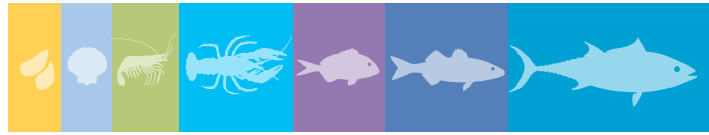




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FAN

FAO Aquaculture News



INTERNATIONAL YEAR OF
**ARTISANAL FISHERIES
AND AQUACULTURE**
2022

SPECIAL ISSUE



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Small in Scale, Big in Value

Dear reader,

This year is a special year. The International Year of Artisanal Fisheries and Aquaculture (IYafa) marks a momentous occasion, an opportunity to mobilize global action, and a time to celebrate small-scale fishers, fish farmers and fish workers the world over. As readers of *FAN*, you are no doubt aware of the impact that small-scale fish farmers make towards global food security, healthy diets and nutrition, poverty eradication and sustainable use of natural resources. With IYafa recognized by the UN General Assembly, this is a time for us to rally, for all champions of artisanal aquaculture to promote the messages of IYafa and disseminate widely.

This Special Issue of *FAN* is dedicated to IYafa, with each article considering IYafa and small-scale aquaculture from different contexts. We start with an article by the Technical Secretary on the upcoming 11th Session of the FAO Sub-Committee on Aquaculture, immediately followed by an editorial from the vice-chair of the IYafa International Steering Committee on why

IYafa is important to the COFI:AQ. We feature a global update from the IYafa Secretariat, and updates from the IYafa regional steering committees in Latin America and the Caribbean and Africa. Several articles provide background information on FAO national projects in Nigeria, Tunisia and Uzbekistan, as well as two regional projects in Asia. Finally, we have a series of thematic articles, covering issues ranging from the value chain approach to aquatic genetic resources to gender, and each thematic discussion presents the context through the lens of small-scale aquaculture.

But what is small-scale aquaculture? There is no single agreed definition, and small-scale aquaculture encompasses so much variety. Although FAO does not differentiate its statistics between small and large scale culture, some authors have estimated that 70–80 percent of all aquaculture is small-scale. It includes commercial aquaculture, or aquaculture focused for domestic markets and exports, as well as backyard farms to augment the family diet. As always,

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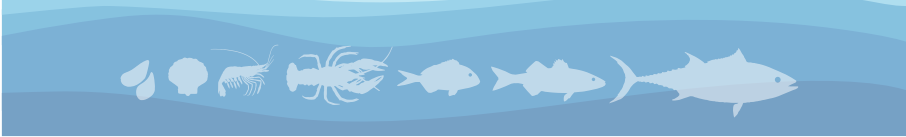
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we take the opportunity to remind ourselves that aquaculture includes hundreds of species, dozens of culture systems and spans the spectrum of salinity from freshwater to marine. Small-scale aquaculture ranges from culture based fisheries in ricefield ecosystems to cage culture in reservoirs or lakes, from coastal seaweed culture to freshwater ponds, and from backyard aquaponics to frog farming to freshwater ponds. From individuals to associations and cooperatives, the level of farmer organizations is also varied, likewise ranging from extensive, low input methods to high-tech, high-intensity practices. With this enormous diversity, broad generalizations are difficult, but overall there are a few similarities and shared challenges, some of which are highlighted in the articles in this edition of *FAN* along with what FAO is doing to support them. One key consideration is that the production of small-scale farmers is sometimes invisible, not captured in national statistics reporting. Often conducted in rural areas, and with the production often consumed by the family, community or local markets, quantifying the total production of aquaculture is often a challenge for enumerators. Which brings us back to IYafa.

Among the objectives outlined in the Global Action Plan (see article on page 9 for more details), a key goal of IYafa is to raise awareness. This special edition of *FAN* strives to share information and key messages on FAO's work with small-scale aquaculture, reaching a broad range of audiences. FAO has long supported artisanal and small-scale aquaculture around the world, many of which were highlighted in the previous 64 issues. But for this issue, we take the opportunity to really focus, and to dedicate each article to the significance of small-scale aquaculture farmers and fish workers working to put fish on our tables. Small in scale, big in value.

Austin Stankus

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Small-scale aquaculture in Viet Nam, and its subsequent expansion to large scale export-oriented activities has provided family farmers with livelihood generating opportunities, lifting farmers from poverty while augmenting food availability and healthy diets for the local communities.

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The Eleventh Session of the COFI Sub-Committee on Aquaculture – What to Expect?



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At the turn of the millennium, the global aquaculture community held a major international technical conference – the FAO/NACA International Conference on Aquaculture in the Third Millennium – and adopted the Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000. The conference noted “there are issues relevant to aquaculture development that require a strong global focus to be addressed and that this might be best achieved by establishing a global intergovernmental forum within an appropriate existing international organization ...”. Soon thereafter, in 2001,

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FAO Members of the Committee on Fisheries (COFI) decided to establish a Sub-Committee on Aquaculture (COFI:AQ) at its Twenty-Fourth Session. Recognizing the growing importance of aquaculture, the main functions of this forum are to identify and discuss major issues and trends in global aquaculture development that require action to address the needs of the sector, as well as action that will improve the contribution of aquaculture to food security, economic development and poverty alleviation. COFI:AQ shall also advise on the preparation of technical reviews and on issues and trends of international significance.

More than twenty years later, in late May 2022, representatives from FAO Members will meet once again, for the eleventh time since the inception of COFI:AQ, to discuss the most important matters affecting aquaculture

at the global and regional levels. At its last session, held in Trondheim, Norway, in August 2019, COFI:AQ decided to meet for its next session in Mexico in 2021. Then came the COVID-19 pandemic and changed the way we live, the way we work, and the way we meet. As a result, the session was postponed, and eventually it was agreed to convene it exceptionally in virtual mode from Rome, Italy, with a somewhat lighter agenda than usual. It will not come as a surprise, however, that one of the two substantive items will focus on “building resilience of aquaculture to ensure food security, nutrition and livelihoods”, looking at the three major stressors (COVID-19, climate change and natural disasters, as well as pests and pathogens), and asking Members to share their experiences and review current approaches on how aquaculture can further increase its resilience and contribute to the transformation of food systems.

The second substantive agenda item at the forthcoming session will be on the Global Conference on Aquaculture Millennium +20 – Aquaculture for Food and Sustainable Development. Here, COFI:AQ will consider the outputs of another international technical conference, the Global Conference on Aquaculture Millennium +20, which was held in September 2021 in Shanghai, China, and in virtual mode, and to which COFI encouraged all its Members to participate. This will be the first time that FAO Members will consider the outputs of the conference – regional aquaculture reviews, thematic reviews, a global synthesis, and the *Shanghai Declaration on Aquaculture for Food and Sustainable Development* adopted by the participants – and advise the FAO Secretariat on potential future work deemed relevant and important by COFI:AQ. Importantly, this will also be an opportunity to identify and support partnership and resource mobilization efforts to implement relevant recommendations of the conference in the promotion of sustainable aquaculture development initiatives.

As per established practice, COFI:AQ will also address a number of standing items that are discussed at each session. This includes progress reporting on the implementation of the Code of Conduct for Responsible Fisheries provisions relevant to aquaculture and culture-based fisheries assessing the degree of implementation

performance at the global and regional levels, to what extent FAO assistance is used by Members, and the levels of support by Regional Fisheries Bodies and Aquaculture Networks. Also, COFI:AQ will be informed about the developments of the Sub-Committee on Fish Trade, with a report given by the Secretariat of this sister Sub-Committee. Importantly, there will be an entire agenda item covering an overview of the efforts made by FAO towards implementing the recommendations of the past sessions, and some of these are also elaborated in this edition of *FAN* (see articles on pages 7–8 and 35–37). COFI:AQ will consider these, and reflect on progress and achievements with a view to strengthening and prioritizing recommendations for the next intersessional period.

From the multitude of activities and projects reported, there will be one workstream that is likely to generate much discussion: the progress made towards the Guidelines for Sustainable Aquaculture (GSA), which are expected to guide government authorities and policymakers in their efforts of promoting the implementation of Code of Conduct for Responsible Fisheries and enable aquaculture to effectively participate in the implementation of the 2030 Agenda for Sustainable Development. Two expert consultations and numerous regional consultations have taken place in preparation for this agenda item, and the Secretariat looks forward to the detailed review and comments on the GSA as well as the advice by the COFI:AQ on the next steps to be taken towards completion and eventual approval of the GSA and associated guidance. The Secretariat looks forward to fruitful discussions, especially in light of this year’s celebration of the International Year of Artisanal Fisheries and Aquaculture, and expects much exchange and focus on the role of small-scale fisheries and aquaculture and family farmers.

It is obvious that the “lighter” agenda still is quite packed with many important items to discuss and provide guidance on. At the same time, it means that two substantive items, one on gender in aquaculture and the other on aquatic plants, will be moved forward to the agenda of the Twelfth Session expected to be held in Ciudad Obregón, Mexico, from 7 to 10 March 2023.



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The Sub-Committee on Aquaculture, subsidiary body of the FAO Committee on Fisheries (COFI), presently constitutes the only global inter-governmental forum where major international aquaculture problems and issues are examined and recommendations addressed to governments, regional fishery bodies, NGOs, fishworkers, FAO and international community, periodically on a world-wide basis.

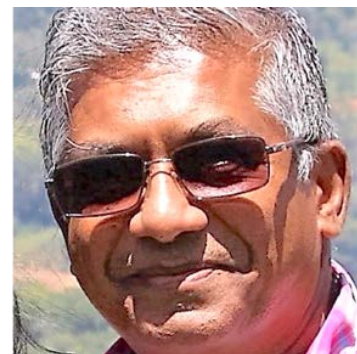
Why is the International Year of Artisanal Fisheries and Aquaculture 2022 Important to the COFI Sub-Committee on Aquaculture?

There is no need to overstate that aquaculture has been the world's fastest growing food production sector for decades, and that this status is likely to be retained for the foreseeable future. During the past two decades, the aquaculture sector has evolved from having a relatively minor role to playing a mainstream part in the global agrifood system. Freshwater fish (carps, tilapias and catfishes, for example) supply the lion's share of global production, predominantly originating from smallholders, and contribute more than any other aquaculture subsector to the total volume, rural livelihoods, and food and nutrition security. This makes small-scale aquaculture (also called artisanal aquaculture) perhaps the most socially important sector of aquaculture production. However, most small-scale aquaculture products do not enter international markets and instead remain in local value chains. To be fair, overall sector improvement, smallholder empowerment and sustainable practices have not been optimized in all cases.

Small-scale fishers and fish farmers hold unique potential to promote changes in how, by whom and for whom aquatic foods and products are harvested, processed and distributed. Therefore, recognition of small-scale artisanal fisheries and aquaculture as a sustainable method of food production is imperative as current agrifood systems face increasing global challenges. According to FAO, these challenges include hunger and diet-related diseases, the need to provide a growing global population with sufficient and healthy food, the vast amounts of food loss and waste, and the depletion of natural resources, environmental degradation and climate change.

Nevertheless, despite their high potential, small-scale artisanal fisheries and aquaculture face unique and complex challenges. They face threats not only from other sectors but also from within the fisheries and aquaculture sectors. Social sustainability of fishers, fish farmers, fish workers and their communities requires better social services, such as healthcare, education, housing, and financial and legal services. The recognition and respect of the role of women remains another core, cross-cutting challenge to ensuring not only gender equality and equity but also to achieving sustainability: when women are empowered to earn and control income, their spending is more likely to benefit a

household's nutrition, health and education. A need also exists to educate and empower small-scale artisanal fishers and fish farmers to be better prepared for environmental degradation, all types of shocks, disasters and climate change.



© FAO/R. Subasinghe

Effective planning and implementation are pivotal for improving aquaculture sustainability. Regulating new aquaculture sites and making informed decisions on fisheries management will be paramount for achieving positive environmental outcomes. Future policies and programmes to promote small-scale aquaculture will require an agrifood systems approach that examines nutrition, equity, justice and environmental outcomes and trade-offs across land and sea. All these bundle together into better sector governance, and who and which instruments could drive it. In this respect, the COFI Sub-Committee on Aquaculture (COFI: AQ) has an important role to play. The Sub-Committee is poised to take collective, action-oriented decisions for improving aquaculture sustainability and to support their implementation at national, regional and global levels.

COFI: AQ was established in 2001, with the objectives of providing a forum for consultation and discussion on aquaculture and advising the Committee on Fisheries (COFI) on technical and policy matters related to aquaculture and on the work to be performed by FAO in the field of aquaculture. Among other things, COFI: AQ is expected to identify and discuss major issues and trends in global aquaculture development and determine those issues and trends of international importance requiring action to increase the sustainable contribution of aquaculture to food security, economic development and poverty alleviation. This task provides COFI: AQ a great opportunity and mandate to develop and implement policies driving aquaculture sustainability, which is especially relevant during the International Year of Artisanal Fisheries and Aquaculture.

In 2016, recognizing the importance of small-scale fisheries and aquaculture and their contribution to the global public, COFI endorsed a proposal for the Declaration of the International Year of Artisanal Fisheries and Aquaculture with the purpose of sensitizing public opinion

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and governments on these subsectors and the importance of adopting specific public policies and programmes to enable them to operate in a sustainable manner. Particular attention was to be given to the most vulnerable rural areas, constrained by poor governance and generally low capacity to make sustainable use of natural resources.

In 2017, the 72nd Session of the General Assembly of the United Nations proclaimed 2022 as the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022), with FAO serving as the lead agency, in collaboration with other relevant organizations and bodies of the United Nations system. The main objectives of IYAFA 2022 are to: (i) enhance global awareness about, understanding of and action to support the contribution of small-scale artisanal fisheries and aquaculture to sustainable development, and more specifically in relation to food security and nutrition, poverty eradication and the use of natural resources; and (ii) promote dialogue and collaboration between and among small-scale artisanal fishers, fish farmers, fish workers, governments and other key partners along the value chain, as well as to further strengthen their capacity to enhance sustainability in fisheries and aquaculture and to enhance their social development and well-being.

On the occasion of IYAFA 2022, our collective role is to work towards a world in which small-scale artisanal

fishers, fish farmers and fish workers of both genders are fully recognized and empowered to continue their contributions to poverty alleviation, human well-being, and resilient and sustainable food systems through the responsible use of fisheries and aquaculture resources and socioeconomic development. Many stakeholders – ranging from producers and processors, from policymakers to voters, from community groups to professional societies, and from aid agencies to donors – have a role to play. Perhaps, most importantly, the consumer has a role to play as well. In fact, next time you eat fish, ask yourself, “Who were the farmers, where do they live, what is their story, and what did it take to get this fish on my plate?”

The IYAFA 2022 Global Action Plan ([IYAFA GAP](#)) speaks to all these various stakeholders, and aims at building global momentum to empower small-scale artisanal fisheries and aquaculture and securing a sustainable future for these important sectors. COFI:AQ further provides a platform for collaboration and action for achieving the goals and objectives of IYAFA 2022, including potentially through commitment and support to implement the IYAFA GAP.

IYAFA 2022 is here; now is the time to celebrate, to reflect and to act. And the responsibility lies with each of us.



Artisanal fish farmers harvest fish in Kyrgyzstan.

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International Year of Artisanal Fisheries and Aquaculture 2022 – Global Developments



INTERNATIONAL YEAR OF
ARTISANAL FISHERIES
AND AQUACULTURE
2022



Woman selling tilapia on the market in Abengourou, Côte d'Ivoire. Tilapia represents a source of affordable and safe supply of animal protein in Côte d'Ivoire.

Small-scale artisanal fisheries and aquaculture hold a unique potential to transform the global food system, and the recognition of their role in how aquatic foods and products are harvested, processed and distributed is central to improving the sustainability of the sector and addressing global challenges. Such challenges include hunger and diet-related diseases, the need to provide a growing global population with sufficient and healthy food, the vast amounts of food loss and waste, the depletion of natural resources, environmental degradation and climate change. Though small in scale, artisanal fisheries and aquaculture are big in value and engaging million of people along the entire value chain.

In 2017, the 72nd Session of the General Assembly of the United Nations proclaimed 2022 as the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022), with FAO serving as the lead agency, in collaboration with other relevant organizations and bodies of the United Nations system. IYAFA 2022 is proving to be an opportunity to celebrate the diversity of small-scale artisanal fisheries and aquaculture, including women and youth; to share the current and potential contributions to achieving the Sustainable Development Goals and highlight related innovation; and to build and strengthen related support and partnerships at all levels. It is also an important opportunity to advance the implementation of relevant normative instruments, such as the Voluntary Guidelines

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for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication.

Global launch event

IYAFA 2022 was officially launched on 19 November 2021 to pay tribute and link to the currently informal World Fisheries Day, celebrated around the world on 21 November each year. The webcast can be watched in its entirety here: www.fao.org/webcast/home/en/item/5716/icode.

FAO Director-General, Dr Qu Dongyu, opened the event with an optimistic message on small-scale fisheries and aquaculture and presented the hopeful shared vision of IYAFA 2022:

A world in which small-scale artisanal fishers, fish farmers and fish workers are fully recognized and empowered to continue their contributions to human well-being, healthy food systems and poverty eradication through the responsible and sustainable use of fisheries and aquaculture resources.

