights of marginalized fish dependent people to reduce inequality and poverty.
- **Sustainable aquaculture technologies:** increase productivity, resilience and development impact from small and medium scale aquaculture.

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<sup>17</sup> This section is based on WorldFish website. <http://www.worldfishcenter.org/>

<sup>18</sup> <http://www.slideshare.net/worldfishcenter/the-worldfish-strategy-8530278?related=1>

<sup>19</sup> <http://www.cgiar.org/cgiar-consortium/research-centers/worldfish/>

- **Nutrition and health:** improve human nutrition and health through investments in fisheries and aquaculture.
- **Policies and practice for resilience:** increase the resilience of small-scale fisheries and their contribution to reducing poverty and hunger based on appropriate policy and management investments.

### Research contributions

While all of the six WorldFish research programmes are designed to contribute to sustainable aquaculture development, two in particular focus on nutrition and health and gender and equity issues.

#### Nutrition and health:

Animal -source foods (ASFs), particularly fish, meat and eggs, constitute a key component in a balanced diet for most people. Conversely, lack of availability, affordability and consumption of ASFs often result in malnutrition, especially among women and children. In many developing countries, fish are the dominant ASF. In some of Asia's poorest countries (Bangladesh and Cambodia, for example) people derive as much as 75 percent of their daily protein from fish.

WorldFish research studies have been making valuable contributions to the existing body of knowledge on understanding the role of fish in improving nutritional status and household food security. Following a research study in Bangladesh, WorldFish has identified the pathways that exist between fish-related livelihoods (small-scale fisheries, fish farming) and household nutritional security. The study identified and explored three key pathways:

- **A consumption pathway** where small-scale fisheries and aquaculture contribute to household nutritional security through the consumption of fish captured or produced by household members;
- **An income pathway** where small-scale fisheries and aquaculture contribute to household nutritional security through the income generated by these activities that is then used to purchase other foodstuffs;
- **A distribution pathway** where small-scale fisheries and aquaculture contribute to empowering women, resulting in better nutritional outcomes at the household level.

The study noted that, although specific data on the linkage between improved diet and nutritional status has been scarce, it showed that expanding aquaculture and supporting small-scale fisheries have potential as sustainable ways of improving nutritional status and household food security through these pathways.

To better understand the contribution that fish makes to human nutrition, and its positive impact on health, WorldFish, along with its partners, are carrying out research on the nutritional value of different species in many developing countries. Research has shown that some small fish, which are more frequently consumed by the poor and often shared more equitably in the household, provide a particularly rich source of calcium, vitamin A, iron and zinc. Small indigenous fish species found in Asia and Africa are often eaten whole, significantly adding to its nutritional value, because many nutrients are concentrated in the heads and bones of the fish (Thorne-Lyman, 2014). Another good characteristic of small fish is that it can be easily dried, enabling poorer households to have year-round access to micronutrients. It has been estimated, for example, that production of only 10 kg/pond of the vitamin-rich small fish *mola* (*Amblypharyngodon mola*), which is already present in 1.3 million small fish ponds in Bangladesh, could meet the annual recommended vitamin A intake for two million children. To put small fish into perspective in the Bangladesh context, it is useful to note that of the 260 freshwater fish found in Bangladesh more than 140 are classified as small indigenous species (SIS) (Belton et al., 2011).

WorldFish has been examining the potential of small fish to improve nutrition through various projects, including the recently closed ["Linking Fisheries and Nutrition: Promoting Innovative Fish Production Technologies in Ponds and Wetlands with Nutrient-Rich Small Fish Species in Bangladesh."](#) The project supported 1,500 target households with small ponds to culture small nutrient dense fish in highly efficient, low risk polyculture systems that include a variety of high value fish including carps and freshwater prawns. The importance of small fish cannot be overemphasized given that malnutrition levels in Bangladesh are amongst the highest in the world.

## **Gender and equity**

Aquaculture is often perceived as an economic activity that is undertaken by males only because of the physical demands of manual labour, high levels of investment and the adoption of complex technologies associated with its development. However, it is increasingly being recognized that women's engagement in aquaculture is extensive, including in value chains for fish, shrimp, seaweeds and crab, and that they are contributing significantly to the overall well-being of households (Weeratunge-Starkloff and Pant, 2011). For example, In many Southeast Asian countries such as Cambodia, Indonesia and Vietnam women carry out 42- 80 percent of all aquaculture activities (AIT, 2000; Kaing and Ouch, 2002; Williams et al., 2005; FAO, 2007). Nonetheless, there is ample scope for advancement as in many countries women themselves often get very little in return due to deep-rooted gender disparities in social, cultural and economic spheres.

Gender inequities are often a cause of persistent poverty for all members of the society. Addressing gender disparities in aquaculture through improved extension services, innovations, policies and institutional practices that are directed towards women can result in higher incomes and labor productivity within the sector and efficient allocation of labor at household and national levels (Rahman, 2005). Given strong evidence that women in the fisheries sector often bear the brunt of poverty, WorldFish recognizes that it can better achieve its mission to reduce poverty and hunger by conducting its research through a gender lens and considering the fact that its stakeholders are not a homogeneous group of people. Research on gender and aquaculture at WorldFish are based on five key themes: (a) market, trade and migration; (b) capabilities and well-being; (c) identities and networks; (d) governance and rights; and (e) climate change, disaster and resilience.