The opening session of the launching event saw presentations from HE Jorge Luis Prado Palomino, Minister of Production of Peru, Chair of the International Steering Committee; Edithrudith Lukanga of the International Planning Committee for Food Sovereignty Working Group on Fisheries, and Rohana Subasinghe of the World Aquaculture Society, both IYAFA 2022 Vice-Chairs; and Maria Flachsbath, Parliamentary State Secretary of the German Federal Ministry for Economic Cooperation and Development. The opening session ended with the 2020 Margarita Lizárraga medal award ceremony, bestowed to Margaret Nakato of the Katosi Women Development Trust for her work on gender equality for women shellfish processors in Uganda. Read her inspiring story here: www.fao.org/fao-stories/article/en/c/1309638.

The second session of the event provided testimonies of the innovative capacity of small-scale fisheries and aquaculture in the context of sustainable development, with presentations from Rita Míguez de la Iglesia, President of the National Women in Fisheries Association, Spain, on “Nothing About Us Without Us – Women and a Changing Tide”; Adrian LaRonda, Chair of the Caribbean Network of Fisherfolk Organisations, Bahamas, on “Youth: Voices of the Future, Aware and Prepared”; Han Han, Founder and Executive Director of the China Blue Sustainability Institute, on “Resource Stewards, Creating Value for All”; and Shakuntala Thilsted, Global Lead for

Nutrition and Public Health at Worldfish, on “Nourishing Nations”. Manuel Barange, Director of the FAO Fisheries and Aquaculture Division, closed the session with a call to action: “Let us remember small-scale artisanal fisheries and aquaculture are small in scale, but big in value!”

IYAFa 2022 website and more information

Regional launching ceremonies, national celebrations, side events at major conference, etc. have been taking place since the launch of the International Year and will continue throughout 2022. It is better to head to the IYAFa website (www.fao.org/artisanal-fisheries-aquaculture-2022) which is available in all six UN languages, and where all this information is stored. For example, the IYAFa calendar (www.fao.org/artisanal-fisheries-aquaculture-2022/events/events-list) has a complete list of events, and has a public section where all stakeholders can submit their relevant events. Also, the list of IYAFa supporters can be found here: www.fao.org/artisanal-fisheries-aquaculture-2022/supporters. Additional supporters are



©FAO/Photo courtesy of GIAHS (Huzhou Mulberry-dyke and Fish Pond System)

The Zhejiang Huzhou mulberry-dyke & fish-pond system originated more than 2500 years ago and includes many traditional and agroecological knowledge. It includes the cultivation of mulberry-dyke trees, silk rearing, fish cultivation and is based on a very complex irrigation and drainage system. This system allows many farmers to respond to their needs, protecting a huge biodiversity as well as a complex landscape.

welcome: please write to the Secretariat at IYAFa@fao.org for more information.

The IYAFa 2022 website also contains IYAFa key messages and links to the Global Action Plan, which includes indicative actions for stakeholders from all levels on ideas on how to support the year. Likewise, a communications handbook is available with instructions on where to find and how to use the IYAFa visual identity, a social media Trello board, and printable posters and other materials.

IYAFa 2022 also has a monthly newsletter, so sign up at the link below to stay current on all developments. Be sure to check out the promotional and video messages, and join the conversation on social media with [#ArtisanalFisheriesAquaculture](https://twitter.com/ArtisanalFisheriesAquaculture) and [#IYAFa2022](https://twitter.com/IYAFa2022); consider tagging [@FAOfish](https://twitter.com/FAOfish) to amplify your message.

Newsletter:

http://newsletters.fao.org/k/Fao/ssf_guidelines_implementation_subscription_form

IYAFa YouTube playlist:

https://www.youtube.com/watch?v=S2eSoZ6bunI&list=PLzp5NgJ2-dK5iXuDT25sn7AxRP2_QyQWx&index=13

A video message from IYAFa 2022 supporters:
www.youtube.com/watch?v=rZLkNyKSzQg

The International Year is a major milestone in enhancing global awareness about, understanding of, and action to support the contribution of small-scale artisanal fisheries and aquaculture to sustainable development, and more specifically in relation to food security and nutrition, poverty eradication and the use of natural resources. At the same time, the International Year is promoting dialogue and collaboration between and among small-scale artisanal fishers, fish farmers, fish workers, governments and other key partners along the value chain, as well as further strengthen their capacity to enhance sustainability in fisheries and aquaculture and to enhance their social development and well-being.

The efforts will not stop in 2022; rather, our actions today will spread like ripples in the water, reaching distant shores into the future.

SEE ALSO

Global Action Plan

www.fao.org/3/cb4875en/cb4875en.pdf

IYAFa communications handbook and toolkit

<https://digital-assets.fao.org/home/action/browseItems?categoryId=136828&categoryTypeId=2&cachedCriteria=1>

IYAFa Trello board

<https://trello.com/b/8Yg9yh9I/international-year-of-artisanal-fisheries-and-aquaculture-2022>

IYAFa useful links

www.fao.org/fileadmin/user_upload/IYAFa2022/documents/UsefulLinksIYAFa.pdf



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The International Year of Artisanal Fisheries and Aquaculture in Latin America and the Caribbean: Towards Inclusive, Responsible and Sustainable Fisheries and Aquaculture

Men and women engaged in artisanal fisheries and small-scale aquaculture contribute significantly to food security and nutrition, to eradication of poverty and to sustainable use of natural resources; however, these people are also the most vulnerable to external shocks, such as climate change and pandemics.

In Latin America and the Caribbean, fisheries and aquaculture, both artisanal and industrial, generate more than 2.8 million direct jobs and three times more indirect jobs. Moreover, at least 16 percent of the employment associated with capture fisheries is held by women according to figures from FAO. In addition, artisanal fisheries provide up to 85 percent of the fish consumed in some countries of the region, and it is the primary source of animal protein for hundreds of communities, many of which have Indigenous Peoples living along the coasts and river basins.

The International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022) was established by the United Nations General Assembly to sensitize public opinion and governments about the importance of adopting



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Women play an integral role in artisanal fisheries and aquaculture in the Western Central Atlantic, as fishers, vendors, boat owners, and chief fisheries officers. Recognizing the important role of women was a key motivation behind the selection of Gender and Youth as cross cutting themes in the celebration of the International Year.

specific public policies and programmes to support small-scale producers. The adoption of these policies and programmes is the result of an initiative taken in 2016 by the Group of Latin America and Caribbean Countries (GRULAC).

An International Steering Committee chaired by Peru was established by FAO to coordinate the various initiatives taking place around the world, as well as a series of regional committees seeking to contextualize the celebration of IYAFA 2022 in the different regions. Three subregional committees were established in Latin America and the Caribbean: the Coordination Committee of the Western Central Atlantic Fishery Commission; the Mesoamerican Committee for the Celebration of IYAFA 2022; and the South American Committee for the Celebration of the IYAFA 2022.

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Western Central Atlantic Fishery Commission Secretariat

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The subregional committees are integrated by a wide range of stakeholders, including fishers, fish farmers, fishworkers, government representatives and academics. All stakeholders have equal voice, and decisions are made by consensus. Work within the committees is guided by solidarity, environmental and social responsibility, and respect for diversity.

On 19 November 2021, FAO officially launched the IYafa 2022 during the week of World Fisheries Day. On this occasion, the FAO Director-General re-emphasized the importance of fish and aquatic resources to support the economic and social well-being of the millions of people across the globe.

Minutes after the global launch, the FAO Regional Office for Latin America and the Caribbean launched a similar ceremony to contextualize the goals and objectives of IYafa 2022 to the region, with the aim of inspiring action-oriented celebrations across the continent throughout 2022. The opening remarks were given by Julio Berdegué, FAO Assistant Director-General and Regional Representative for Latin America and the Caribbean. Ten presentations representing the multisectoral stakeholders engaged in celebrating IYafa 2022 in the region followed. The event was very well received and virtual attendance surpassed 1 200 people.



Artisanal fishers (Indigenous Peoples) from Guna in northeast Panama.

Coordination Committee of the Western Central Atlantic Fishery Commission

Yvette Diei-Ouadi, FAO Technical Secretary

Activities within the Western Central Atlantic Fishery Commission (WECAFC) region are being led by a diversity of partner organizations, including academia, civil society, and fisherfolk and aquafarmer associations. Notably, the WECAFC Coordination Committee includes representation from the South American and Mesoamerican committees. Indeed, activities planned by the WECAFC Coordination Committee represent not only the inherent diversity of small-scale fisheries and aquaculture in the region but also the spatial diversity of WECAFC members. Similarly, activities range from local to the regional level, in an effort to capture the multi-scalar dimension of IYafa 2022.

Activities within the region are being celebrated under the theme of recovery and resilience, with gender and youth as cross-cutting themes. The celebration also has three subthemes: social resilience, innovation and intersectoral linkages.

TABLE 1 – Activities of the WECAFC Coordination Committee

Month	Activity	Corresponding pillars of the Global Action Plan*
Ongoing	Identifying, selecting and celebrating regional IYafa champions (individuals and institutions) who exemplify the ideals of the Small-scale Fisheries (SSF) Guidelines and the pillars of IYafa 2022.	2, 3, 4, 5
August	Co-sponsoring the Caribbean Network of Fisherfolk Organisations leadership institute to support the continued development of fisher-led strategies to implement the SSF Guidelines in the region.	2, 3, 5
October	High-level dialogue of the Caribbean Community (CARICOM) fisheries ministers on mainstreaming the contribution of SSF/A in the regional blue economy dialogue during the Caribbean Regional Fisheries Mechanism's 11 th Ministerial Council.	1, 2, 4, 7
November	Hybrid Regional Women in Fisheries Forum at the 75 th Meeting of the Gulf and Caribbean Fisheries Institute.	3, 5

* The pillars of the Global Action Plan are: 1. Environmental sustainability; 2. Economic sustainability; 3. Social sustainability; 4. Governance; 5. Gender equality and equity; 6. Food security and nutrition; and 7. Resilience.

Mesoamerican Committee for the Celebration of the International Year of Artisanal Fisheries and Aquaculture 2022

Alejandro Flores-Nava, FAO Technical Secretary

The Mesoamerican Committee, established in February 2021, is constituted by the National Fisheries Authorities and represented by the Organization of the Fisheries and Aquaculture Sectors of the Central American Isthmus, the Confederation of Artisanal Fisherfolk of Central America, the Indigenous Fisherfolk Alliance, and a number of small-scale aquaculture organizations of the subregion.

The Agreed Plan of Action of the Mesoamerican Committee has three main objectives: (i) enhancing the inclusion of small-scale fisheries/small-scale aquaculture in national social protection systems; (ii) strengthening partnerships and networking among small-scale fisheries/small-scale aquaculture; and (iii) organizing a subregional forum for sharing information and experiences among small-scale fisheries and small-scale aquaculture.

TABLE 2 – Activities of the Mesoamerican Committee

Month	Activity	Corresponding pillars of the Global Action Plan*
May	A Mesoamerican forum on social protection and decent work conditions in small-scale fisheries/small-scale aquaculture will be organized. It aims at generating policy recommendations for the inclusion of these producers in national social protection systems.	1
April	A virtual meeting of the Committee with all small-scale aquaculture associations of the subregion will promote the creation of the Mesoamerican Network of Small-scale Aquaculture.	2
September	The first Mesoamerican Congress of small-scale fisheries/small-scale aquaculture will review the state of the sector, identify limiting factors for sustainable development and propose a road map to gradually overcome them.	3

* The pillars of the Global Action Plan are: 1. Environmental sustainability; 2. Economic sustainability; 3. Social sustainability; 4. Governance; 5. Gender equality and equity; 6. Food security and nutrition; and 7. Resilience.

South American Committee for the Celebration of the International Year of Artisanal Fisheries and Aquaculture 2022

José Aguilar-Manjarrez, FAO Technical Secretary

The South American Committee for the Celebration of IYAF 2022 was created on 7 September 2021. It is comprised of representatives of fisheries and aquaculture

organizations from Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela (Bolivarian Republic of).

TABLE 3 – Activities of the South American Committee

Month	Activity	Corresponding pillars of the Global Action Plan*
April–September	Two national-level surveys are being conducted; the first survey aims to review the status of the sectors regarding fish consumption; value chains; artisanal fisheries and aquaculture registries; artisanal fisheries and aquaculture associations; gender; success stories and main challenges; the second survey is on seafood safety and quality for artisanal fisheries products. The expected results of these surveys are two summary reports and one policy brief that will present key results of the surveys and public policy recommendations for authorities and communities, to support artisanal fisheries and aquaculture.	All pillars
June	Virtual meeting on seafood consumption to stimulate local consumption of fish and other seafood, especially through school feeding programmes.	5, 6
August	Virtual meeting to promote the formation of small-scale artisanal fisheries and aquaculture associations to strengthen value chains and family and regional economies.	2, 3, 5, 6
November	Virtual congress to present the key results from the national surveys and recommendations from each country to support the IYAF beyond 2022	All pillars

* The pillars of the Global Action Plan are: 1. Environmental sustainability; 2. Economic sustainability; 3. Social sustainability; 4. Governance; 5. Gender equality and equity; 6. Food security and nutrition; and 7. Resilience.



A small-scale mussel farmer from Santa Catarina in Brazil harvesting his product manually.

The Agreed Plan of Action of the Committee in South America comprises two main objectives: (i) establish mechanisms for dialogue and exchange of experiences and good practices among small-scale fishers and fish farmers; and (ii) develop joint actions to strengthen artisanal fishers and small-scale fish farmers as guarantors of food security through their work, culture and identity.

A joint meeting of the three subregional committees is scheduled towards the end of 2022 to exchange lessons learned and derive key recommendations for actions of IYAFA beyond 2022 to provide continuity to the efforts by IYAFA.

FAO Member States and partners are encouraged to support the subregional committees and integrate dedicated IYAFA 2022 activities in their programmes at the national level to achieve the objectives of IYAFA, including key actions for the region such as gender equality and women's empowerment. It will also be important

to set a framework and a platform to incorporate youth into IYAFA's work since they form an exceptional human resource base needed to support fisheries and aquaculture for the future.

SEE ALSO

Global Launch of the International Year of Artisanal Fisheries and Aquaculture 2022:

www.fao.org/webcast/home/en/item/5716/icode

Regional Launch of the International Year of Artisanal Fisheries and Aquaculture 2022:

www.fao.org/americas/eventos/ver/en/c/1450084

FAO Lanza el Año Internacional de la Pesca y la Acuicultura Artesanales 2022 en América Latina y el Caribe:

<https://www.fao.org/chile/noticias/detail-events/ru/c/1456899>

Año Internacional de la Pesca y la Acuicultura Artesanales 2022:

www.cndh.org.mx/noticia/ano-internacional-de-la-pesca-y-la-acuicultura-artesanales-2022



Mr Hilarión Gaona practicing and promoting family fish farming in Paraguay.

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FAO Presence at AquaSur 2022 in Chile



AquaSur is an important aquaculture exhibition and conference event in the Southern Hemisphere, and an important meeting place to exchange experiences and achievements in aquaculture development at the national, regional and international levels.

The eleventh edition of AquaSur (www.aqua-sur.cl) was held in person (mainly) in Puerto Montt, Chile, from 2 to 4 March 2022; it brought together more than 12 000 participants and 250 exhibitors from Canada, China, Denmark, France, Japan, the Republic of Korea, Norway, Portugal, Spain, and the United States of America. Participants and exhibitors represented stakeholders from the global aquaculture supply chain, including producers and producer organizations, academia, representatives from ancillary industries, and others.

The theme of this year's AquaSur conference was "Blue Trilogy: Ocean, Aquaculture and Society, feeding the future". It was organized in three sessions: Sustainability and Innovation, Technology and Human Capital, and Health and Wellness (OneHealth) to address important issues related to the aquaculture sector. There were 16 presentations from 12 countries, namely Argentina, Australia, Brazil, Canada, Chile, Italy, Lithuania, Mexico, Norway, the United Kingdom of Great Britain and Northern Ireland, the United States of America, and Venezuela (the Bolivarian Republic of). Participation and attendees included international organizations, including the World Bank, the United States Food and Drug Administration, the European Commission, and the Bill and Melinda Gates Foundation. Four FAO officials attended the event and delivered various interventions.

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FAO's tasks at the conference were to give two opening remarks about the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022) and deliver two thematic presentations.

At the opening ceremony, Audun Lem, Deputy Director of the FAO Fisheries and Aquaculture Division, assured that "during the last decades the aquaculture sector has been the food production sector with the highest growth rate in the world, but we need this development to continue in a sustainable way to guarantee the supply of fish for future generations". He also highlighted the global importance of IYAFA 2022 to sensitize public opinion and governments about the importance of adopting specific public policies and programmes to support artisanal fisheries and aquaculture.

Eve Crowley, FAO Deputy Regional Representative for Latin America and the Caribbean, stressed that "men and women dedicated to artisanal fisheries and aquaculture in Latin America and the Caribbean contribute significantly to food security and nutrition, the eradication of poverty and the sustainable use of natural resources". She underscored that IYAFA 2022 aims to enhance global awareness on the role of artisanal fisheries and aquaculture, strengthen science-policy interaction, empower stakeholders to take action, and build new partnerships and strengthen existing ones.

At the Sustainability and Innovation session, Marcio Castro de Souza, Senior Fishery Officer, reinforced the role that aquaculture plays at the global level in production and trade while drawing attention to the most recent figures involving fisheries and aquaculture products. He also presented an overview of the new trends affecting the commercialization of fisheries and aquaculture products, including market requirements and the shifts brought by the COVID-19 pandemic. His presentation concluded by stressing the importance of information access for

exploring opportunities in international trade and the role that FAO can play in this regard.

At the Health and Wellness session, José Aguilar-Manjarrez, Fisheries and Aquaculture Officer of the Regional Office for Latin America and the Caribbean, spoke about marine spatial planning within the context of a new Global Environment Facility project on “Strengthening management and governance for the conservation and sustainable use of globally significant biodiversity in coastal marine ecosystems in Chile”. He emphasized that with marine spatial planning “oceans, aquaculture and society” can be better integrated to understand and manage aquaculture as a complex socio-ecological system.

Among the key achievements and agreements derived from FAO’s attendance at the conference were:

- Reinforced awareness about, understanding of, and action to support the contribution of artisanal fisheries and aquaculture.
- Enhanced promotion of FAO’s activities for IYAF 2022.
- Raised awareness about the importance of marine spatial planning as an essential decision-making process to strengthen marine and coastal governance.
- Strengthened ties with AquaSur, including through the keynote openings by FAO.

SEE ALSO

Con más de 12,000 asistentes finalizó AquaSur 2022
www.aqua.cl/2022/03/07/con-mas-de-12-000-asistentes-finalizo-aquasur-2022/#

Aguilar-Manjarrez, J. 2022. Proyecto abordará gobernanza de la biodiversidad de ecosistemas marinos costeros. Columna de Opinión. *Revista Salmonexpert*, Edición marzo 2022.
www.salmonexpert.cl/articulo/proyecto-abordara-gobernanza-de-la-biodiversidad-de-ecosistemas-marinos-costeros

Photos from AquaSur 2022
www.flickr.com/photos/195191638@N04

Tweets from AquaSur 2022
<https://twitter.com/AquaSurChile>
<https://twitter.com/faochile/status/1499460070303842305?s=24>



Group of seaweed women farmers harvesting Sea Chicory (*Chondracanthus chamissoi*) in Caleta Coliumo, Biobío Region, Chile.

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A "Sea" Grassroots Approach to Celebrating IYafa 2022 in the Western Central Atlantic Region

The celebration of the International Year of Artisanal Fisheries and Aquaculture 2022 (IYafa 2022) across the globe highlights and underscores the significant contribution small-scale fisheries and aquaculture (SSF/A) make to people's well-being. IYafa 2022 has mobilized partners to develop innovative and creative approaches that showcase the multisectoral links within SSF/A. The Western Central Atlantic Fishery Commission (WECAFC) region has taken an active role in celebrating the year and has embodied the global theme "Small in Scale, Big in Value" throughout its programmatic activities.

The importance of small-scale fisheries in Latin America and the Caribbean has been widely recognized in terms of income, livelihoods and food security for more than 2 million people (TBTI, 2018). Within the region, approximately 2.3 million people depend on small-scale fisheries and aquaculture either directly or indirectly,¹ contributing approximately 10 percent to global fisheries production.² At the same time, the region is also vulnerable to the impacts of climate change, market variabilities, and illegal, unreported and unregulated fishing activities. Although these challenges contribute to some uncertainty in how management approaches will address them, the region has experienced noteworthy growth and development over the past decade. For example, Belize and Mexico have introduced new marine protected areas, while the Eastern Caribbean States are currently mainstreaming social protections and decent work practices. In addition, aquaculture continues to show significant growth, accounting for approximately 18 percent of the total fish production in Latin America and the Caribbean. Because capture fisheries production shows signs of declining, aquaculture in the region is poised to fulfill the local fish needs and contribute to export revenues. This increase in production also creates new employment opportunities for women as well as avenues through which fisherfolk can diversify their livelihoods.

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©Caribbean Network of Fisherfolk Organizations

Belizean fisheries preparing their vessels before heading out to sea. A central goal of IYafa 2022 celebrations in WECAFC is creating an enabling environment to foster social protection of fishers in responding and coping with external and internal shocks to the fisheries industry.

The WECAFC Coordination Committee has committed to a "sea" grassroots approach to the International Year. Indeed, the activities are being driven by a diversity of partners from across the region, using collective action from the local level as the basis. Recognizing the challenges brought on by the recent global pandemic, which has exacerbated the vulnerabilities and challenges of SSF/A stakeholders, the international year in WECAFC is being celebrated under the theme "Resilience and Recovery" (Figure 1). This theme highlights the strength of fishers, fish workers and aquaculture farmers in developing adaptive solutions to withstand and respond to changes in their system.

The WECAFC region has maintained an active engagement in supporting the development of aquaculture in the region. At the recent Caribbean Regional Fisheries Mechanism fisheries forum held in March 2022, several resolutions were passed centred on the promotion of sustainable aquaculture development in the region. The forum also identified opportunities for continued development of aquaculture. At the same time, in coordination with and within the framework of IYafa 2022, work is ongoing to develop the first harmonized digital library of aquafarmers and aquafarms in the region, which will also include current and past regional experts on aquaculture. This work will culminate with a multisectoral discussion including

FIGURE 1 – The figure illustrates the overall theme of IYafa 2022 in WECAFC, Resilience and Recovery (with gender and youth as cross-cutting themes). There are three subthemes: social resilience, innovation and intersectoral linkages.



1. Chuenpagdee, R., Salas, S. & Barragán-Paladines, M.J. 2019. *Viability and sustainability of small-scale fisheries in Latin America and the Caribbean*. 19: 3–13.
2. Salas, S., Chuenpagdee, R., Seijo, J.C. & Charles, A. 2011. Coastal fisheries of Latin America and the Caribbean. *Coastal Fisheries of Latin America and the Caribbean*, 544: 231–84.

aquafarmers, producers, policymakers and funding agencies on identifying ways to support the long-term development of aquaculture. Recognizing the important role played by aquaculture workers in the region, significant efforts have been placed in the celebration of IYafa 2022 to ensure their contributions are highlighted.

The celebration of IYafa 2022 within the WECAFC region was in response to a recommendation from the 17th Session of WECAFC in July 2019. It recommended that IYafa be used as an opportunity to consolidate activities with partners, taking advantage of the year to link the highly distributed activities and showcase the progress made in the implementation of the Small-Scale Fisheries (SSF) Voluntary Guidelines in a coordinated way and to gain more visibility for the WECAFC area SSF/A and fisherfolk stakeholders at a global scale.

As a demonstration of the commitment to creating a celebration that meets the needs of the members of WECAFC, the WECAFC Secretariat facilitated the establishment of a coordination committee in 2020. This committee is led not by the Secretariat but rather by key stakeholders within the region: two fisherfolk groups, namely the Caribbean Network of Fisherfolk Organizations and the Confederation of Artisanal Fisherfolk of Central America; and two regional fisheries bodies, specifically the Caribbean Regional Fisheries Mechanism and the Central American Fisheries and Aquaculture Organization. At the same time, the coordination committee includes representation from academia and civil society (see the article on pages 11–14 in this edition of *FAN*). Importantly, Members and partners are encouraged to join the committee as observers to contribute to continued development and shaping the implementation of activities. In formulating its approach to the international year, the committee has sought to focus on highlighting and mainstreaming the contributions of those persons most involved in SSF/A.

The diversity of activities occurring throughout the year is a testament to the priorities and themes in the region. A significant overarching and ongoing initiative is the selection of the IYafa 2022 champions within the region. These champions, whether they are individuals or organizations,

are representatives of the ideals of the SSF Guidelines and demonstrate a commitment to mainstreaming and advocating for the integration of the guidelines into policy frameworks at the local, national and regional levels. For example, Dr Alejandro Espinoza, an academic IYafa champion, will represent the committee at the upcoming 4th World Small-Scale Fisheries Congress in October. He will not only present his ongoing work on SSF in Mexico, but will also have an opportunity to participate in regional dialogues on SSF within the framework of IYafa. At the same time, recognizing the important and often forgotten contributions of women in SSF/A, the committee will convene a regional women-in-fisheries forum at the 75th meeting of the Gulf and Caribbean Fisheries Institute. This regional women's forum will not only celebrate the significant role of women but will also provide an opportunity for women to share stories and best practices. A central objective of this regional event is to bring added regional focus to the significance of women as fishers, fish vendors, boat owners, organizational leaders and chief fisheries officers.

Significantly, activities are not only taking place at the regional level but also at the national level. With the support of the European Union, the coordination committee, in partnership with the project steering committee, will finance national level IYafa 2022 activities in two or three Member States. This represents an important deliverable for the committee, as it further demonstrates its commitment to supporting and celebrating stakeholders most reliant on SSF/A. Activities are being designed in partnership with local stakeholders, including civil societies, fisherfolk and aquaculture farmer associations, and community-based organizations. Lastly, in recognition of the importance of policymakers to the sustainable development of SSF/A in the region, the committee is co-sponsoring a high-level dialogue of fisheries ministers from the Caribbean Community (CARICOM) at the 11th Ministerial Council of the Caribbean Regional Fisheries Mechanism. At this important meeting, fisheries ministers will engage in a discussion on identifying current and emerging policy windows that can be leveraged to mainstream the development of SSF/A policies within the regional blue economy dialogue. After this event, the committee expects to prepare a policy brief that not only summarizes the main discussion points covered by ministerial representatives but also reminds Members of the importance of securing small-scale fisheries and aquaculture for current and future generations.

Small-scale fisheries and aquaculture are a central tenet of the cultural fabric of the men and women in the Western Central Atlantic region. IYafa 2022 represents the opportunity not only to celebrate these men and women but also to acknowledge the vulnerabilities they face and to jointly support their resilience. Indeed, the committee's "sea" grassroots approach to celebrating IYafa prioritizes those men and women who depend on the industry to survive. In closing, the foundation laid throughout this year as a result of these activities represents a renewed and continued focus on securing small-scale fisheries within the region.



Workers of the Juan Tama Community Fish Farm in Colombia are preparing rainbow trout for sale. The association seeks to promote food security by promoting sustainable and community-led fish and agricultural production. The association was recently selected as an IYafa 2022 civil society champion in the WECAFC region for exemplifying the ideals of the International Year and the promotion of the SSF Voluntary Guidelines.

The International Year of Artisanal Fisheries and Aquaculture: Updates from the Africa Region

In Africa, fisheries and aquaculture are predominantly artisanal and small-scale in scope, respectively, but contribute significantly to food security and nutrition, livelihoods, economic development, tradition, social capital, biodiversity and climate change resiliency.

The estimated total production of African artisanal fisheries and aquaculture is about 5.2 million tonnes with an economic value at first sale estimated at USD 5.8 billion, 22 percent of the global value (SOFIA, 2020). The sector employs 5.4 million fisherfolk and fish farmers and provides the main source of quality protein to many Africans, often with no other alternatives.

Given the current population growth, African governments are increasingly adopting policies to promote markets, including focusing on expanding intra-African trade. Despite the positive prospects, fish demand in sub-Saharan Africa exceeds supply, and this provides an opportunity for aquaculture growth and expansion. In 2020, per capita fish consumption in the region was estimated at 8.9 kg below the African average of 12.6 kg and the world average of 20.5 kg.

As part of the celebrations to mark the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022), the sub-Saharan Africa Steering Committee of IYAFA 2022 and respective national and subregional partners have planned and conducted activities to celebrate the small-scale fisheries and aquaculture sector to recognize their contribution to millions of riparian communities' well-being and nature across the region.

To celebrate IYAFA 2022, sub-Saharan Africa has successfully organized national and regional launch events across the region as part of this initiative. At most of these regional initiatives, the Assistant Director-General of the FAO Regional Office for Africa called upon members to take action on IYAFA 2022. In his own words: "Before closing, I would like to draw your attention to the fact that next year 2022 has been declared by the United Nations General Assembly as the International Year of



FAO booth at the regional OACPS 7th Meeting of Ministers, Accra, Ghana, raising awareness of IYAFA.

©FAO/D. Youngs

Artisanal Fisheries and Aquaculture (IYAFA 2022), which will have many events throughout the year. The year has been launched by the Director-General of the Food and Agriculture Organization of the United Nations, the lead Agency designated to coordinate the celebrations on 19 November 2021. To make the most of this opportunity, it is time to think creatively, join hands and start making plans for how to make IYAFA 2022 a memorable year".

Some of the regional initiatives are:

Hybrid Meeting of Professionals/Experts in Fish Safety, Technology and Marketing in Africa (ANFTS) in Kampala, Uganda, on 9 December 2021

The first-ever hybrid meeting attracted 84 experts and focused on the progress in post-harvest fish utilization, with particular attention given to fresh fish handling, fish processing, quality assurance, marketing and socioeconomic issues. Arising from the presentations and discussions, a number of recommendations were made to FAO, its Members, and all institutions and organizations that have a stake in fish utilization in Africa.

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The 19th Session of the Committee on Inland Fisheries and Aquaculture in Africa (CIFAA) in Lilongwe, Malawi, from 30 November to 2 December, 2021

The first-ever hybrid session included 119 participants from 23 member countries, 5 observers and the FAO Secretariat. The session covered four main topics: (i) implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) and commemoration of IYAFA 2022; (ii) digitalization of aquaculture in Africa; (iii) best practices for improved fish safety and loss reduction in inland fisheries and aquaculture; and (iv) the independent study on CIFAA strategic reorientation.

The Organisation of African, Caribbean and Pacific States (OACPS), 7th Meeting of Ministers in charge of aquaculture and fisheries in Accra, Ghana, 5–8 April 2022

The President of Ghana, H.E Nana Addo Dankwa Akufo-Addo, officially opened the OACPS 7th Meeting of Ministers in charge of fisheries and aquaculture. The meeting was guided by the theme “OACPS Blue Economy Agenda 2030 – Catalyzing Sustainable Development for the Future.” The fisheries and aquaculture ministers reiterated that the Seventy-Second Session of the United Nations

General Assembly declared 2022 as the “International Year of Artisanal Fisheries and Aquaculture.” This provides an opportunity for the OACPS to focus attention on the role that small-scale fisheries, fish farmers and fish workers play in food security, nutrition, poverty reduction and the sustainable use and conservation of our oceans, seas, lakes and rivers, and the natural resources therein. In her remarks, Hon. Mavis Hawa Koomson, the Minister for Fisheries and Aquaculture Development of Ghana, highlighted that “To ensure the sustainable utilization and management of the fisheries resources, national, regional as well as international, actions are required to mitigate the challenges considering the shared nature of fisheries resources”.

To further shine the spotlight on fish farmers and those involved in the aquaculture sector, certain IYAFA 2022 Africa events will have national launch activities in Ghana, Senegal and the United Republic of Tanzania. The FAO Regional Office for Africa is also liaising with the Non-state Actor platforms in Eastern and Southern Africa to organize subregional commemorations. It is expected that an aquaculture centric event will take place in Zambia in September 2022 under the African Development Bank and FAO “Technical Assistance to Zambia Aquaculture Enterprise Development” (ZAEDP) project.



©FAO/IS. Kambo

Women fish workers smoking tilapia in Abengourou, eastern Côte d'Ivoire, supported as part of the FISH4ACP project which aims to stimulate sustainable growth of the tilapia sector to create jobs and provide an income for the rural population, and increase the availability of tilapia which is a source of affordable and safe supply of animal protein.

Aquaculture Development in Nigeria and FAO's Role

Fish is one of the most consumed animal-source foods in Nigeria. According to FAO data, fish and shellfish accounted for 36 percent of daily protein intake,¹ testifying to the nutritional importance and high demand for fish by the population and the critical role of fish in the national food system. Considering that Nigeria is the most populous country in Africa, and growing, this is an enormous amount of fish consumed – over 1.74 million tonnes of aquatic food in 2017 was available to the roughly 191 million people, and more recent estimates put per capita fish consumption around 13 kg per year. Of that, about 1.2 million tonnes was produced locally as a combination of aquaculture and capture fisheries, with the remaining 30 percent imported.

Nigeria is a major regional aquaculture producer, producing 261 621 tonnes of fish farmed in 2020, contributing about 11 percent of the total aquaculture production on the continent. Since the 1990s, aquaculture has boomed, with Nigeria becoming the leading producer in sub-Saharan Africa, accounting for more than 50 percent of the production of farmed fish in the sub-Saharan subregion and the second largest producer on the African continent after Egypt.

Nigeria is the world's largest producer of African catfish, one of the most commercially important freshwater fish species in Africa. Catfish is the most popular fish on the local market. There is also substantial trade in smoked fish to neighbouring countries and to the Nigerian diaspora in Europe, the Near East and the United States of America. The catfish sector supports an estimated 1 million direct and indirect jobs throughout the value chain, a vast majority of which are small-scale producers and processors.²

However, aquaculture production has fallen off significantly in recent years, with 2020 production 17 percent lower than its peak in 2015. Much of this decline can be attributed to the high cost of fish feed.

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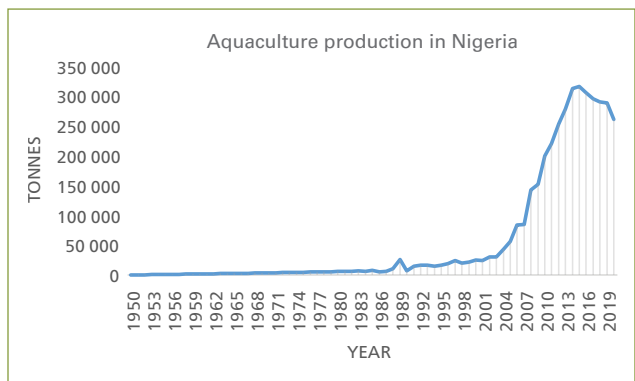
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FAO Nigeria trained 100 fish processors in Abuja on the new FAO Thiaroye Techniques (FTT) Fish Smoking Kiln Technology, to produce and sell safe and high quality smoked fish.