While aquaculture is widely stated to contribute to poverty reduction, robust evidence is limited. Using household income and expenditure surveys in Bangladesh to analyse fish consumption changes from 2000 to 2010, a new study by WorldFish and the Bangladesh Institute of Development Studies has contributed to a broadening of the debate on whether the growth of aquaculture in Bangladesh has been pro-poor. The study found that: aquaculture's impacts on fish consumption were pro-poor throughout this period; pro-poor aquaculture growth was related to pro-poor economic growth; and decline in capture fisheries partially offset the pro-poor effects of aquaculture (Toufique and Belton, 2014; Hall, 2014b). The study revealed that, although non-poor households showed the highest increases in farmed fish consumption due to the benefits of economic growth in general, the rate of increase was about twice as large for poor consumers. This outcome was due to the expansion of aquaculture, which stabilized or reduced the price of both wild caught and farmed fish, making them more affordable as incomes rose. In summary, the findings of the study provide solid evidence and sound rationale for more investments in both fisheries and aquaculture.

## **World Bank**

Working with its client countries and the international donor community, the World Bank is committed to developing a sustainable global fisheries and aquaculture sector by helping countries "establish institutions, values, and practices that will safeguard the future of fish resources and the health and livelihood of communities who depend on these resources for their income, nutrition, and quality of life" (SeaWeb, 2005). The World Bank holds a unique position among the international institutions which are engaged in global fisheries as it is a source of leveraged funding, enjoys access to high-level policy makers, public officials, and development planners whose decisions impact the governance of the fisheries sector, and has a proven record of working across sectors and of reaching out to the private sector and other organizations to form strategic partnerships. Accordingly, the World Bank has the capacity to generate knowledge products and combine policy dialogue at the highest levels followed up with specific investments. Some examples of the World Bank's range of global, regional and national support for the sustainable development of the fisheries and aquaculture sector are highlighted below.

### **Strengthen governance**

Consistent with the World Bank's 2010 vision of a *New World, New Bank Group: Post Crisis Directions* and the 2009 *Action Plan for Agriculture and Rural Development*, the mission of the World Bank Group's Global Program on Fisheries (PROFISH) is "to promote and facilitate the contribution that fisheries and aquaculture can make to sustainable economic growth, better nutrition, economic opportunities for women, and poverty reduction" (World Bank, 2011). To achieve its mission, PROFISH gives greater emphasis on strengthening governance of the fisheries

and aquaculture sector “due to the common property nature of fisheries, aquaculture externalities, national and international ocean management issues and the linkages between fiscal issues and sustainable management of fisheries”. Therefore, PROFISH seeks to:

- Design and implement good governance systems through World Bank investments and international partnerships; and
- Provide information, knowledge products and expertise to help ensure that fisheries and aquaculture create sustainable wealth and reduce poverty.

PROFISH has received financial and in-kind support from the UK, Iceland, France, New Zealand, Norway and Finland, Japan, USA, FAO and the World Bank. The growing partnership includes regional economic organizations representing developing countries, including the African Union and the ASEAN Secretariat. Other PROFISH partners include, among others, FAO, International Union for the Conservation of Nature, WorldFish, International Food Policy Research Institute, Organisation for Economic Co-operation and Development, United States Agency for International Development, National Oceanic and Atmospheric Administration/National Marine Fisheries Service, NEPAD, Strategic Partnership for Fisheries in Africa. PROFISH is actively engaged in the development of the Global Partnership for Oceans (GPO) and played a lead role in coordinating the Blue Ribbon Panel and its report “Indispensable Ocean”<sup>20</sup>

### Increased investments

Since the creation of PROFISH in 2005, the World Bank Group has steadily increased its investments in the fisheries and aquaculture sector. The Bank has recently expanded its expertise in aquaculture, markets, value chains and international trade. The strengthened program on fisheries and aquaculture is flexible and adaptive in its approach and the work will (World Bank, 2011):

- Define policy frameworks for economic growth, poverty reduction, food security and climate change resilience
- Develop and apply reform pathways and build partnership support,
- Define and apply best practice business models,
- Design and evaluate market systems and,
- Develop and apply metrics for monitoring and evaluation.

The World Bank Group’s 2013-2015 Agriculture Action Plan, which also includes fisheries and aquaculture, supports: “(i) increasing the capacity of developing countries to implement and enforce effective management of capture fisheries; (ii) fishing port infrastructure; and (iii) improving aquaculture practices”. In addition, after a decade of minimal activity in the sector, the International Finance Corporation of the World Bank Group will be reengaging, with a particular focus on investment opportunities in sustainable aquaculture enterprises, given that the increasing trend of global supply of fish sourced from aquaculture (The World Bank Group, 2013).

The World Bank Group’s agriculture and related sector lending increased from an average of USD4.1 billion annually in FY2006–08 to an average of USD7 billion annually in FY 2010-12. Building on recent scaled-up support, the World Bank Group’s 2013-2015 Agriculture Action Plan projects to lend an average of between USD8 and 10 billion annually. The dominant focus of support is on smallholder agriculture, with greater attention to, among others, on nutritional and gender equity outcomes. Although, separate data on lending for fisheries and aquaculture is not readily available, it could be assumed that, consistent with the past trend in increased lending to the agriculture sector as a whole and given the recognition attached to the role of the fisheries and aquaculture sector towards contributing to poverty reduction, food security and nutrition, the relative share of the sector’s lending had also risen.