Aquaculture in Nigeria has gone through several stages of development since the 1950s. The first reported attempt was in 1951 at a small experimental station in Onikan, Lagos, where several species of tilapia were cultured.³ Following this experimentation, a large and modern pilot fish farm was established in Panyam, Plateau state, for the culture of carp, *Cyprinus carpio*. Realizing the potential of aquaculture from these trials, other regional governments started to set up their own production and demonstration sites. Extension activities and services at these demonstration sites in the 1960s and 1970s increased awareness of fish farming, and aquaculture production saw increased recognition and development in subsequent decades with the active participation of public and private organizations, smallholder farmers and development



1. FAOSTAT New Food Balances (updated 14 February 2022; www.fao.org/faostat/en/#data/FBS)
2. www.fao.org/3/cb4127en/cb4127en.pdf
3. doi: 10.1109/ICBBT.2010.5478927 <https://ieeexplore.ieee.org/document/5478927>

partners with the support of government institutions. The explosion of catfish production in the early 2000s was a result of successful introduction of catfish breeding techniques, enabling the mass production of fingerlings.

Today, a few species dominate aquaculture production, nearly all of which is freshwater, with North African catfish and other members of the family Clariidae dominating production at about 64 percent in 2020.⁴ The table below shows a breakdown of the most important species groups. Note that some production is reported at higher taxonomic levels, and is consequently listed in FAO statistics with the acronym “nei”, or not elsewhere included.

The Nigerian government has been actively promoting the growth of aquaculture to meet the growing demand for fish, reduce dependence on fish imports, create jobs and business opportunities, and generate additional income streams to diversify its oil-based economy. The government has given significant attention to programmes, policies and strategies^{5,6,7} to improve both commercial and artisanal aquaculture production across the country.

FAO support to aquaculture development in Nigeria

FAO has long supported aquaculture development in Nigeria, actively providing support to the Government of Nigeria in its efforts to unleash the country’s potential for aquaculture production in a joint bid to influence the sector’s contributions to increased national food and nutrition security, improved smallholder livelihood and income, and enhanced long-term sustainability. The FAO Nigeria Country Office, in line with its overall mandate, global goals, strategic objectives, organizational outcomes and defined regional priorities, is committed to supporting the Government of Nigeria through a defined Country Programming Framework (CPF). FAO has been assisting Nigeria to promote current and emerging national food and agriculture development priorities by providing technical assistance and support to achieve the CPF strategic objectives, also taking into account the country’s macroeconomic framework and the intersectoral and international linkages in development processes, with a view of realizing the government’s Economic Transformation Agenda. In the CPF and in synchronization with government priorities under the Agriculture Transformation Agenda, aquaculture and value chain development featured prominently in the priorities. Activities under this priority contribute to the CPF strategic objectives on increasing food and nutrition security, accelerating agricultural production of high-value and value-added agricultural products, adopting



FAO’s aquaculture intervention in northeast Nigeria is enhancing access to fish for fish processors whose supply was disrupted by the conflict, reviving markets and providing livelihoods.

best agricultural practices and sustainable management of natural resources, providing opportunities for young men and women to engage in agriculture, and strengthening the capacities of relevant ministries, departments and agencies to develop and implement cross-sectoral policies and investment programmes for aquaculture development.

FAO has led some key historical projects in Nigeria and has some ongoing projects with measurable impact contributing to the realization of the Nigeria CPF strategic objectives. Some of these projects are briefly summarized below. In more recent years, FAO has facilitated key and strategic aquaculture development policies, frameworks and programmes, in particular the implementation of the provisions of the Code of Conduct for Responsible Fisheries (CCRF) relating to aquaculture and culture-based fisheries and national aquaculture strategies, among others. Two ongoing projects are also presented in more detail.

Historical projects

The National Special Programme for Food Security in Nigeria (UTF/NIR/047/NIR), implemented from October 2001 to July 2007. Aquaculture and inland fisheries formed a component of the intervention for rapid improvement in food security at the household and community levels and alleviating rural poverty. Small-scale farming families were trained on new technological packages, including earthen pond construction and stocking, concrete pond rehabilitation and integrated aquaculture, fingerling production, feeds and feeding, and value addition through processing and storage.⁸

Sustainable Aquaculture Systems (TCP/NIR/3203):

This assistance was approved by FAO under the Technical Cooperation Programme project, implemented between January 2009 and December 2011. The Federal Department of Fisheries made a request to FAO for assistance in elaborating the National Aquaculture Strategy⁹ for the

4. FAO. 2022. Fishery and Aquaculture Statistics. Global aquaculture production 1950–2020 (FishStatJ). In FAO Fisheries and Aquaculture Division [online]. Rome. Updated 2022.

5. FAO. 2022. Nigeria. Text by D’Andrea, A. Fisheries and Aquaculture Division [online]. Rome. [Cited 4 April 2022].

6. <http://extwprlegs1.fao.org/docs/pdf/nig165890.pdf>

7. https://au.int/sites/default/files/documents/30266-doc-au-ibar_-_fisheries_policy_framework_and_reform_strategy.pdf

8. www.fao.org/3/ak504e/ak504e.pdf

9. <http://extwprlegs1.fao.org/docs/pdf/nig189027.pdf>

TABLE – Aquaculture production in Nigeria in 2020 by ASFIS species group, showing volume and percent of total

Species group	Scientific name	Tonnes	Percentage
North African catfish	<i>Clarias gariepinus</i>	141 640	54
Torpedo-shaped catfishes nei	<i>Clarias spp.</i>	25 932	10
Cyprinids nei	<i>Cyprinidae</i>	21 351	8
Tilapias nei	<i>Oreochromis spp.</i>	19 653	8
Nile perch	<i>Lates niloticus</i>	14 084	5
Aba	<i>Gymnarchus niloticus</i>	6 136	2
Reticulate knifefish	<i>Papyrocranus afer</i>	5 844	2
African bonytongue	<i>Heterotis niloticus</i>	4 612	2
Characins nei	<i>Characidae</i>	4 302	2
Upside-down catfishes	<i>Synodontis spp.</i>	4 130	2
Grass-eaters nei	<i>Distichodus spp.</i>	3 930	2
Total		261 710	

development of viable and sustainable aquaculture systems for small-scale farmers. The project produced four business plans from different production systems obtainable in Nigerian aquaculture to serve as a model for the expansion phase of the project countrywide. Another notable outcome of the project is the development of a 5-year National Aquaculture Development Plan, validated and produced to facilitate implementation of the key elements of the National Aquaculture Strategy.

Telefood Project – Production of Juveniles and Table Size Fish (TFD-16/NIR/002), implemented from May 2016 to April 2017. The aim of the project was to diversify the livelihoods of a predominantly subsistence crop and poultry farming community by introducing sustainable fish farming to improve their earning potentials. The Bleban Youth Farmers in the Federal Capital Territory were the direct project beneficiaries, and were trained on fingerlings and fish culture practices to produce 10 000 table size fish (catfish) of 300 grams each. The project was largely successful and also recommended as a model for replication in different parts of the country and as an enterprise opportunity for unemployed youths to start a decent and profitable enterprise.

Technical Assistance to Sustainable Aquaculture Systems for Nigeria (UTF/NIR/056/NIR) was implemented between December 2013 and December 2019 and is strongly linked to the countrywide application of the National Aquaculture Strategy.⁷ The specific objective of the assistance was to assist in the implementation of the country's strategic framework for sustainable aquaculture development for small- and medium-scale enterprises, and within the context of this framework, sustainable and profitable farmer-led aquaculture demonstration plots were established to support the development of the subsector. As a result of the project, key actors in the aquaculture sector started using high-quality fingerlings and locally produced fish feeds in an efficient and profitable manner.

Restoring and Promoting Sustainable Agriculture-Based Livelihoods for Food Security, Employment and Nutrition Improvement in Borno State (UNJP/NIR/068/EC), implemented between February 2018 and November 2021. The aquaculture component of this project focused on vulnerable groups displaced from their homes and communities into an internally displaced persons (IDPs) centre due to conflict, especially for the communities who were dependent on capture fisheries on Lake Chad before being uprooted and cut off. More than 300 youth beneficiaries participated. FAO also established 10 fish-processing centers for 200 women fish processors, equipped with FAO Thiaroye Techniques fish smoking kilns to address challenges of post-harvest losses and poor preservation techniques in rural areas. This project fostered integration of the IDPs into local communities, and the collaboration between the IDPs and the host communities in growing fish and tomatoes, beans and other crops was successful. The project served a purpose to provide food and income for IDPs and their host communities, and also to engage youths in productive activities, thus preventing them from joining militant groups.

Building resilient livelihoods in northeast States of Adamawa, Borno and Yobe through climate change adaptation good practices and services (OSRO/NIR/805/NOR). Funded by the Kingdom of Norway, this project aimed to transform farming systems through integration of crops, vegetables, poultry into fish farming in Northern Nigeria. A key component, the Integrated Homestead Gardening and Aquaculture Livelihoods Incubation Model, trained beneficiaries on aquaculture, small drip irrigation system, micro gardening and water harvesting techniques, and good agricultural practices. Through this activity, conflict-affected farmers in Borno, Adamawa and Yobe States have been enabled to produce diversified food through these systems. Four incubation model centers were established in Borno, Adamawa and



Fish harvested from a rice-fish adaptive research demonstration plot in Kebbi state, northwest Nigeria.

Yobe states, and over a six-month production cycle, each centre produced 4.3 tonnes of catfish generating about NGN 382 500 (USD 1 062) per household.

Current projects

While there are numerous ongoing aquaculture development programmes and projects in Nigeria, this article briefly describes two global projects that have focused on family farmers, farmer groups, institutional capacity development and intensification of innovative aquaculture technology and practices. They include:

Farm Diversification Strategy Through Integrated Agriculture-Aquaculture System (MTF/GLO/101/MSS), started in June 2021 and will end in September 2023. In this project, FAO is working with the USAID Feed the Future Innovation Lab for Fish (USAID-FIL), the University of Ibadan, Nigeria, and the University of Georgia, United States of America, to promote a process of farm diversification through integrated agriculture-aquaculture (rice-fish) production system in two Nigerian states of Ebonyi and Kebbi. Rice-fish farming as a farm diversification strategy is an approach to assist rural communities to transform their traditional rice field environments into a more productive, resilient and biologically diverse agroecological landscape, with efficient use of land and water resources to produce fish in addition to rice within their existing rice fields. The diversification process involves farmer-managed and co-learning modification of existing rice fields by introducing farmers to simple low-cost integrated agriculture-aquaculture practices, and then locally supporting the farmers to test and adapt these practices for the culture of fish in a cost-effective integrated rice-fish system. This production system optimizes the production of two food commodities – rice and fish – in the same production area. Through the promotion trial process of adapting rice fields to include the culture of fish, FAO and partners are in the process of generating “entry-level” advice for the farmers who generally have little or no experience in aquaculture.

The Intra-ACP Blue Growth Program for Sustainable Fisheries and Aquaculture Value Chains Productivity and Competitiveness (FISH4ACP) (GCP/GLO/028/EC), started in March 2020 and will end in February 2025. FISH4ACP is an initiative of the Organisation of African, Caribbean and Pacific States (OACPS) aimed at making fisheries and aquaculture value chains in Africa, the Caribbean and the Pacific more sustainable. It is implemented by FAO and country partners with funding from the European Union and the German Federal Ministry for Economic Cooperation and Development. The overall objective of the project is to contribute to poverty reduction, job creation, and food and nutrition security. FISH4ACP aims to stimulate Nigeria’s catfish sector by supporting initiatives driven by the government and the private sector for enhancing productivity, increasing domestic production of high-quality feed and seed, and improving access to exports markets. In addition, these initiatives will increase market competitiveness through marketing and product diversification. Another cornerstone action of the project is to actively improve the economic, social and environmental sustainability of fisheries and aquaculture value chains in Nigeria. The implementation approach for the project involves value chain analysis to help the catfish sector increase production and improve self-sufficiency; creation of business and employment opportunities, particularly for women and youth; capacity development; improving training opportunities along the catfish value chain and making catfish farming more environmentally sustainable by reducing its carbon footprint; and helping businesses access additional sources of finance and investment.

Positive impacts, challenges, projections and potential opportunities

The success of the aquaculture subsector development depends on ensuring a system of progressive improvement and value addition along the value chains to meet the growing demand for fish at affordable and reasonable prices. Sustained efforts for capacity development, especially of artisanal and small-scale producers who form the major workforce in aquaculture production, will significantly boost aquaculture production in the next 10–15 years, given that the sector has a different outlook in terms of a positive contribution to domestic fish supply, reduced dependency on importation, and a significant contribution to food security and nutrition. FAO, within its mandate, will continue to support the Nigerian Government in developing policies and implementing strategic activities aimed at influencing the growth of the aquaculture sector to promote inclusive and sustainable economic growth, employment and decent work, efficient resource-use management, and above all to ensure the sustainable consumption and production patterns for fish and fish products.

SEE ALSO

Allen, K., Rachmi, A.F. & Cai, J. 2017. Nigeria: faster aquaculture growth needed to bridge fish demand-supply gap. *FAO Aquaculture Newsletter*, 57: 36–37.

Uzbekistan and the Development of its Aquaculture Value Chain

FAO has been actively supporting the development of the aquaculture sector of Uzbekistan for several years. In 2020, FAO with the Ministry of Agriculture and Water Resources implemented the National Review and Strategy for the Aquaculture Sector and the Fish Value Chain project; subsequently, the National Association of Fish Industry of Uzbekistan set about analysing the aquaculture sector. The project focused on the entire value chain, from producer to consumer, to identify challenges and opportunities for sustainable and efficient fish production, marketing, processing and trade. The review provided vital information to help the government and FAO develop a National Aquaculture Development Strategic Plan (NADSP). More recently, in March 2022, FAO organized a multistakeholder workshop as part of the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022) celebrations.

Uzbekistan, as with many of the countries in Central Asia, has abundant inland water resources, namely rivers and lakes, which are suitable for freshwater aquaculture. The country has made significant gains in fish production in recent years through government land distribution to smallholders for individual fish ponds that produce common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idella*) and bighead carp (*H. nobilis*) primarily using extensive methods. In 2019, total fish production/landings amounted to 121 717 tonnes, an almost fivefold increase from 25 885 tonnes in 2012. Of this total production in 2019, 81 percent (98 338 tonnes) was from aquaculture.

Newly built ponds are generally small in size at 0.5–3.0 ha compared to ponds 10–100 ha built during the planned economy period. These small, intensively managed farms use modern technology throughout the hatchery, nursery and grow-out stages, which significantly increases productivity and thereby the economic returns. Farmers who grow fish in extensive systems produce 1.0–2.5 tonnes/ha (75–85 percent silver carp; and 15–25 percent carp, grass carp and bighead carp) compared with production rates of more than 10 tonnes/ha with intensive systems. There are about 60 fish feed producers in the country as well

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Uzbek farmer feeding fish in a pond.

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as 79 hatcheries and 232 nurseries producing larvae and fingerlings.

Most of the fish that is farmed (or harvested from the wild) in the country is sold in live (25 percent) or fresh chilled (75 percent) form. The largest fish and fish product market in the country is located in the Chinoz district (rayon) of the Tashkent region. The principal points of retail sale are at the bazaar, where the fish farms (enterprises) have market stalls. Supermarket sales of fish are limited, where it is sold live but mainly as chilled fish. In general, the existing infrastructure at most markets is limited (and old) and, as a result, the hygiene standards are poor. Ice is rarely used, and fish distribution is generally done without the use of refrigeration equipment.

FAO's NADSP review process revealed that carps are available at affordable prices and that frozen and smoked products are accepted by the domestic market. Fish production is also still growing, and innovative systems for cultivation of carp and African catfish are able to keep prices consistent and affordable. A programme also exists to support the development of clusters to better synchronize cooperation services for production, feed, processing, storage and marketing. However, consumption of fish is low at about 3 kg per capita, and the majority of consumers are traditionally meat eaters. Furthermore, consumers tend to prefer larger fish, which take longer to grow and are more expensive to produce. There is also a strong seasonality to supply and demand together with stagnating fish prices and rising costs of production. A weak food safety regulatory system and associated services and infrastructure do not help market access and



Participants observing a demonstration of food safety.

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consumer demand. Production is also hampered by poor access to sufficient quantities of quality feed and a reliance on imported feed. Fish from aquaculture competes with fish from capture fisheries as well as imports. Many of these negative factors deter investors. Despite this, there appear to be a number of opportunities moving forward. For example, the number of consumers is likely to increase over time, and consumption could be increased through product development, particularly focused on fast food and easy-to-prepare type products and boosted by a national campaign to encourage greater consumption of fish. Innovation, in terms of retailing and improving export market access and helped by a strengthened food safety system, will likely lead to increased demand for aquaculture products. Underpinning many opportunities is the need for capacity building of the private sector, including in areas such as processing, value addition and food safety.

These issues and other factors discovered during the review have influenced the NADSP and its objectives, which are to strengthen the governance of the aquaculture sector in a way that is consistent with the objectives of achieving economic, social and employment benefits. At the same time, the NADSP will ensure that aquaculture development is environmentally sustainable in the short, medium and long term. It will also support better organization of markets, fish quality, processing, and domestic and export trade to increase value added and contribute to improved food security, benefiting not only farmers and other actors but also consumers across the country.

Bearing in mind the importance of small-scale aquaculture, in March 2022, as part of IYafa 2022 celebrations, FAO organized a workshop that provided a platform for FAO experts, experts from the State Committee of Veterinary and Livestock Development and Association

“Uzbekbaliqsanoat”, professors, scientific researchers and fish farmers to discuss prospects for the development of domestic fish farming and aquaculture as well as activities to promote artisanal fisheries and aquaculture in the country. The workshop was supported by the FISHCap project (Capacity Building for Sustainable Fisheries and Aquaculture Management in Central Asia, Azerbaijan and Turkey). This project is part of the FAO-Turkey Partnership Programme on Food and Agriculture (FTPP II), funded by the Government of Turkey, which aims to encourage collaboration between the private and public sectors.

During the workshop, Sherzod Umarov, Assistant FAO Representative, stated that “celebrating the International Year of Artisanal Fisheries and Aquaculture gives important recognition to the millions of small-scale fishers, fish farmers and fish workers who provide healthy and nutritious food to billions of people and contribute to achieving food security. This initiative is also an opportunity to enhance dialogue between small-scale producers of fish production. It is important to make their voices heard at all levels, so they can influence the decisions and policies that shape their everyday lives”.

The NADSP review and value chain analysis, although confined to primarily a desk study due to the COVID-19 pandemic, provided valuable information, helping shape the NADSP and raising the capacity of the government to manage the sector. Initiatives such as the recent IYafa 2022 workshop, which brought key stakeholders closer, highlight FAO’s ongoing commitment to supporting the development of the aquaculture sector in Uzbekistan. In the future, new rules and regulations as well as investment into the sector are foreseen, which will improve production, demand and market efficiency and facilitate access to international markets. Benefits are likely to reach not only fish farmers but also women, who play an active role in downstream value chain activities related to processing and trade.

SEE ALSO

<https://uzbekistan.un.org/en/176516-fao-marks-international-year-artisanal-fisheries-and-aquaculture-uzbekistan>

Production of the Grooved Carpet Shell, *Venerupis decussata*, Seedling in the Bivalve Hatchery of Bizerte (North Tunisia)

The grooved carpet shell *Venerupis decussata* (= *Ruditapes decussatus*) is an indigenous species of bivalve clam of high commercial importance in Tunisia. However, its production volume decreased sharply between 2017 and 2020, from 1 780 tonnes to 84 tonnes, respectively. Enhancing the wild stocks of *V. decussata* through the release of hatchery-produced spats is therefore becoming a necessity. In this regard, FAO recently started a collaboration with the Tunisian Technical Center of Aquaculture (CTA) with the objective to provide technical and logistical support to its bivalve hatchery at the Higher Institute of Fishing Technologies and Aquaculture of Bizerte. Initiated by the FAO Subregional Office for North Africa, this activity is part of the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022) and perfectly embodies the IYAFA 2022 slogan “Small in scale, big in value”.

The clam production sector generates employment for artisanal fishers, mainly women, along the coastal area in the Gulf of Gabès in southeastern Tunisia. Considering its importance, the government has developed a strategy to promote shellfish fishery activities, which include conservation and management. In collaboration with FAO, the Tunisian Government is focusing on empowering women collectors and developing a strategic partnership to improve women’s income. This collaboration has been supported under the FAO Flexible Multi-Partner Mechanism “Enabling women to benefit more equitably from agrifood value chains”.

This article describes the main achievements on the captive production of grooved carpet shell spats, broodstock management, spawning, larval and spat rearing as well as phytoplankton mass production. The production protocol was developed based upon the experience of the CTA team, and elaborated based on the results obtained by various scientists and researchers (Da Costa *et al.*, 2020; Medhioub *et al.*, 2017; Hamida *et al.*, 2004).

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A key requirement for bivalve hatchery production is sufficient production of larval feed, specifically phytoplankton. In this case, several different species of phytoplankton have been produced in mass culture (Figure 1) to satisfy the physiological needs of the various development stages of the grooved carpet shell. They include *Chaetoceros calcitrans*, *Isochrysis galbana*, *Isochrysis affinis galbana* (T-iso green), *Tetraselmis suecica* and *Phaeodactylum tricornutum*.



FIGURE 1 – Phytoplankton production in mass culture.

Broodstock management

Adult clams, measuring about 3.5 cm in length and weighing approximately 20 g, are collected from different areas along the coast of the Gulf of Gabès in southeastern Tunisia as broodstock for artificial reproduction.

After quarantine, the individuals (Figure 2) are kept at a temperature of 20 °C and a salinity of 32 psu (practical salinity unit) for about 45 days in a flow-through system



FIGURE 2 – Grooved carpet shell *Venerupis decussata* broodstock.



FIGURE 3 – Macroscopic assessment of the gonad maturation.

until achieving gonad maturation. They are fed with an abundant multispecies phytoplankton diet, and weekly samples are taken to assess the gonad maturation, both macroscopically and microscopically (Figure 3).

After 45 days, a thermal shock is applied to induce spawning. One cycle of cold water (10 °C, 30 minutes), followed by another cycle of warmer water (26 °C, 30 minutes), cause the release of sperm and oocytes in the spawning tank. Egg diameter ranges from 63 to 68 µm. After fertilization, cell division starts immediately, with the trochophore stage reached 12 hours after spawning and the D-shape larvae stage reached after 24 hours. After the thermal shock, the culture is conducted at 24 °C (Figure 4).

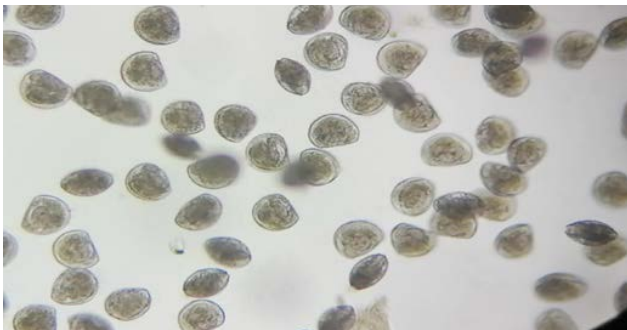


FIGURE 4 – Veliger larvae (D-shaped) of the grooved carpet shell.

The larvae are reared in batches based on size. Different mesh size nets are used to collect the larvae by sieving every 48 hours (Figure 5). After 16 days, the larvae enter the pediveliger phase, where they begin using their



FIGURE 5 – Larval culture room.

feet to crawl (Figure 6), indicating the start of the final metamorphosis and settlement phase. Larvae are reared at a density of one larvae per millilitre. Post-larval and small seed culture are carried out in containers using a down-welling system with probiotics until they reach 2 mm, approximately 3 months after spawning. Overall, this experiment was highly successful, and the Technical Center of Aquaculture produced 3.6 million spats (Figure 7).

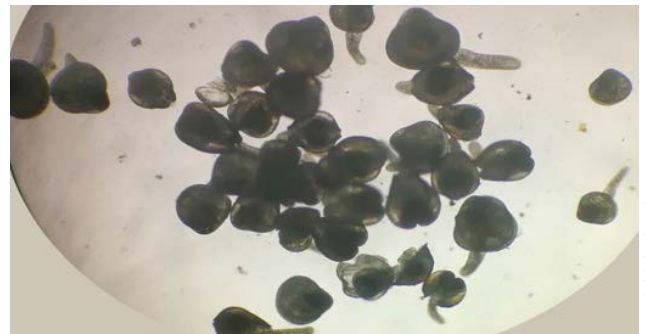


FIGURE 6 – Pediveliger larvae stage of clam.

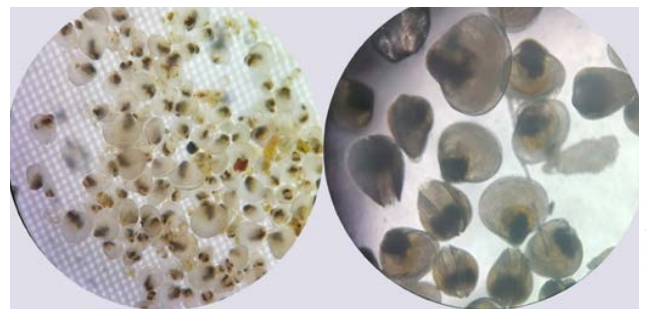


FIGURE 7 – 2 mm spats of the grooved carpet shell *Venerupis decussata*.

Artificial seedling production of *Venerupis decussata* in Tunisia aims to enhance stocks and rehabilitate natural sites to maintain jobs for a population of collectors and to develop aquaculture in Tunisian waters by providing spats to new promoters. Through the expertise gained during the implementation of the project, the Technical Center of Aquaculture now have the capacity to implement several campaigns of clam seedling production and stock enhancement each year.

SEE ALSO

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Importance of Small-scale Aquaculture in Asia



Homestead aquaculture in Bangladesh; walking catfish micropond culture in Nepal; tilapia ponds in Timor-Leste.

To commemorate the International Year of Artisanal Fisheries and Aquaculture 2022 (IYafa 2022), INFOFISH organized two webinars that put the spotlight on Asia as home to the world's majority of small-scale fishers and aquaculturists. The main objectives of the webinars were to raise awareness on IYafa 2022, launch the IYafa 2022 photobook, promote the results of the Illuminating Hidden Harvests study on small-scale fisheries, and advocate policy support for small-scale fisheries and aquaculture.

Among the diverse panel of distinguished speakers during this two-day event, Dr Ben Belton of WorldFish and Michigan State University discussed the diversity of small-scale aquaculture in Asia. The following article summarizes the key points.

The full presentation (including more fantastic photographs) and the agenda are available at the following link: www.infofish.org/Webinar/index.php/e-photobook-launch-iyafa-2022

Small-scale aquaculture in Asia can be separated into two general, albeit partially overlapping, categories: traditional, and more specialized. Integration with agriculture is

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common across many different types of small-scale aquaculture. A varied mix of technologies and practices are found throughout the Asian region. When thinking about small-scale aquaculture, one must also consider value chains, from upstream input supply to downstream sales. Finally, small-scale aquaculture has important and far reaching implications for sustainable development, from environmental management, social impacts on food security and nutrition, and employment and livelihoods.

Often, when people hear “small-scale aquaculture”, their first thoughts may turn to very small ponds. Sometimes called rural aquaculture in the past, this traditional aquaculture is characterized by loose organization, with often only a few ponds scattered within a village. Ponds usually are small, ranging from less than 0.2 hectares down to a few square metres. These tend to be multi-use waterbodies, as ponds are often constructed for harvesting drinking water and/or used for washing, bathing, watering livestock, irrigation and so on. As such, aquaculture is not necessarily the primary purpose of having a small pond. In terms of the fish species farmed, these systems are often polycultures of traditional species, usually carps or tilapia. Often, unstocked fish enter the ponds and they are also harvested, underscoring the connection between aquaculture and fisheries. These are typically quite low input systems, with little use of formulated feeds, and thus considered to be extensive and semi-intensive systems. Consequently, the ponds have low yields because of their small size; and because they are mainly managed using only family labour, the levels of investment but also the returns are fairly low. As a result, these systems tend to be one small component of a household's livelihood

portfolio, as household members are typically also engaged in farming and off-farm work. This traditional small-scale aquaculture is a complementary activity as part of this wider livelihood portfolio. Very often the fish produced are for home consumption, with surplus fish sold at local markets.

More specialized forms of small-scale aquaculture also exist. A common characteristic of these systems is the use of pelleted feeds and the increasing level of intensity. Likewise, there is greater diversity of stocked species, as well as more investment and complexity to the physical construction of ponds in the form of high dykes and regular pond shapes. Constructed specifically for use in fish culture, these systems have been one of the most rapidly growing segments of aquaculture in Asia since the 1990s. Fish and other aquatic foods produced in these specialized systems are sold at markets. This growth is driven primarily by the growing demand from domestic markets in Asia. Often, these types of farms appear in clusters, in other words, many farms co-located in one particular area. Though often still rural, these farms are also found in peri-urban areas on the outskirts of large cities. The scale of these farms ranges from small 0.2 hectares up to perhaps 10 hectares, that is to say, from “small” to “medium”.

Though often still polycultures, some systems can be monocultures, depending partly on the species farmed. This is more common for higher value species or species that are well suited to being grown at high density; as the value increases, the input use tends to range from intermediate to quite high. Overall, these systems can be considered between semi-intensive and intensive. Although agricultural processing by-products such as rice bran are widely used, formulated feeds are increasingly being used. These types of farms are generally family owned and operated but also use hired labour to varying

extents. The level of investment and operating costs tend to be moderate to quite high but with consequent economic returns, which means that these systems tend to be a major component of the livelihoods of people or households. Most of the production supplies domestic value chains, particularly for urban markets; however, a number of products are also produced for export.

A common feature of many small-scale aquaculture systems is the degree of integration with agriculture. This includes the classic rice-fish or the common chicken-fish combination. Other forms of integration include the VAC system from Viet Nam (V = *Vuong* – horticulture; A = *Ao* – ponds; C = *Chuong* – livestock), where livestock manure fertilizes ponds and pond water is used to irrigate vegetables or fruits grown intensively on pond dykes; another is the classic “ditch-dyke” system commonly found in deltaic areas, where crops are grown on elevated beds and fish are raised in channels between them. In addition to fish, crustaceans such as freshwater prawns and crayfish are grown in integrated systems. Likewise, many different fruits, vegetables and nuts are cultivated. There is also indirect integration through the use of agricultural by-products and processing wastes from off farm, such as rice bran, oil cake or chicken manure, which are used as feeds or fertilizers for the pond. This kind of reuse of waste is now known as a circular economy, even though these integrated systems have been a crucial part of aquaculture in Asia for a very long time. Factors driving integration include the low cost of inputs, efficient land use to grow multiple crops and efficient cycling of nutrients among different crops. Integration allows spreading of risk across multiple crops where poor production of, for instance chickens, can be compensated with fish sales. It also smooths out seasonal variations in income because there are different crops that can be harvested regularly or at different times of the year.



Specialized small-scale aquaculture sees increased use of feed; practices such as high dykes, hired labour and raising intensity; small-scale aquaculture is often integrated with vegetable and fruit production while also using farm by-products as feed.



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Small-scale aquaculture creates diverse opportunities, such as growing spinach in drainage canals; off-farm employment producing and transporting feed; increasing food security and nutrition linkages, including for instance these prawn heads sold locally after the bodies were exported.

Small-scale aquaculture encompasses much more than just ponds, as a range of other technologies in different environments are abundant. A few examples include cage culture of finfish, such as pangasius cage culture in rivers in Cambodia; tilapia cages in rivers, lakes and reservoirs throughout the region; and water spinach produced in peri-urban canals in Thailand. There are examples of coastal small-scale aquaculture too, such as extensive shrimp ponds in Bangladesh or milkfish farming in the Philippines. These examples prove that small-scale aquaculture is not only about finfish but also about cultivating a wide variety of crustaceans and other species. The wild caught crabs that are farmed in Bangladesh and fattened until they shed their shells further emphasizes the important link to wild seed. More intensive forms of small-scale shrimp aquaculture are practiced throughout the region. Additionally, in marine aquaculture, small-scale farmers grow high-value species such as red snapper in Malaysia, cultivate mussels on rafts in Thailand, and raise seaweed in many of the countries across the region.

Small-scale aquaculture also includes hatcheries and nurseries, essential components of the production system and sometimes highly numerous in aquaculture-rich areas in India and Viet Nam. Many direct and ancillary jobs are created in small-scale aquaculture value chains, both downstream and upstream of the farm. Some of these diverse jobs involve feed production and transport; product processing, collection, distribution and sales; and other types of input suppliers. This also illustrates the self-organization of some of these dense clusters of small-scale aquaculture farmers, creating an environment with many different economic opportunities and specialized activities.

Small-scale aquaculture has direct links to food and nutrition security. One good example is the small,

indigenous fish species harvested from the rice-fish system in Bangladesh, which are eaten directly by the members of the household themselves. Affordable fresh fish originating from small-scale aquaculture are widely available in wet markets and are sold as cooked and prepared fish, such as fried or barbequed tilapia. An interesting example is fried prawn heads! Freshwater prawns are a high value product produced in southwest Bangladesh. The tail meat is exported to Europe, but the heads remain locally where they are sold as a tasty and nutritious snack. In summary, small-scale aquaculture in Asia is highly diverse – and that diversity reflects local adaptations to the environment and resource base and to market opportunities in those locations. The situation has been changing over time, and a trend towards intensification is emerging, with more widespread use of formulated feeds and more sophisticated technologies. Simultaneously, extensive and semi-intensive farming systems remain effective in many contexts and are persistent as a result. There is also continuous diversification to new higher value niche species, as many traditional aquaculture species (carps, tilapia, catfish, for example) are produced in such large quantities that the price is very low, which is good for consumers but not so good for farmers.

Small-scale aquaculture fulfills a wide range of roles in producer livelihoods, ranging from a small but complementary contribution to the other activities of the household, all the way to the main economic activity of the family. In this light, small-scale aquaculture can create a wide range of employment opportunities both on the farm for hired workers and off farm in the value chains that emerge around clusters of these specialized farms. Of course, small-scale aquaculture is a very important contributor to food and nutrition security in the region through the supply of affordable aquatic food.

Updates on FAO Projects in Asia: Three Projects to Improve Well-being Through Aquaculture



Seaweed training activities at Satkhira area.



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Three recently completed FAO projects in Asia broadly contributed to enhanced well-being: (i) in Bangladesh, a seaweed project improved livelihoods, food security and nutrition; (ii) in India, Indonesia and Viet Nam, an antimicrobial resistance risk mitigation project resulted in better production and better environment; and (iii) in Indonesia, a traceability system for farmed shrimp created safe food for consumers and improved access to markets for farmers. All three also contributed to good aquaculture practices, strengthened value chains of products and improved the profitability of small-scale farmers, processors and rural traders, who were participants in the projects.