Examples of the Bank’s recent support to the countries in their efforts to promote responsible and sustainable aquaculture includes: community fish ponds (under community-driven development projects) and integration of fisheries components in irrigation tank (reservoir) projects in India (The World Bank Group, 2013); capacity

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<sup>20</sup> <https://www.globalpartnershipforoceans.org/indispensable-ocean>

building of the Government of Ghana and stakeholders to develop and implement policies and framework for increased investment in inland aquaculture;<sup>21</sup> and good practices for sustainable aquaculture in Viet Nam through improved bio-security management, improved seed quality management, and improved environmental management.<sup>22</sup>

### Better management of oceans

The Global Partnership for Oceans (GPO), championed by the World Bank, is a growing alliance of Governments, civil society organizations, private sector companies and associations, research institutions, UN agencies, multi-lateral banks and foundations committed to addressing the problems affecting the health, productivity and resilience of the ocean. These problems stemming from overfishing, pollution, and habitat loss are contributing to the depletion of a natural resource bank that provides nutrition, livelihoods and vital ecosystem services. The World Bank serves as an interim secretariat in support of design of the GPO. The Partnership aims to work toward meeting a number of interrelated objectives by 2022, as stated in the **Declaration for Healthy Productive Oceans to Help Reduce Poverty**. Regarding sustainable seafood and livelihoods from capture fisheries and aquaculture, the GPO plans to provide support to "significantly increase global food fish production from both sustainable aquaculture and sustainable fisheries by adopting best practices and reducing environmental and disease risk to stimulate investment".<sup>23,24</sup>

### Promote gender equity

Recognizing the importance of gender-based knowledge and roles with regards to household food security in the agriculture sector, including fisheries and aquaculture, the World Bank, FAO and IFAD jointly produced *Gender in Agriculture Sourcebook*.<sup>25</sup> *Women are the key to food security* for their households as they are generally responsible for food selection and preparation and for the care and feeding of children (Quisumbing *et al.*, 1995). There is also substantial evidence that when women have income it is more likely to be spent on food and children's needs. Further, poorer households headed by women are reported to provide more nutritional food for their children than those headed by men (Kennedy and Peters 1992).

The *Sourcebook* views aquaculture as being especially attractive to rural women because it can be carried out with minimal investment, is close to homesteads and can be integrated into existing food systems. It is widely accepted that an investment approach that improves access to resources and increases the capacity and knowledge of women to engage in aquaculture technology will contribute to women's empowerment and social advancement and help improve the livelihoods of women, their households, and their communities.

The *Sourcebook* also provides indicators that could be used to monitor gender issues in fisheries and aquaculture. Broad examples of indicators to measure improvements at the household and community levels include, among others, improved health and nutrition of women and children; positive attitude of husbands and other men toward women's training; and more involvement of women in decision making in aquaculture management.

## IFAD

IFAD is recognized as the only international financial institution and a specialized United Nations agency with a specific mandate to reduce rural poverty and empower poor rural women and men in developing countries to achieve higher incomes and improved food security through investments in agriculture and rural development, including investments in inland fisheries and aquaculture.

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<sup>21</sup> <http://www.worldbank.org/projects/P124812/ghana-west-africa-regional-fisheries-program-gef?lang=en>

<sup>22</sup> <http://documents.worldbank.org/curated/en/2013/03/17465217/vietnam-vietnam-coastal-resources-sustainable-development>

<sup>23</sup> <http://www.globalpartnershipforoceans.org/about>

<sup>24</sup> <http://www.globalpartnershipforoceans.org/sites/oceans/files/images/GPO%20Declaration.pdf>

<sup>25</sup> gender <http://www.genderinag.org/content/gender-agriculture-sourcebook>

Fisheries and aquaculture, however, comprise a relatively small part of IFAD's overall lending portfolio. There are also relatively few projects wholly or mainly dedicated to fisheries and aquaculture. Generally targeted support to fisheries and aquaculture is within broader rural development projects supporting rural businesses, natural resource management, rural finance, integrated development, livelihoods and food security programmes.

### Evaluation of investments in the fisheries and aquaculture sectors

IFAD has yet to undertake a full evaluation of its investments in the fisheries and aquaculture sectors but has, at various points, prepared brief reviews/summaries of fisheries and aquaculture in its portfolio. IFAD's existing systems for portfolio monitoring are not sufficiently disaggregated or detailed to generate accurate reports on the fisheries and aquaculture projects, particularly as fisheries and aquaculture activities are often included in projects or components which are actually focused on other themes (i.e. rural finance).

All IFAD projects prepare a Project Completion Report after the end of the project. Some recent project completion reports/evaluations of individual fisheries and aquaculture project recorded overall satisfactory performance. The projects include:

- **Armenia:** The Rural Areas Economic Development Programme<sup>26</sup> supported the expansion of availability of credit in rural areas and fish farms were among the businesses supported successfully with credit products. This project was rated as 'satisfactory' in a project performance assessment completed following the end of the project (2012).
- **Bangladesh:** The Aquaculture Development Project, which completed in 2006<sup>27</sup>, achieved good results including: (i) enabling large numbers of women to engage in pond fish culture; (ii) providing access to credit to the target group; (iii) improved food security of the target group (number of families eating 3 meals per day increased from 81 to 95 percent); (iv) fish production in ponds and boars increased by 3,366mt/year. Sustainability of project impacts was rated as satisfactory.
- **Bangladesh:** The Microfinance and Marginal and Small Farmers Project supported livelihood diversification into aquaculture. Case studies of beneficiaries include households who successfully adopted fish culture as part of a diversified livelihood are included in the Project Performance Assessment prepared after project completion (2014)<sup>28</sup>.
- **Benin:** The Support Programme to the Participatory Development of Artisanal Fisheries Project intended to introduce floating cage aquaculture but achieved only limited success (2012)<sup>29</sup>
- **Cambodia:** Efforts to improve fish ponds under the Rural Poverty Reduction Project in Prey Veng and Svay Rieng were somewhat but not highly successful (2013)<sup>30</sup>.