Support to Seaweed Cultivation, Processing and Marketing Through Assessment and Capacity Development (TCP/BGD/3704): Bangladesh

The project boosted the production, processing and marketing of seaweed in the coastal districts of Bangladesh to support livelihoods, food security and better nutrition. It helped strengthen the capacity of coastal communities in seaweed farming, processing and marketing.

Demonstration sites and training were carried out in the three coastal districts of Patuakhali, Satkhira and Bagerhat. Over 70 demonstration plots were set up in different coastal areas to showcase and disseminate good seaweed culture practice for increased production; more than 120 beneficiaries were trained. Additional training

was carried out on post-harvest activities, including processing value-added products that included higher value items based on seaweed such as cosmetics. Training also included learning to find new ways to access markets. To further help trainees, a training manual on culture and processing was produced in Bengali. Seaweed-based food products and other consumer items are becoming more popular with the public. In particular, the increased awareness of the health benefits of seaweed-based products has expanded the market.

Regarding the quality of the harvested seaweed biomass, the demonstration sites piloted improved net drying supported by a bamboo structure and introduced proper packaging procedures and water quality testing. The project distributed 25 hygienic food carts to coastal seafood vendors to sell seaweed food products, with an eye to reaching local tourists who come from all over the



Seaweed demonstration plot monitoring at Cox's Bazar, Bangladesh.

©FAO/M. Rahman

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country. The knowledge generated by demonstrations, training and field visits are now being applied to improve seaweed production, processing and marketing.

Production and marketing channels have been established in the project area. Based on a study conducted under the project, a national plan for future expansion of the seaweed industry in Bangladesh has been drafted and proposed for adoption by the government. The national seaweed plan seeks to expand production in other suitable areas in Bangladesh and marketing the seaweed throughout the country. With advocacy and awareness-raising, different government agencies and non-governmental organizations are now considering the seaweed industry as an important driver for the social and economic development of coastal communities and, more broadly, the growth of the country's blue economy.

Support Mitigation of Antimicrobial Resistance Risk Associated with Aquaculture in Asia (TCP/RAS/3702): India, Indonesia and Viet Nam

FAO's support to mitigation of antimicrobial resistance (AMR) risk associated with aquaculture was comprehensive, as it: (i) created awareness and improved understanding of the antimicrobial risks in aquaculture (done through national and regional training workshops); (ii) strengthened laws and regulations governing the use of antimicrobials in aquaculture; (iii) trained farmers in good management practices to enable them to conduct animal health management and biosecurity control for prudent and effective use of antimicrobials; and (iv) strengthened national laboratory capacity for monitoring and surveillance of AMR in aquaculture.

Pilot AMR surveillance activities were carried out in the three countries. In India, piloting of antimicrobial use and AMR surveillance was done in two states and on two types of freshwater aquaculture systems – catfish and carps grown in ponds. Indonesia worked on three freshwater aquaculture systems – tilapia, catfish and gourami. The pilots in Indonesia were set up in four districts, one in each of the four provinces on Java Island (West Java, Central Java, East Java and D.I. Yogyakarta). Antimicrobial resistance surveillance was performed by technical officers from four laboratories, reinforcing capacity-development activities in these facilities. Viet Nam chose shrimp aquaculture in Hai Phong and Quang Ninh provinces for the pilot on AMR surveillance.

The project assisted in strengthening national legislation on antimicrobial use in aquaculture and their enforcement. India has developed national guidelines for prudent and responsible use of antimicrobials in aquaculture based on the OIE Aquatic Animal Health Code, which provides reference to existing laws and regulations related to antimicrobial use, maximum residue limits permitted in foods, disease prevention, and antimicrobial stewardship in aquaculture. In Indonesia, the focus was on the development of guidelines for a survey to monitor and assess antimicrobial use and antimicrobial resistance



Training workshop on good aquaculture practices, India.

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in aquaculture. The guidelines describe the roles and responsibilities of different institutions in conducting the survey and the methodology for data collection and antimicrobial susceptibility testing. In Viet Nam, the achievements included the development of guidelines for prudent and responsible use of antimicrobials; the guidelines included incorporating awareness-raising among aquaculture operators, improving the capacity for diagnosis and antimicrobial susceptibility testing, limiting antimicrobial use to evidence-based application, and introducing antimicrobial resistance surveillance to monitor trends in resistance.

Overall, this project contributed to a reduction in AMR risk in carps (India), catfish (Indonesia) and shrimp (Viet Nam). These countries are among the top five aquaculture producers in the world. The project outputs have provided useful information on the formulation of national action plans for antimicrobial resistance in aquaculture, good aquaculture practices for the three commodities, and development of guidelines for prudent and responsible



National, provincial and district animal health staff attending the training on antimicrobial resistance surveillance and monitoring, Hai Phong, Viet Nam.

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use of antimicrobials in aquaculture in these countries. In sum, the project contributes to improved governance of the sector, accelerates the adoption of good farm practices, and increases technical, management and operational effectiveness in dealing with AMR.

Support to Traceability for Farmed Shrimp (TCP/INS/3704): Indonesia

Support was aimed at increasing the traceability of farmed shrimp, improving food safety and strengthening the entire value chain of the commodity. Improved farming practices were promoted for adoption and an effective implementation of a traceability system for farmed shrimp was introduced. The system follows the new standard of good aquaculture practice, or IndoGAP, and data recording for a traceability system. A traceability system entails several requirements; activities included compiling a database of farm registration and licensing information, improving record-keeping activities by farmers, and mapping of ponds and farms. The map – prepared by a

GIS expert – indicates GPS position data for shrimp farms, including the position of farms, processing plants and hatcheries in the target area of Banyuwangi District.

All target processors and their suppliers (intermediaries and farmers) have their own data records for a traceability system. Introduction to STELINA (Sistem Telusur dan Logistik Ikan Nasional – the National Fisheries and Traceability System initially developed for capture fisheries) and training on its application were carried out to allow one single fisheries and aquaculture traceability system implementation in Indonesia. All the processors, distributors, intermediaries and farmers improved their capacity in applying internal and external traceability systems. This increased capacity – the implementation of IndoGAP as well as the required data recording standards – is expected to enable small-scale farmers to move towards IndoGAP certification. With certification, small-scale producers will have a better access to and a stronger leverage in international shrimp markets.



Training participants to the support to traceability for farmed shrimp in Indonesia.





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FAO Council Adopts a Global Plan of Action for Enhancing the Management of Aquatic Biodiversity Used for Aquaculture



The publication of the first-ever report on the global status of aquatic genetic resources for food and agriculture (AqGR) gave us a comprehensive snapshot of the global state of AqGR (FAO, 2019). But for FAO this was only the starting point towards promoting real positive change in the way in which the aquaculture community manages its genetic resources.

This article summarizes the next steps being taken along this path, introducing the *Global Plan of Action for the Conservation, Sustainable Use and Development of AqGR* (GPA), which was published in English in May 2022 with publication in the other UN languages expected shortly. The GPA presents a comprehensive framework for action to enhance all critical aspects of the management of AqGR by countries and regions.

The development process

The preparation of the GPA was first requested by the Commission on Genetic Resources for Food and Agriculture (Commission), in 2019, to provide a response to the many needs and challenges of AqGR management as identified in the aforementioned report on the global status of AqGR. The development of the GPA went through extensive consultation (as summarized in Figure 1) that involved comprehensive dialogue with Members, principally through a series of regional workshops held in 2020 and 2021. The text was reviewed and revised by the Commission and its Intergovernmental Technical Working Group on AqGR (ITWG-AqGR) and endorsed

by the Committee on Fisheries and its Sub-Committee on Aquaculture (COFI-AQ), and was finally adopted by the 168th Session of the FAO Council in December 2021.

What is a GPA?

A Global Plan of Action is a framework which aims to enhance the management of AqGR to make a significant contribution to the promotion of food security, sustainable development and alleviation of poverty. Global Plans of Action for management of genetic resources exist for the terrestrial agriculture sectors covering livestock, crops and forests. The GPA is a voluntary and non-binding rolling plan with a time horizon of ten years, being updated in concomitance with FAO's decadal global assessment of the status of AqGR. As was evident from the global consultations, the priorities for action vary between regions and between countries and for this reason the GPA should not be considered a blueprint for management of AqGR, but rather a menu of options. Likely, each country will prioritize different actions depending on the prevailing status of their resources.

The GPA is presented in two parts. The first part introduces the background and context including its rationale and objectives. The second part presents the strategic priorities for action under four priority areas, and it includes specific goals and actions under each priority area. In total, the GPA contains 21 strategic priorities and nearly 100 recommended actions.

Why do we need a GPA?

The global assessment of AqGR identified over 40 specific challenges and needs that should be addressed in order to correct some of the deficiencies that were identified in the management of AqGR globally. These needs were divided into four categories, which are reflected in the four priority areas of the GPA (see the section below). Among the most significant challenges and needs are to:

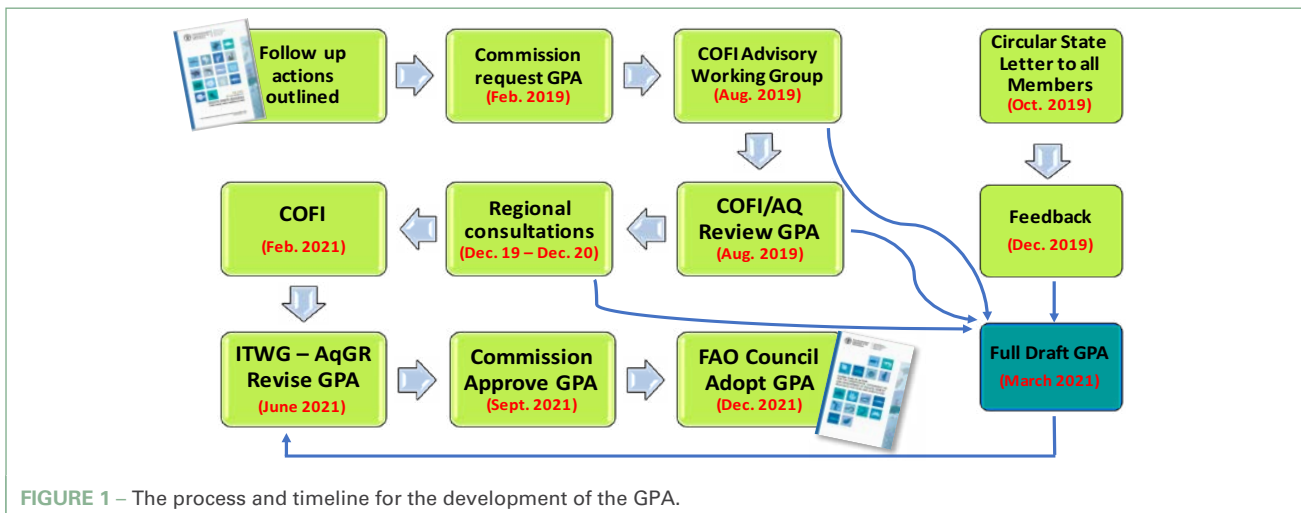
- increase and improve the information available on AqGR, especially below the species level;

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- widely adopt a standard terminology to describe AqGR;
- develop and implement a proactive strategy to identify and conserve those resources that are most at risk (Lucente *et al.*, 2021);
- create awareness and build capacity for better management of seed supply systems given that there is often lack of attention in the genetic management of seed, resulting in rapid erosion of genetic variability of farmed types;
- accelerate the adoption of genetic improvement; development of breeding programmes focused on the core approach of selective breeding would have significant impacts on production efficiency; and
- build capacity and review policy to create an enabling environment for improved genetic management.

The priority areas

Reflecting some of the specific properties of AqGR, as outlined above, the GPA identifies strategic priorities across four priority areas.



Inventory, characterization and monitoring

The long-term goal for this priority area is that information on AqGR is made accessible for and usable by FAO Members and stakeholders via a detailed, institutionalized and sustainably resourced global information system utilizing standardized terminology. Sample actions across three strategic priorities include: developing and disseminating a thesaurus of terms; developing standardized reporting procedures; and seeking long-term funding for a global information system.



Conservation and sustainable use

The long-term goal for this priority area is that AqGR, including native and non-native species, their farmed types and wild relatives, are conserved and sustainably used for the benefit of aquaculture, culture-based fisheries, commercial and recreational fisheries, and ecosystems. Sample actions across six strategic priorities include: identifying wild relative stocks at risk; monitoring impacts

of environmental change; promoting appropriate use in situ and ex situ conservation; promoting application of basic principles of genetic management and developing and utilizing monitoring tools for farmed types in seed supply systems; and promoting use of codes of practice for introductions and transfers.



Development of AqGR for aquaculture

The long-term goal for this priority area is to increase adoption of demand-driven genetic improvement programmes enhancing the efficiency and sustainability of aquaculture production and delivering benefits to consumers, broader society and the environment. Sample actions across four strategic priorities include developing online training resources for implementing breeding programmes; generating key stakeholder case studies; fostering public-private collaboration on breeding programmes including their funding; and developing systems for evaluation and registration for improved farmed types.



Policies, institutions and capacity building

The long-term goal for this priority area is to develop capacity to support sustainable and efficient implementation of AqGR policy that takes into consideration environmental and economic dimensions enhanced through dedicated institutions. Sample actions across eight strategic priorities include: supporting development of gene banking networks; promoting application of international agreements and instruments; holding meetings to share information on AqGR; developing measures, guidelines and regional legislation for responsible use and exchange of AqGR; and enhancing linkages and mechanisms for coordination and collaboration between institutions.

Implementation and monitoring

The GPA is a plan for implementation by all stakeholders in aquaculture and AqGR with the principal responsibility at the national level. However, there are several strategic priorities and actions which FAO can support and implement.

FAO actions initiated

While the GPA was only adopted by the FAO Council in late 2021, FAO has already started to work on a number of priorities. Fundamental to the implementation of the GPA is the collection and sharing of up-to-date and standardized information on AqGR; this can be achieved through AquaGRIS, a global information system for AqGR that is being developed by FAO. A prototype of AquaGRIS was released on the FAO website in March 2022, and work is continuing to transform the prototype into a fully functional system (see Mair *et al.*, 2021, *FAN 64* for further details). FAO has also developed a communication strategy for AqGR consisting of several components that will help generate awareness of the key AqGR-related issues in the international community. One of the main components of this strategy will be the development and publication of a thesaurus of AqGR terms. FAO is also preparing a number of case studies exemplifying the importance of genetic management and improvement for the sustainable use and development of AqGR, as well as technical guidelines on gene banking and genetic management for restocking.

Seeking country partners

The GPA represents a key instrument for driving real change in the aquaculture sector and complements other resources developed by FAO, such as technical guidelines on genetic resource management (FAO, 2008), a framework of minimum requirements for genetic management (FAO, 2018) and AquaGRIS. However, to really make a difference in the way aquatic biodiversity is managed in aquaculture, the active engagement of FAO Members with regionally and nationally relevant components of the GPA is key. FAO is currently seeking partnerships with government agencies and is willing to engage with and support Members on the implementation of key elements of the GPA. Please contact the authors of this article if you have ideas for the implementation of any part of the GPA in your country or region.

Indicators

At its 18th session, the Commission requested FAO to develop monitoring systems for implementation of the GPA. This will be done through the generation of a series of indicators that can be used to assess progress towards the specific goals indicated in the GPA. AquaGRIS can be a principal, but not sole, source of data that can be used to generate and assess indicators. FAO is currently identifying potential indicators for future monitoring of the management of AqGR (at national, regional and international level) and the progress made by countries, and globally, in implementing the GPA. The identified indicators will be proposed and presented to the next session of the Intergovernmental Technical Working Group on AqGR in February 2023. Furthermore, in the longer term, some of these indicators could also be utilized to assess progress, specific to AqGR, towards goals of broader international instruments, such as Sustainable Development Goal target 2.5 (conservation of plant and animal genetic resources) and relevant targets of

the post-2020 framework currently under development by the Convention on Biodiversity. At present, aquatic biodiversity resources are excluded from the assessment of progress towards the goals and targets of these instruments due to lack of relevant information.

How will the GPA impact small-scale aquaculture?

In the context of the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022), it is important to consider the relevance of the GPA to small-scale farmers, and what difference its implementation could make to artisanal farmers who are so important to rural aquatic food systems. In many ways, the GPA is more important to small-scale aquaculture than to small and medium-sized enterprises and to larger scale and commercial aquaculture. Small-scale aquaculture lags behind commercial aquaculture in terms of implementation of key measures to conserve, sustainably use and develop its AqGR. We know, for example (from the global assessment and from AquaGRIS), that 100 percent of global production of Atlantic salmon is of strains developed in well-managed and successful genetic breeding programmes. In contrast, some of the species critical to small-scale aquaculture especially in developing countries, such as the major carps, are suffering from the consequences of poor genetic management within seed supply systems, and breeding programmes are few and far between. There are greater challenges to the implementation of effective genetic management of resources in small-scale aquaculture due to lack of investment, lack of infrastructure, and lack of awareness, all exacerbated by the decentralized and dispersed nature of the sector and its participants. With this in mind, the implementation of the GPA should focus on developing countries and the small-scale aquaculture sector, which correspondingly have the most to gain from its effective implementation.

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Sustainable Food Systems: Highlighting the Contribution of Small-Scale and Artisanal Aquaculture to Healthy Diets



Women account for about 50% of the workers in the fisheries and aquaculture primary and secondary post-harvest and service sectors.

The underlying issues threatening food and nutrition security are often complex and continue to present challenges for meeting the targets of the Sustainable Development Goal of ending hunger. Poor diets are a major contributing factor to the rising prevalence of malnutrition in all its forms. Unhealthy diets and malnutrition are among the top ten risk factors contributing to the global burden of disease. Conversely, a healthy diet promotes growth and development and prevents malnutrition. It is estimated that 821 million people, or 1 out of 9 people in the world, were undernourished in 2018.¹ Having been on a declining trend for many years, this figure has been rising since 2014 and has been exacerbated by the recent COVID-19 pandemic that disrupted food supply chains around the globe. There is little doubt that there is a need for increasing production and access to nutritious foods for healthy diets, and the time to adapt, transform and strengthen food systems to become resilient, sustainable and sensitive to nutrition has never been more important than now.

Considering the detrimental environmental impact of some current food systems, and the concerns raised about their sustainability, an urgent need exists to promote diets that are healthy and that have low environmental impacts.

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These diets also need to be socio-culturally acceptable and economically accessible for all.

A sustainable food system is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised (FAO, 2018).

The term aquatic foods refers to animals, plants and microorganisms that are farmed in and harvested from water, and includes cell- and plant-based foods emerging from new technologies.² Aquatic foods include finfish (such as tilapia), shellfish (such as shrimps), aquatic plants (such as seaweed or water spinach), amphibians (such as frogs), molluscs (such as oysters, clams and mussels), echinoderms (such as sea cucumber or sea urchins), reptiles (such as turtles), insects (such as diving beetles), and other foods harvested from water. The ultimate goal of aquaculture production is to produce aquatic foods that are nutritious and contribute to the healthy growth of individuals. To feed the growing population, today and tomorrow, we must adopt more sustainable aquaculture practices, which integrate the environmental, economic and social aspects of sustainability. The aquaculture sector offers unique opportunities to support all pillars of food security, namely availability,

1. FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. <https://doi.org/10.4060/ca9229en>
2. www.worldfishcenter.org/knowledge/glossary

access, utilization, stability, agency and sustainability.³ Fish and other aquatic products often provide an economically accessible and nutritious source of essential micronutrients, necessary for healthy diets. This is particularly true for isolated communities that rely on small-scale and artisanal fisheries and aquaculture, where aquatic foods are a central part of the diet. With proper management, aquaculture (and fisheries) provides a resilient, high-quality and sustainable component of nutrition.

Sustainable Healthy Diets are dietary patterns that promote all dimensions of individuals' health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable. The aims of Sustainable Healthy Diets are to achieve optimal growth and development of all individuals and support functioning and physical, mental, and social wellbeing at all life stages for present and future generations; contribute to preventing all forms of malnutrition (i.e. undernutrition, micronutrient deficiency, overweight and obesity); reduce the risk of diet-related NCDs; and support the preservation of biodiversity and planetary health. Sustainable healthy diets must combine all the dimensions of sustainability to avoid unintended consequences (FAO and WHO, 2019a, p.11).

It is noteworthy to acknowledge the broad diversity of aquatic foods, and the opportunity this has to serve diverse consumer needs based on preference, choice and socio-cultural considerations. The consensus is that aquatic foods contribute significantly to healthy diets and, in addition to dietary importance, they also have a significant contribution to the health and well-being of people. Thus, the consumption of aquatic foods obtained from sustainable aquaculture sources aligns with the concept of sustainable food systems and is being increasingly recognized as a component of sustainable healthy diets.⁴ Even though the per capita consumption of fish is influenced by factors such as affordability, dietary preference, cultural norms and perceptions, there are recommendations on the amount of aquatic foods to be consumed. The WHO recommends 1–2 100 g servings of fish per week,⁵ the European Food Safety Authority (EFSA) recommends adults consume 300 g of fish per week,⁶ and the EAT-Lancet recommends up to 28 g fish per day per adult (range 0–100 g/day).⁴ The caveat for these recommendations is that the WHO and EFSA recommendations are based on risk-benefit analysis that consider nutrients and food safety/contaminants, while the EAT-Lancet goes further to include environmental considerations in its recommendation.

Scientific evidence supports the nutritional and health benefits of aquatic food consumption. Examples⁷ include:

- i) Preventing diet-related non-communicable diseases: fish consumption has been shown to reduce blood pressure, lower cholesterol levels, improve cardiovascular function, thereby reducing the risk of death from coronary heart disease.
- ii) The consumption of aquatic foods in the first 1 000 days of life contributes to a decline in the prevalence of severe acute malnutrition, reduces the incidence of stunting and promotes greater cognitive development of a child.
- iii) A study has shown that replacing meat consumption with lean aquatic foods (exemption of shellfish and fried lean meat) led to weight loss due to reduced energy intake from consuming aquatic foods.
- iv) Fish consumption for pregnant women is associated with positive birth outcomes and better nutrient composition of breastmilk.

The importance of fish as part of a healthy diet is being recognized by some countries through including aquatic foods in national food-based dietary guidelines, defining the context-specificity of aquatic foods as part of overall diets, and taking into account the social, cultural, economic, ecological and environmental circumstances for their consumption.^{8,9} Furthermore, some countries have recognized the significance of sustainably produced aquatic foods in their home-grown school feeding programmes.¹⁰

As the role of aquatic foods in diets continues to grow, it is important to acknowledge the work of small-scale aquaculture producers and value chain actors involved in aquatic food production, which largely contributes to food and nutrition security for households and communities engaged in small-scale aquaculture. About 70–80 percent of all those actors involved in fish farming worldwide are considered small-scale.¹¹ In 2018, an estimated 20.5 million people were engaged in the primary sector of aquaculture.¹ Most of these people are in developing countries, and most are small-scale artisanal aquaculture workers. This highlights the important role artisanal and small-scale producers play in aquatic food systems to make aquatic foods available for consumers. Thus, the small-scale aquaculture sector is recognized as making an important contribution to food security, nutrition, poverty alleviation and socioeconomic development. Sustaining these contributions can be achieved by strengthening the capacity of small-scale producers to operate and deliver aquatic products in a sustainable and equitable manner, particularly by addressing production challenges and providing producers

3. www.fao.org/3/ca9731en/ca9731en.pdf

4. <https://pubmed.ncbi.nlm.nih.gov/30660336>

5. www.fao.org/3/ba0136e/ba0136e00.pdf

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Global consumption of fish has increased by 122% since 1990.

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with better access to both upfront investment and quality sustainable feeds for efficient production; training on low-cost food safety and storage techniques is also needed. These latter activities not only help prolong the shelf life of aquatic foods, but they also help minimize aquatic food losses, maximize small-scale producers' profits, and make a variety of aquatic foods available all year round.

FAO is in the process of drafting the Guidelines for Sustainable Aquaculture (GSA),¹² a practical guidance for government authorities and policymakers to promote the implementation of the Code of Conduct for Responsible Fisheries (CCRF) provisions relevant to aquaculture

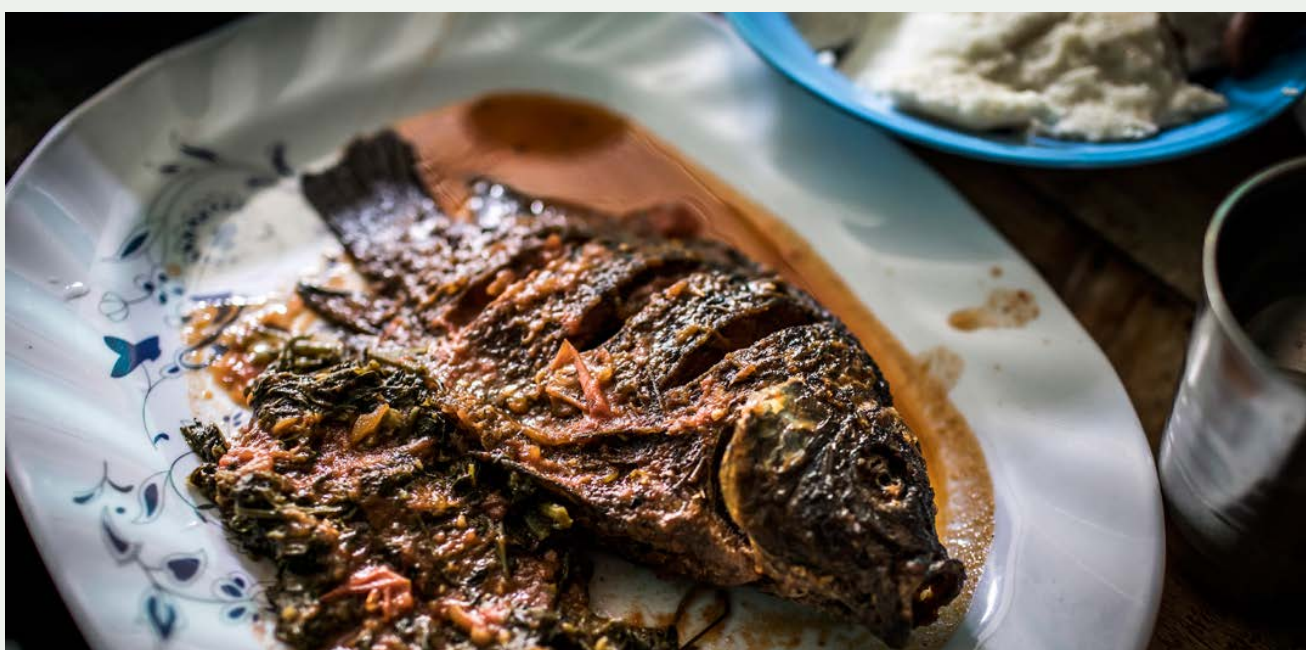
and culture-based fisheries. Upon finalization, the implementation of the guidelines in respective countries will further the delivery of healthy foods from aquaculture, simultaneously promoting the health of humans as well as the health of the environment.

ADDITIONAL READING

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Tilapia fish with Ugali and vegetables served in the traditional way in a fish restaurant in Eldoret, Kenya.

12. www.fao.org/in-action/gsa/en

Building Momentum for Small-scale Aquaculture: FISH4ACP Value Chain Approach



Fish farmer in Côte d'Ivoire feeds tilapia in a greenwater pond.

Global fish¹ production witnessed a tenfold increase over the past 70 years and currently stands at 177.8 million tonnes in live weight equivalent. Whereas aquaculture accounted for only 3 percent of fish production in 1950, farmed fish contributed with almost 50 percent to global supply in 2020.

Small-scale aquaculture is a key contributor to food security and nutrition, and generates both employment and income, particularly in rural areas. This recognition forms the foundation of the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022) implicitly laid out in the Global Action Plan,² which aims at building momentum to empower small-scale artisanal fisheries and aquaculture and secure their sustainable future.

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While the fisheries and aquaculture sector faces various sustainability challenges, further exacerbated by climate change, pollution and most recently the COVID-19 pandemic, small-scale farmers are further impacted given their limited technical and structural capacity, as well as the imbalances in value chains which reduce their access to lucrative markets.

Supporting and improving the performance of small-scale aquaculture, in the context of a sustainable value chain development approach, recognizes the complexity and the interlinkages within food systems. The approach anchors both the analytical and operational aspects in the three pillars of sustainability and brings about concerted and long-term solutions.

The sustainable value chain development approach considers the interaction within a given value chain, and between this value chain and its environment, and proposes improvement plans that ensure profitability and generate broad-based benefits for society while having a positive or neutral impact on the natural environment.

1. Used as a collective term, fish encompasses finfish, crustaceans, molluscs and other aquatic animals.
2. www.fao.org/3/cb4875en/cb4875en.pdf

FAO is implementing various sustainable aquaculture value chain development projects in a wide range of countries and across regions. The sustainable development of fisheries and aquaculture value chains in African, Caribbean and Pacific countries, outlined below, is one example of how this innovative and holistic tool is helping small-scale farmers in Africa to capitalize on their potential and address inefficiencies in aquaculture development.

FISH4ACP: Unlocking the potential of fisheries and aquaculture in Africa, the Caribbean and the Pacific

Fisheries and aquaculture are growing in most of Africa, the Caribbean and the Pacific (ACP). However, growth has been slow, and benefits do not always reach communities who rely on them for their livelihoods and food security. In addition, poor fisheries and aquaculture practices can put stress on the environments in which they operate.

Led by the Organisation of African, Caribbean and Pacific States, FISH4ACP is a five-year programme that aims to tackle some of the underlying challenges to sustainable fisheries and aquaculture. These include poor economic performance, limited market access, and inadequate social and environmental sustainability.

The programme, implemented by FAO with funding from the European Union and the German Federal Ministry for Economic Cooperation and Development (BMZ), is focused on enhancing the productivity and competitiveness of fisheries and aquaculture value chains while ensuring that economic improvements go hand in hand with environmental sustainability and social inclusiveness.

FISH4ACP will work with twelve value chains in twelve ACP countries with the goals of maximizing economic returns and social benefits while minimizing detrimental effects on natural habitats and aquatic resources. It will pay special attention to small and medium-sized businesses because of their potential to deliver economic and social benefits, particularly for women and youth.

Three of the value chains covered by FISH4ACP involve aquaculture: in Nigeria (see article on page 21) the programme supports the huge catfish sector, but in this article we focus on Côte d'Ivoire and Zimbabwe, where it is all about tilapia.

Getting more local tilapia on the table – FISH4ACP Côte d'Ivoire

Nile tilapia is the main fish species farmed in Côte d'Ivoire, where most farmers are small-scale producers who rely on aquaculture as their main source of income. According to a value chain analysis conducted by FISH4ACP, annual production lies between 6 000 and 8 300 tonnes,³ roughly 15 percent of the yearly tilapia consumption of around 45 000 tonnes. The balance of demand is met by imports.

FISH4ACP supports Côte d'Ivoire efforts to intensifying local aquaculture, and tilapia farming in particular, to reverse the country's reliance on imports to satisfy its yearly demand of over 650 000 tonnes of fish.

FISH4ACP's value chain analysis carried out in 2021 found huge potential for increased domestic production. It also pointed out the lack of quality fingerlings and affordable quality feed as the main constraints to developing the tilapia sector. Furthermore, the analysis highlighted the lack of training of fish farmers, for example in financial management, which limits their access to credit and their ability to invest in modernizing production systems.

The analysis laid the groundwork for a strategy developed with the support of value chain stakeholders aimed at increasing annual production of farmed tilapia to 68 000 tonnes by 2031, enough for Côte d'Ivoire to meet domestic demand of tilapia. The strategy would work towards a more structured, resilient and sustainable value chain that will generate jobs and respect good environmental practices.

It is expected that an investment of USD 60 million in services, infrastructure, training and equipment will be needed to meet this goal. FISH4ACP will spearhead the implementation of the upgrading strategy in the first half of 2022 and hand over the programme to value chain stakeholders in 2025 when it ends.

Facts and figures

- ▶ In 2019, domestic fish consumption amounted to around 650 000 tonnes per year, according to the official estimate.
- ▶ Domestic fish production is about 110 000 tonnes, with over 9 000 tonnes coming from aquaculture.
- ▶ Tilapia farming is mainly extensive and semi-intensive pond culture, with some 1 800 farms producing 3 tonnes per farm on average. Cage and tank farming are very limited.
- ▶ Dams and ponds represent more than 90 percent of aquaculture production systems.
- ▶ Men make up 95 percent of direct employment in tilapia production.

Supporting an expanding and sustainable tilapia aquaculture industry – FISH4ACP Zimbabwe

Zimbabwe's aquaculture sector has yet to take off despite the country's abundant water resources – it has over 10 000 dams – and conducive warm-water conditions. The fish farming output of Nile tilapia amounts to around 5 000 tonnes, nearly half of Zimbabwe's total tilapia production.

FISH4ACP aims to work towards a productive, expanding and sustainable tilapia aquaculture industry in Zimbabwe,

3. Estimate from FISH4ACP value chain analysis, 2021.



African catfish, *Clarias gariepinus*, is an essential aquaculture species in Nigeria.

contributing to poverty reduction, as well as improving food security and stimulating economic growth across this landlocked nation.

The programme's priority areas include scaling-up production by improving access to quality inputs and technical know-how. The overarching goal is to facilitate strong fish farming businesses in a conducive regulatory environment, linking smallholders to domestic and export markets as a means of reducing poverty.

FISH4ACP started operating in Zimbabwe last year with a value chain analysis. It showed that training is needed to fill the gap of skilled labour and that incomes, especially among women, would need to rise to make the sector more attractive.

While implementation will start this year with support of fish feed production for small-scale fish farmers, with feeds made from black soldier fly larvae, an upgrading strategy is under development to set the agenda for FISH4ACP's activities in Zimbabwe until 2025. It would focus on capacity development and ways to improve salaries, but also support for small-scale farmers to access financial services, or the use of solar energy to reduce dependency on non-renewable energy sources, for example in powering cold stores.