### Credit support to fish farmers

Many IFAD projects involve improving access to credit in rural areas. This includes microcredit, commercial loans, and recently even equity and quasi-equity investments. Credit is never delivered directly by IFAD but through partnering microfinance institutions, banks and investment funds. With many experiences throughout the world, IFAD has had a number of great successes in this field.

IFAD does not have a database which allows it to say specifically how much credit has been provided to aquaculture farmers under IFAD-funded projects but the examples above of the Armenia Rural Areas Economic Development Programme and Bangladesh Microfinance and Marginal and Small Farmers Project have both successfully supported extension of credit to fish farmers, in very different country contexts.

### Non-investment support

IFAD investment projects also include policy and knowledge management activities at national level. Regional grant-financed projects provide similar support at regional or global level.

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<sup>26</sup> [http://www.ifad.org/evaluation/public\\_html/eksyst/doc/prj/region/pn/armenia/raedpppa/rural.pdf](http://www.ifad.org/evaluation/public_html/eksyst/doc/prj/region/pn/armenia/raedpppa/rural.pdf)

<sup>27</sup> <http://operations.ifad.org/documents/654016/5345e5d9-741d-4ea6-87d6-592a5c93363c>

<sup>28</sup> [http://www.ifad.org/evaluation/public\\_html/eksyst/doc/prj/region/pi/bangladesh/bd\\_mmsfp.pdf](http://www.ifad.org/evaluation/public_html/eksyst/doc/prj/region/pi/bangladesh/bd_mmsfp.pdf)

<sup>29</sup> [http://www.ifad.org/evaluation/public\\_html/eksyst/doc/validation/2013/benin.pdf](http://www.ifad.org/evaluation/public_html/eksyst/doc/validation/2013/benin.pdf)

<sup>30</sup> [http://www.ifad.org/evaluation/public\\_html/eksyst/doc/prj/region/pi/cambodia/rprp\\_2013.pdf](http://www.ifad.org/evaluation/public_html/eksyst/doc/prj/region/pi/cambodia/rprp_2013.pdf)

As IFAD has never had a dedicated staff member for fisheries or aquaculture (only interns/consultants, though a Technical Advisor on Fisheries and Aquaculture is currently being recruited) it has not had the capacity to provide policy or knowledge management directly except in a few isolated cases, for example: (i) the IFAD Farmers' Forum, a global biannual gathering of smallholders', pastoralists' and fishers' organisations; and (ii) occasional knowledge products such as those recently prepared on the impact of climate change on fisheries and aquaculture.

### **Regional support**

In addition to the above mentioned activities, IFAD has a grant financing window for global/regional grants. These fund projects targeting two or more countries either in the same region or globally. Grant recipients typically include CGIAR centres, NGOs, research centres and universities, consortia of partners. One recent example is a grant to Worldfish for Ex-ante Impact Assessment of Aquaculture Investments - an IFAD grant funded-project under which Worldfish developed a methodology for ex-ante impact assessment of aquaculture projects targeting small scale fish farmers.

### **Partnership strategy**

IFAD has no specific partnership strategy for aquaculture development but has collaborated with FAO, World Bank, Worldfish, and global civil society organisations on a number of fisheries/aquaculture related projects in recent years. At national level in countries where IFAD invests in aquaculture projects, IFAD develops partnerships with relevant Government, civil society and private sector organisations.

### **Regional and international development commitments and agreements**

IFAD does not have a particular aquaculture lending policy or strategy but IFAD's current Strategic Framework 2011-2015 (and previous strategic frameworks) have been fully aligned with the main international agreements to which IFAD is committed, including the Millennium Development Goals. IFAD is not a party to any specific international development commitments on aquaculture development.

IFAD does not allocate funds by sector but rather by country using a Performance Based Allocation System (PBAS) which allocates funds on the basis of population, GNI, rural population, contribution of agriculture to GDP. Decisions on which sectors to invest in within each country are taken together with Government on the basis of national strategies and policies.

### **Asian Development Bank**

ADB's assistance to fisheries sector commenced in 1968. About two decades later, ADB approved its fisheries policy, which was designed to support the promotion of sustainable management of fisheries and aquatic resources (ADB, 2006). By December 31, 2005, ADB had approved 68 projects with a cumulative loan amount of USD1.4 billion, equivalent to 9 percent of the agriculture and natural resources portfolio, or 1.2 percent of cumulative ADB lending. ADB initially supported capture fisheries to increase fish production. Of the 68 projects, only 14 were approved in the eight years after the fisheries policy was adopted, representing 22 percent of the total fisheries portfolio. Three countries—Indonesia, Philippines and Sri Lanka—accounted for 61 percent of the total amount of fisheries loans, which increased to 92 percent since adoption of the fisheries policy. With ADB's fisheries operations concentrated in few countries, reflecting limited demand for fisheries loans, the sector remained a minor part of ADB's lending operations after adoption of the policy.

In 2006, ADB's OECD carried out an evaluation of the relevance and effectiveness of the fisheries policy in guiding ADB's fisheries operations. The evaluation reported that, with the evolution of global and regional policy initiatives, emerging issues, and contemporary challenges, the fisheries policy had become redundant. The evaluation also indicated that the policy had been largely irrelevant and inefficient in terms of ADB's fisheries operations, and its implementation was unlikely to be sustainable in the future. Regarding aquaculture, the evaluation noted that the policy was deficient in its conservative approach to aquaculture expansion, as was demonstrated in the past decade. Further, by combining aquaculture with capture fisheries, the policy limited the attention that could have been given to the diversity within aquaculture, and the extent to which aquaculture could have been seen in a much broader inter sectoral context. In subsequent years, as recommended by the evaluation, aquaculture support, although still marginal in value terms, was generally integrated in a larger "rural

infrastructure” and “agriculture and natural resources management” projects, for example in two “Strengthening Water Management and Irrigation Systems Rehabilitation” projects in Vietnam. Further, in line with the evaluation’s recommendation, ADB will continue to strengthen strategic partnerships with international institutions with expertise in fishery, such as FAO and WorldFish center, to mitigate the lack of fishery sector expertise and human resources within ADB to provide better service to clients.

For the purposes of the AFSPAN WP 3 study, an analysis of ADB-supported projects on aquaculture development from 1999 to 2014 was carried out by FAO, FIRA, based on information available online. At the Regional level, the Asia and Pacific Region received funds for aquaculture with a total budget of USD81.4 million for 16 projects with some aquaculture component (Table 11).

Table 11 Investment by the Asian Development Bank, grouped by thematic focus areas

Thematic focus areas	Funding (million USD)
Policy and framework	20.7
Improve production and technology	20.8
Capacity building and training	18.5
Food security, nutrition, livelihood	18.4
<b>Total Funding</b>	<b>81.4</b>

These projects focused on many aspects of aquaculture at a national level, including assistance to poor farmers. In addition, there were many integrated projects with large budgets, of which aquaculture was included. An estimated percent of the budget was assigned to aquaculture by reading all available project documents, but it is advised to use caution in interpreting these numbers due to lack of readily available data. In general, the distribution of funding was fairly even between thematic focus areas of the projects.

## European Commission

Following the method used for estimating ADB’s aquaculture lending volume and thematic focus areas, FAO, FIRA, conducted a similar exercise for EC’s support to aquaculture development in various regions and countries during the period 2000-2014. The total funding support was USD8.1 M for 9 projects, of which 3 projects have exclusive focus on aquaculture, while the rest 6 support both capture fisheries and aquaculture (Table 12). Again, as in the case of ADB, the estimates need to be interpreted with caution.

Table 12 Investment from EuropeAid, Development and Cooperation, grouped by thematic focus areas

Region	Funding (USD thousand)
Asia and Pacific	159
Sub-Saharan Africa	4 819
Near East and North Africa	1 464
Latin America	1 599
Europe and Central Asia	0
Thematic focus areas	Funding (USD thousand)
Policy and framework	1 634
Improve production and technology	2 073
Capacity building and training	1 622
Food security, nutrition, livelihood	2 711
<b>Total</b>	<b>8 041</b>

**Asia and Pacific Region**

In Cambodia, the National Aquaculture Development Strategy was elaborated, focusing on policy and legal framework.

**Sub Saharan Africa Region**

In Zimbabwe, an ongoing project supports integrated and sustainable fisheries and aquaculture production for improved food security in vulnerable households. The funding is USD4. 1M - this is the largest single project funded by EC-DevCo.

**Near East and North Africa Region**

In Algeria, the capacities of the National Research Center for the Development of Fish and Aquaculture were reinforced (USD1. 4M)

**Latin America Region**

In Latin America, the general focus was on diversification, capacity development through training and livelihood support.

## Part 3: Findings and recommendations

This section first presents the key findings of the responses provided by the 11 country partners and of the analyses of selected international and regional aquaculture development organizations' programmes to support aquaculture development and then provides a set of recommendations for consideration by AFSPAN project partners. While the findings of partner countries and development organizations are reported separately, some are applicable to both since in most cases they jointly participate in aquaculture development initiatives. The same applies to the set of recommendations

### Findings

#### Partner countries

**General.** The analysis of the preliminary desk study report and the detailed responses to a follow-up questionnaire revealed that there are significant differences among the 11 partner countries in terms of aquaculture's contributions to protein intake, national economic growth, species cultured, farming systems adopted and employment generated. The nature of regional and international cooperation activities also varied among the countries and depended on addressing common issues that would be of mutual benefit.

**Project profile.** A review of the profile of the aquaculture projects implemented by the partner countries shows that, while the primary objective of most projects is to reduce poverty and improve the livelihoods of fish farmers, the means to achieve it is diverse. The project support range includes, among others: technical research, gender empowerment, small-scale aquaculture development, climate change adaptation and mitigation measures, and policy, strategy and plan formulation. Further, in many cases, both funded from national and international sources, aquaculture is only a component of a fisheries or a rural development or an integrated water management project.

**Data.** Separate data on key nutritional and socio-economic parameters to establish aquaculture's contributions to food security, nutrition, employment and poverty alleviation are generally not available. In some cases, data on fisheries, i.e. including capture fisheries, as a whole is reported. However, in such cases, aquaculture's relative position could be gauged given that its share in total fisheries production has increased substantially in recent years, reaching almost half globally. In some cases, aquaculture's contributions to food security, nutrition, employment and poverty alleviation are reported at project level. However, even then there are questions on the methodologies and robustness of such analyses and consequently the impact being attributable solely to the project. While aquaculture's contribution to GDP is small, its importance to the national economy in terms of poverty alleviation and nutritional benefits is significant, particularly in developing countries.

**Guiding documents.** It is encouraging that the majority of the participating countries generally have fisheries, including aquaculture, policies, strategies and plans. The documents emphasize the importance of ensuring food security, reducing poverty and increasing income through fisheries and aquaculture development programmes. Most of the documents were prepared during the past decade, reflecting the influence of major regional and international commitments and agreements, such as the UN Millennium Development Goals, MDGs, 2000, and Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000. Again, most participating countries include support to capture fisheries and aquaculture in their overall national development plans.

Despite the widely accepted importance of aquaculture's contribution to human development, and the recent initiatives in developing aquaculture policies and strategies, the current knowledge and understanding of aquaculture's contribution is still inadequate. Consequently, fisheries, including aquaculture, are often virtually absent in all global reports on food and food insecurity (e.g. FAO State of Food and Agriculture and the FAO food insecurity reports) and in aquaculture policy (e.g. the FAO Code of Conduct for Responsible Fisheries). However, recently, the role of aquaculture in improving nutrition was reflected in FAO's 2014 State of World fisheries and

Aquaculture report, and a paper on the role of sustainable fisheries and aquaculture for food security and nutrition was presented at the 2014 2014 Second International Conference on Nutrition.

**Impact of cooperation.** Regional and international development commitments and agreements influence partner countries in development of their policies, rules and regulations in relation to fisheries and aquaculture (examples are: UN Millennium Development Goals, MDGs, 2000; Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000). Regional and international development commitments and agreements generally stress on sustainable development, focusing on food security and poverty alleviation.

### International and regional development organizations

**Commitment.** All organizations are committed to sustainable development of aquaculture and recognize the importance of aquaculture's contribution to meet the growing demand for fish, alleviate poverty, and promote food security and nutrition. The organizations' commitment is reflected in their breath and variety of investment and non-investment support, mostly to developing countries. Given their respective mandate and comparative advantage, the support provided by some of the organizations could be broadly summarized: FAO, technical (example, Secretariat to COFI/AQ); WorldFish, research (example, research focusing on generating and synthesizing knowledge for subsequent sharing and application); World Bank, good governance (example, design and implement good governance systems in the aquaculture sector, PROFISH); IFAD, small-farmer development (example, access to inputs and technical knowledge); ADB, integrated approach (example, aquaculture in the framework of natural resource development); and EC, policies and knowledge ( example, AFSPAN project).

**Partnerships.** For all organizations, partnerships are a cornerstone of their work on sustainable aquaculture development. The organizations recognize that the magnitude and diversity of the aquaculture sector challenges call for a concerted, long-term global partnerships effort to effectively and efficiently channel their technical and financial resources to support prioritized global, regional and national initiatives. The importance of forging partnerships with all stakeholders is embedded in their development strategy and plan. For example, in FAO's revised Strategic Framework, facilitating "partnerships for food and nutrition security, agriculture and rural development between governments, development partners, civil society and the private sector" is one of the seven core functions.

Partnerships have led to establishing important milestones in the development of the aquaculture sector, for example the FAO-led 2010 *Global Conference on Aquaculture* in Phuket, Thailand, and the Global Partnership for Oceans (GPO), championed by the World Bank. Partnerships have also been instrumental in establishing Networks of Aquaculture Centers in various regions. These Networks serve as mechanisms through which governments, international and regional development organizations and other stakeholders work together towards the development of the sector. Further, many governments have benefitted from FAO's South-South and Technical Cooperation (SSTC) initiative, which is widely acknowledged as a complementary model of development cooperation to the traditional North-South model, in addressing development challenges and achieving food and nutrition security, poverty reduction and sustainable management of natural resources.

## Recommendations

While the consolidated results, findings and recommendations of the AFSPAN project will provide a comprehensive framework for the aquaculture sector to promote food security and nutrition and poverty alleviation, the recommendations of this part of the AFSPAN project are mostly based on the reviews of national and international development organizations' aquaculture development initiatives. The recommendations, in particular, take into account the recommendations of the seventh session of the Committee on Fisheries, Sub-Committee on Aquaculture in 2013, the recommendations presented in the 2014 fisheries and aquaculture report of the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, and the 2014 Rome Declaration on Nutrition and Framework for Action adopted at the Second International Conference on Nutrition.

**Provide greater exposure to fisheries' and aquaculture's role.** Governments and international development organizations should ensure that fisheries, including aquaculture, have a central position in inter-sectoral national food security and nutrition policies, strategies and programmes. National food security and nutritional programmes should recognize and build on the potential of fish for reduction of malnutrition and micronutrient deficiency. The important role of fish in improving the nutritional status of individuals, in particular those at risk of malnutrition such as children and pregnant women, should be underscored in nutritional programmes and promoted in international debates on food security and nutrition.

**Promote good aquaculture governance.** Good aquaculture governance must reconcile ecological and human well-being to ensure its sustainability (Hishamunda et.al., 2014). Governance broadly encompasses institutions, policies, legislations and processes. Among regulations affecting social well-being are minimum wages, prohibition of child labour, and conditions of work, factors that have an effect on food security and nutrition aspects. Governments should assess policies, interventions and investments that have direct and indirect links to fisheries and fishing communities to ensure positive impacts on the right to food of the affected communities.

**Address climate change impacts.** Governments need to mainstream climate change adaptation strategies relevant to fish and food security and nutrition into all fisheries and aquaculture policies, strategies and programmes. The fisheries and aquaculture sector should also interact with climate and weather research and prediction agencies and participate in specific studies.

**Promote safe genetic and other technical improvements in aquaculture.** While trade and commercial interests are generally major drivers of genetic improvement programmes, governments, international development organizations, research institutions and the private sector should consider food security and nutrition as a key factor. The successful example of the genetically improved farmed tilapia (GIFT) programme shows that a food and nutrition security approach to breeding programme can generate substantial growth in aquaculture development and benefit small-scale fish farmers. Other technical area relates to carrying out further research on the vitamin-rich small fish *mola* (*Amblypharyngodon mola*), which has shown encouraging results in Bangladesh.

**Improve quality and availability of feeds and alternative sources of feed.** Governments, international development organizations, research institutes and the private sector need to join hands to further reduce the use of fishmeal in fish feeds as much of the small pelagic fish used to produce fishmeal is edible and can contribute to food security and nutrition in developing countries. Further, low trophic level fish (herbivores and omnivores) need to be promoted.

**Promote gender equality.** Gender is a key determinant of the many different ways by which aquaculture affect food security and nutrition outcomes. While a large number of women work in the aquaculture sector, their contributions are mostly unrecognized, unrecorded and undervalued, largely due to a major knowledge gap on gender and lack of routine collection of gender-disaggregated data. Governments need to address the shortcomings and mainstream gender in aquaculture. FAO should take the lead in preparing policy guidelines on

gender equality, for example through technical guidelines on gender in aquaculture with in the Code of Conduct on responsible Fisheries.

**Encourage public-private partnerships.** Governments, with the support of regional and international development organizations, could engage local, regional and international aquaculture sector entrepreneurs to support Corporate Social Responsibility programmes focusing on food security and nutrition objectives to support small-scale fish farmers.

**Promote international, regional and local trade.** Governments, supported by international development organizations, should ensure that policies and mechanisms related to international, regional and local fish trade take into consideration food and nutrition aspects, particularly those that protect the large number of small-scale, informal producers and traders (mainly women), who are usually marginalized by the globalization of fish trade oriented to a small number of globally traded species.

**Focus on emerging regions.** International and regional development organizations, along with governments, should provide more resources to support emerging aquaculture development regions. Particular attention needs to be given to Africa, where many countries have reported significant growth rates. The aquaculture sector offers great potential to generate wealth and contribute to food security and poverty alleviation.

**Focus on new initiatives.** Recognizing the potential of aquaculture to meet the future demands for fish, the global community has been designing and developing new initiatives, such as the FAO-led Global Aquaculture Advancement Partnership (GAAP) and the World Bank championed Global Partnership for Oceans (GPO). Governments, International and regional development organizations, civil societies and the private sector need to ensure that such initiatives take into account food security and nutrition aspects based on the recent knowledge, including that provided by the AFSPAN project.

## Appendix 1. Global production: 11 countries and global

The following data were provided by the focal point for each partner country.

Country	Quantity (tonnes) and Value (USD)	1990	2000	2012
Bangladesh	Aquaculture production			
	food fish quantity	193 000	657 120	1 726 067
	aquatic plant quantity			
	Total aquaculture quantity	193 000	657 120	1 726 067
	food fish value	423 010 000	1 792 150 000	6 472 750 000
	aquatic plant value			
	Total aquaculture value	423 010 000	1 792 150 000	6 472 750 000
	Capture fisheries production			
	Total capture quantity	424 000	70 465	957 095
	Total capture value	929 320 000	1 828 540 000	3 589 110 000
	<b>Total quantity</b>	<b>617 000</b>	<b>1 327 585</b>	<b>2 683 162</b>
	<b>Total value</b>	<b>1 352 330 000</b>	<b>3 620 690 000</b>	<b>10 061 860 000</b>
Brazil	Aquaculture production			
	food fish quantity			<b>707 461</b>
	aquatic plant quantity			<b>730</b>
	Total aquaculture quantity	20 490	172 450	708 191
	food fish value			1 446 257
	aquatic plant value			56 000
	Total aquaculture value	78 634	271 294	1 502 057
	Capture fisheries production			
	Total capture quantity	619 805	666 846	842 987
	Total capture value			
	<b>Total quantity</b>	<b>640 295</b>	<b>839 296</b>	<b>1 551 178</b>
	<b>Total value</b>	<b>78 634</b>	<b>271 294</b>	<b>1 502 057</b>
Chile	Aquaculture production			
	food fish quantity	<b>70 672</b>	425 059	1 105 231
	aquatic plant quantity			
	Total aquaculture quantity	70 672	425 059	1 105 231
	food fish value			
	aquatic plant value			
	Total aquaculture value			
	Capture fisheries production			
	Total capture quantity	5 162 939	4 539 945	2 992 235
	Total capture value			
	<b>Total quantity</b>	<b>5 233 611</b>	<b>4 965 004</b>	<b>4 097 466</b>
	<b>Total value</b>			

China	Aquaculture production			
	food fish quantity	5 810 000	24 561 000	41 111 000
	aquatic plant quantity	270 000	1 221 200	1 772 600
	Total aquaculture quantity	6 080 000	25 782 200	42 883 600
	food fish value			
	aquatic plant value			
	Total aquaculture value		18 190 000 000	104 180 000 000
	Capture fisheries production			
	Total capture quantity	6 300 000	17 007 500	16 193 200
	Total capture value		16 900 000 000	33 490 000 000
	<b>Total quantity</b>	<b>12 380 000</b>	<b>42 789 700</b>	<b>59 076 800</b>
	<b>Total value</b>		35 090 000 000	137 670 000 000
India	Aquaculture production			
	food fish quantity			
	aquatic plant quantity			
	Total aquaculture quantity			
	food fish value			
	aquatic plant value			
	Total aquaculture value			
	Capture fisheries production			
	Total capture quantity			2 712 300
	Total capture value			
	<b>Total quantity</b>	<b>3 836 000</b>	<b>5 656 000</b>	<b>2 712 300</b>
	<b>Total value</b>			
Kenya	Aquaculture production			
	food fish quantity	975	967	21 487
	aquatic plant quantity			
	Total aquaculture quantity	975	967	21 487
	food fish value	1 974 000	4 891 000	55 162 000
	aquatic plant value			
	Total aquaculture value	1 974 000	4 891 000	55 162 000
	Capture fisheries production			
	Total capture quantity	197 907	201 672	132 726
	Total capture value	84 962 000	100 845 000	160 168 000
	<b>Total quantity</b>	<b>198 882</b>	<b>202 639</b>	<b>154 213</b>
	<b>Total value</b>	86 936 000	105 736 000	215 330 000
Nicaragua	Aquaculture production			
	food fish quantity	487	5 411	24 299
	aquatic plant quantity			
	Total aquaculture quantity	487	5 411	24 299
	food fish value			
	aquatic plant value			
	Total aquaculture value			
	Capture fisheries production			
	Total capture quantity	627	8 929	10 052
	Total capture value			

	<b>Total quantity</b>	<b>1 114</b>	<b>14 340</b>	<b>34 351</b>
	<b>Total value</b>	9 200 000	124 120 000	135 400 000
Philippines	Aquaculture production			
	food fish quantity	<b>379 820</b>	<b>359 960</b>	<b>790 894</b>
	aquatic plant quantity	<b>291 180</b>	<b>618 040</b>	<b>1 751 071</b>
	Total aquaculture quantity	671 000	978 000	2 541 965
	food fish value		400 950 225	1 955 545 023
	aquatic plant value		53 800 905	231 658 768
	Total aquaculture value	843 621 400	454 751 130	2 187 203 791
	Capture fisheries production			
	Total capture quantity	1 833 000	1 890 000	3 822 814
	Total capture value	1 304 526 749	1 481 900 452	3 919 431 280
	<b>Total quantity</b>	<b>2 504 000</b>	<b>2 868 000</b>	<b>6 364 779</b>
	<b>Total value</b>	2 148 148 149	1 936 651 582	6 106 635 071
Uganda	Aquaculture production			
	food fish quantity	1 664	15 000	100 000
	aquatic plant quantity			
	Total aquaculture quantity	1 664	15 000	100 000
	food fish value	4 492 000	40 500 200	280 000 000
	aquatic plant value			
	Total aquaculture value	4 492 000	40 500 200	280 000 000
	Capture fisheries production			
	Total capture quantity	219 500	355 800	360 000
	Total capture value	474 120 000	960 660 000	1 008 000 000
	<b>Total quantity</b>	<b>221 164</b>	<b>370 800</b>	<b>460 000</b>
	<b>Total value</b>	478 612 000	1 001 160 200	1 288 000 000
Vietnam	Aquaculture production			
	food fish quantity			
	aquatic plant quantity			
	Total aquaculture quantity	310 000	720 000	3 112 000
	food fish value			
	aquatic plant value			
	Total aquaculture value			
	Capture fisheries production			
	Total capture quantity	710 000	1 280 000	2 633 000
	Total capture value			
	<b>Total quantity</b>	<b>1 020 000</b>	<b>2 000 000</b>	<b>5 745 000</b>
	<b>Total value</b>			

Zambia	Aquaculture production			
	food fish quantity	4 500	4 500	12 988
	aquatic plant quantity			
	Total aquaculture quantity	4 500	4 500	12 988
	food fish value			
	aquatic plant value			
	Total aquaculture value			
	Capture fisheries production			
	Total capture quantity	64 868	66 671	80 638
	Total capture value			
	<b>Total quantity</b>	<b>69 368</b>	<b>71 171</b>	<b>93 626</b>
<b>Total value</b>			-	
	<b>Quantity (tonnes) and Value (USD)</b>	<b>1990</b>	<b>2000</b>	<b>2012</b>
Total of 11 partner countries	Aquaculture production			
	food fish quantity	6 461 118	26 029 017	45 599 427
	aquatic plant quantity	561 180	1 839 240	3 524 401
	Total aquaculture quantity	7 352 788	28 760 707	52 235 828
	food fish value	429 476 000	2 238 491 425	8 764 903 280
	aquatic plant value	-	53 800 905	231 714 768
	Total aquaculture value	1 273 176 034	20 482 563 624	113 176 617 848
	Capture fisheries production	-	-	-
	Total capture quantity	15 532 646	26 687 828	30 737 047
	Total capture value	2 792 928 749	21 271 945 452	42 166 709 280
	<b>Total quantity</b>	<b>26 721 434</b>	<b>61 104 535</b>	<b>82 972 875</b>
<b>Total value</b>	<b>4 075 304 783</b>	<b>41 878 629 076</b>	<b>155 478 727 128</b>	
<i>Notes: Rounded to the nearest whole number. Blank means data are not available, not applicable, or production volume and value are negligible. Philippines: average Peso- USD exchange rate. India: Annual data: 1990-91; 2000-01; and 2012-13. Nicaragua: Values correspond to exports .</i>				

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# AFSPN partners