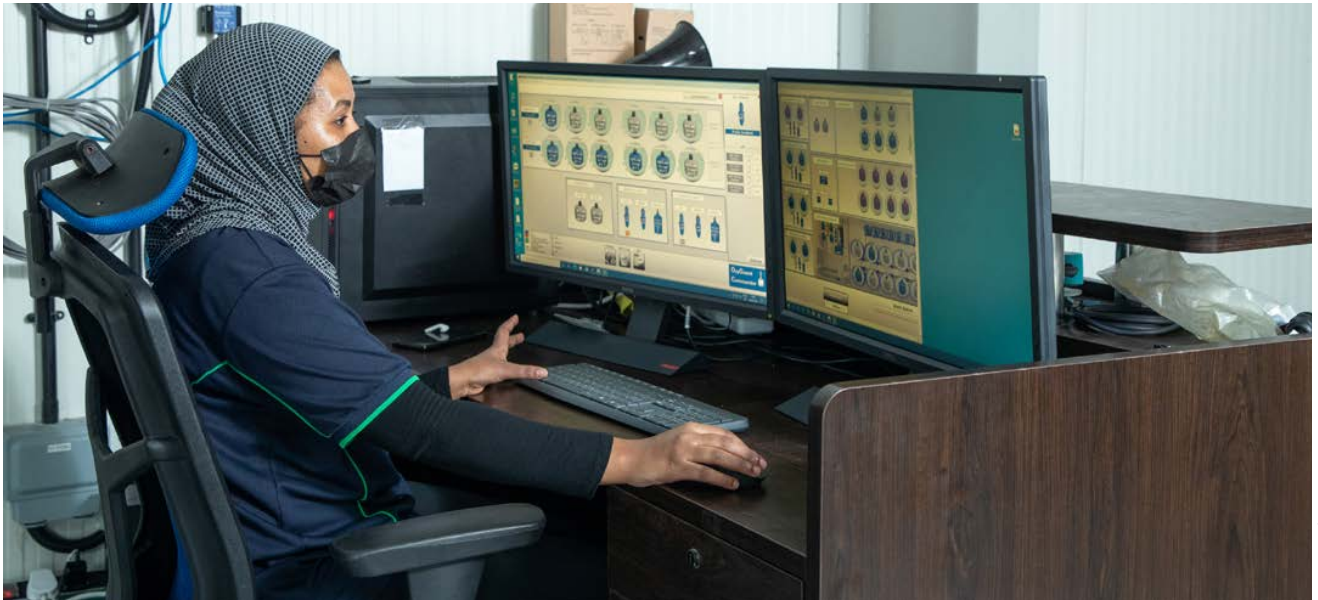
Support to the sustainable development of aquaculture through a value chain approach will enable small-scale

aquaculture producers to grow their businesses and find better jobs to improve their livelihoods while ensuring that no harm is done to the environment and future generations can also share in their benefits.

Facts and figures

- ▶ Zimbabwe's per capita fish consumption of 2.7 kg is significantly below the average of 6.7 kg of other southern African countries.
- ▶ Zimbabwe is home to one of Africa's largest integrated tilapia producers, Lake Harvest Aquaculture, which employs hundreds of people and accounts for 94 percent of the production of Nile tilapia in the country.
- ▶ The retail price of Nile tilapia is higher in Zimbabwe than in many other African countries, with retail prices hitting USD 3/kg, twice the regional average.
- ▶ Demand for fish has outgrown domestic supply, with the most popular imported fish being frozen mackerel from Namibia.
- ▶ Regional markets such as South Africa and Zambia offer potential to increase exports of Zimbabwean tilapia, with nearly 2 700 tonnes worth about USD 6 million exported to Zambia in 2020.

Women and the Changing Tide: Breaking the Bias in Small-scale Fisheries and Aquaculture During IYAFA 2022



Emirate technician using the latest computer technology to monitor water quality and other variables in a recirculating aquaculture system to ensure an optimal culture environment for the fish.

International Women's Day and IYAFA 2022

Global aquaculture and fisheries value chains are inherently complex and transboundary in nature, particularly in regional and international trade. This context comes with a recognition of the roles that women play in value chains, where they represent half of the people engaged when considering all nodes of the value chain. Acknowledging the role women play in small-scale fisheries and aquaculture, and the deep-rooted challenges they face, it is essential therefore to construct gender-sensitive approaches to management to allow and incentivize women to engage in responsibilities across the value chain. Through progressive implementation and use of relevant international instruments, guidance and tools, including **Gender Transformative Approaches**, policies should aim to secure women's access to, use of, voice in and tenure over resources and assets while enhancing their access to markets and enabling and empowering their leadership.

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Empowering and enabling both women and men to participate more effectively in small-scale fisheries and aquaculture throughout value chains not only improve food security, nutrition, health and education outcomes but also bring both immediate and long-term economic and social benefits for families, communities and nations at large.

In celebration of International Women's Day on 8 March, a **webinar** was jointly hosted by Ghana, Kenya, Malawi, Norway (the Global Action Network),¹ the United Republic of Tanzania and Uganda. H.E. Bjørnar Skjæran, Minister of Fisheries and Ocean Policy, Norway, opened the webinar, which was followed by presentations by Jacqueline Kazembe, Deputy Director, Department of Fisheries, Malawi; Lillian Ibengwe, Ministry of Livestock and Fisheries, the United Republic of Tanzania; Mary Glover-Amengor, Council for Scientific and Industrial Research, Food Research Institute, Ghana; and Margaret Nakato, Katosi Women Development Trust, Uganda, the winner of the 2020–2021 FAO Margarita Lizárraga Medal. They all converged around the necessity to recognize the fundamental role women play in small-scale fisheries and aquaculture in Africa and featured actions to break the gender bias in the sectors. This event was timely, at the

1. Global Action Network – Sustainable Food from the Oceans and Inland Waters for Food Security and Nutrition.
<https://nettsteder.regjeringen.no/foodfromtheocean>

start of the **International Year of Artisanal Fisheries and Aquaculture 2022** (IYAFA 2022) and set the scene for a series of events on gender throughout IYAFA 2022, which will target key objectives that should be achieved (see box).

Building the narrative of gender equality and equity in small-scale fisheries and aquaculture: key messages and objectives of IYAFA 2022

EQUAL VOICE AND DECISION-MAKING POWER:

Women and men in small-scale fisheries and aquaculture (SSF/A) have equal voice and decision-making power and no one is left behind. Women working together in SSF/A have a stronger voice, and women's organizations are supported in their activities.

EQUAL RIGHTS, ACCESS AND CONTROL OVER RESOURCES:

Women and men in SSF/A have equal rights, access to and control over natural and productive resources.

EQUAL RIGHTS AND ACCESS TO SERVICES, MARKETS AND DECENT WORK: Women and men in SSF/A have equal rights and access to services, markets and decent work and equal control over the resulting income and benefits.

REDUCTION OF WOMEN'S WORK BURDEN: SSF/A women's work burden is reduced by enhancing women's access to technologies, practices and infrastructure. Gender Transformative Approaches are fundamental tools in promoting an equitable distribution of responsibilities, including at the household level.

In her statement at the event closure, H.E. Ambassador Jackline Yonga of Kenya emphasized Kenya's willingness to fill the gender gap and to overcome the gender-based constraints and discriminations that prevent small-scale fisheries and aquaculture from reaching their full potential. Indeed, FAO and Kenya have collaborated to implement gender-sensitive activities throughout the years to strengthen women's empowerment in the country.

FAO's support to small-scale fisheries and aquaculture in Kenya: success stories of women's leadership

Kenya, a country of great opportunities and needs, is home to significant aquatic biodiversity. It is, therefore, important to ensure the conservation of aquatic ecosystems in order to promote socioeconomic development and food and nutrition security while sustaining natural resources for the immediate needs of the users of these ecosystems but also for the users of future generations.

Two synergistic projects were implemented in Kenya: The "Ecosystem Service and Biodiversity for Food and Nutrition Security project (FMM/GLO/112/MUL)", a part of the wider Blue Growth Initiative; and the "Support to the Implementation of Mariculture in Kenya project

(TCP/KEN/3502)", implemented from 2015 to 2017. These two projects have resulted in an increased knowledge of the environmental and socioeconomic value of the ecosystem; mangrove restoration; small-scale mariculture demonstrations; the conservation of biodiversity and conflict management among resource users; and the mainstreaming of the Ecosystem Approach to Aquaculture in national policies.

Under the FMM project, 15 groups with 442 beneficiaries (260 women, 182 men) benefited from support through a series of interventions to improve livelihoods and the ecosystem. Following a mariculture assessment of the Kenyan coastal region, recommendations were made and initiatives undertaken. Indeed, the importance of mariculture development was emphasized with a focus on species, such as milkfish, shrimp, oyster and crab. The work was paired with intensive mangrove restoration and environmental awareness campaigns on the socioeconomic value of the ecosystems in the area. Seaweed production, processing and marketing were also highlighted, all particularly relevant activities for women. Finally, trainings in better production management practices of mariculture, seaweed and value addition were provided for 315 beneficiaries (163 women, 152 men), all of whom were small-scale producers.

Under the TCP project, emphasis was placed on technical capacity building to the group through trainings on fish farming practices, processing, marketing and conservation, specifically with the Angazia Forest and Wildlife Conservation Group, located southeast of Malindi town in Kilifi County. This group was founded by women, as a women's group, and benefited from project support by receiving tailored trainings and small grant funds of USD 2 000; the group is still operating strongly after seven years. The women's desire to establish this group was twofold. First, the community's dependency on the marine ecosystems was subject to continuous destruction of mangrove forests, which have supported their livelihoods through gathering firewood, timber for house construction and burning charcoal. Second, the community has witnessed the damaging effects of climate change. The group's main aim is to conserve the mangrove ecosystems for their sustainable use and exploitation by the various users.

The aims of the TCP project were to increase knowledge of the water basin and the coral reef ecosystem, as well as to understand how ecosystem services support the provision of food, nutrition and livelihood security. These were the drivers of change affecting these services, their values, and associated technical and management options. The proposed intervention was to improve ecosystem services, foster investment in sustainable coastal mariculture, and promote an effectively governed mariculture development that is socially inclusive, equitable and environmentally responsible and that does not overlook economic profitability and sustainability of other sectors in the same area. The Angazia group has implemented activities

revolving around the core objectives of conservation and livelihood improvement. While some of the funds from the grant were used to educate the community through sensitization meetings in local administration gatherings, other funds were used to organize short meetings in schools during students' free time and to print posters to create more visibility and awareness, making use of the most strategic gathering points such as government office notice boards, churches and mosques. This persistence in messaging has enhanced the success of local environmental conservation, as evidenced by the quantified increase in biodiversity in restored areas. The group members are now stewards in spreading the message on the benefits drawn from sustainable use and management of natural resources.

For coastal communities dependent on the ocean for their livelihoods, degraded mangrove forests meant loss of biodiversity, which impacted the marine ecosystem and threatened communities' entire way of life. With this realization, the group conducted a variety of activities – from mangrove replanting, livelihood diversification, and microfinancing through table banking and “merry-go-rounds” or rotating funds. Communities are now engaged in social-economic activities, which include planting 60 000 seedlings of mangrove trees, equating to about 12 acres of mangrove forest. Three species have been planted: *Rhizophora mucronata*, *Bruguiera gymnorhiza*, and *Ceriops tagal*. There's also a nursery of another 50 000 seedlings of the same species that is ready to transplant at the onset of rain.

As a measure to sustain the group funding base, in the past three years members have saved USD 4 500, with a target of saving USD 1 500 a year. The available funds have enhanced members' standard of living through borrowing and saving. These good results, namely governance, stability

of the group, the benefits accrued from environmental conservation, have a spillover effect. For future growth of the group and to meet its objective, the group has drawn up a business plan on the blue economy, including the continued support of environmental conservation. The plan aims at creating employment and ensuring that the community is food secure. This is reflected in the group's motto: *More mangroves represent more habitat for marine animal species*. The Angazia group has been so successful with both their ecosystem restoration and actions to improve livelihoods that they now have an expanded group membership of 58 people, and the women included some men of the community to join the group. Additionally, there are another 26 new applicants having recently expressed interest in joining the group.

These projects spotlight the ability of women to take concrete action to overcome destruction of the ecosystems on which their livelihoods depend while improving livelihoods of whole communities. Once again, women have proven to be agents of change by organizing themselves, developing inclusive structures and leading by example.

SEE ALSO

Women and a Changing Tide: How to Break the Bias (webinar): <https://nettsteder.regjeringen.no/foodfromtheocean/meetings-and-events/webinar-8-march-2022>

www.fao.org/artisanal-fisheries-aquaculture-2022/home/en

Global Action Network Sustainable Food from the Oceans and Inland Waters for Food Security and Nutrition:

<https://nettsteder.regjeringen.no/foodfromtheocean>

TCP/KEN/3502: An Ecosystem Approach to Mariculture:

www.fao.org/documents/card/fr/c/CA4956EN

FAN 64: Gender Transformative Approaches in Aquaculture:

A Tool to Address Root Causes of Gender Inequalities and

Discrimination. www.fao.org/3/cb8047en/cb8047en.pdf



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Members of the Angazia group in Kilifi, Kenya outplanting mangroves.

Solar Energy to Power Sustainable Aquaculture Development

The rapid growth of aquaculture production has required a large power supply: it is estimated that global energy demand for aquaculture is expected to increase to 10 700 million GJ until 2050 (Hornborg and Ziegler, 2014). With the development of technology and mechanizations, aquaculture farms are consuming more and more electric and fuel energy for their farms on land and at sea or in lakes, rivers and reservoirs. Among the common cost on farms, energy makes up a major part of the costs of production, in addition to the cost of feed, disease prevention, wages and fuel.

The sun emits energy in the form of electromagnetic radiation which can be converted into usable thermal or electric power with the aid of modern technology. One of the most common is using photovoltaic panels to convert this solar energy into electricity to provide energy for home systems (such as electricity for lighting, televisions, washing machines and other appliances), cooling systems (air conditioning), and water heater systems. Solar energy is considered as one of the cleanest energy sources and is touted as a potential renewable energy source for the world; the benefits include addressing climate change and reducing CO₂ emissions, among others.

There are several ways to effectively use solar power on aquaculture farms. One option is to use “aquavoltaics”, or to integrate solar panel arrays into an aquaculture farm. For example, solar panels can be set above the surface of a pond and generate surplus electricity to be sold to the electric grid as a complimentary income. And at the same time, the solar panels can provide shade to the fish, and this can be an efficient use of space. However, this requires a high capital investment and may not be relevant for all farmers.

The second option is to power electric equipment such as pumps and aerators with solar-generated electricity, either by using standard devices connected to a separate photovoltaic (PV) panel, or to have devices with integrated



Solar-powered station over fish ponds in Jiangsu, China.

© L.P. Jiang

panels. Although the application of solar-powered equipment has a relatively short history, there are many benefits. First, in remote areas where electricity is not available, solar-powered equipment can be an option to increase the intensity of aquaculture operations in areas not connected to the power grid. Devices with integrated PV panels also eliminates the need for the farmer to run electric cables across the farm, which can also decrease costs. Second, solar-powered equipment can reduce the operating costs of production, especially in places where grid-electricity is expensive. In addition, most solar-powered equipment has a long life-cycle, meaning that depreciation is relatively low. Finally, solar-powered equipment is ecologically friendly and can reduce greenhouse gas emissions.

The Table 1 and following section summarizes solar-powered devices with integrated PV panels commonly used in aquaculture, including aerators, pumps, feeding machines, water quality monitoring systems, followed by a brief section on equipment that can be connected to independent PV panels, such as office devices and cooling systems. Each of these are readily available from industrial suppliers.

1. Aeration systems

Aeration systems are the most commonly used solar devices on aquaculture farms; aeration system are used in ponds, cages and reservoirs to increase the dissolved oxygen in the aquaculture environment. Different types of solar aerators are available, including the impeller aerator, surge wave aerators, paddle wheel aerators and air-jet aerator. Different sizes are available based on the different aeration needs, ranging from 750–2 200 watts which can provide more than 2.0 kg O₂/hour and each aerator can oxygenate an area of up to 8 000 m², according to the power of the motor. Additionally, advanced versions can produce 10 g/h ozone at the same time as aerating the water.

2. Water pump

Water pumps are the second most common solar-powered device. These pumps vary in size and types (surface pump and submersible pump, for example). They have a power rating from 150 W to 15000 W and reach a maximum of 200 m of total dynamic head (in other words, the

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height the water can be pumped). Pumps are used to pump water in traditional ponds or, in pond raceway systems, to circulate water. Recent improvements to specially designed solar pumps allow them to operate even when there is little sunlight.

3. Feeding machine

Automatic feeding machines can be powered with a solar panel. They can be located either on pond dykes or on floats in the pond. Many types of feed can be used, such as standard pellets or dried fish. Current solar-powered feeding machines have a maximum capacity of about 400 kg of feed in the holding tank.

3. Sensors

Solar-powered water sensors enable real-time monitoring of water quality and meteorological changes, allowing for data-based decisions and management responses. Many water quality parameters can be measured, including the pH, temperature, dissolved oxygen and turbidity. In addition, meteorological data can also be monitored, such as temperature, light intensity, wind speed and rainfall.

5. Office use, store rooms and chillers

Installing standard photovoltaic panels on farms can also provide power for office and household devices, such as computers, lights, cooking surfaces, climate control. This use of photovoltaic power can improve the working and living conditions of farmers living in remote areas.

Cooling systems consume a high amount of energy, including refrigerators and air conditioners for offices. Perhaps more importantly, freezers, chillers and cold rooms are essential components of an aquaculture cold chain, which is required for many aquaculture farms to ensure high quality, safe product for the final consumer. Both of these uses, cooling systems and general office and domestic use, can be supplied by a solar energy system, consisting of photovoltaic panels and a charge controller to manage the voltage.



A solar paddle wheel aerator.

TABLE 1 – Solar-powered devices with integrated PV panels

Aerator	Mobile solar aerator (including paddle wheel, impeller or air-jet)	Power: 750-2200 W Load water surface*: 500-8 000 m ² Aeration capacity: ≥1.1-2.0 kg (O ₂)/h
	Surge wave aerator	Power: 280-1500 W Load water surface: 200-5 000 m ² Aeration capacity: ≥0.35-1.95 kg (O ₂)/h
	Ozone generator	Power: 280-1 500 W Load water surface: 200-5 000 m ² Ozone output: 10 g/h
	Pond sediment regulating system	Power: 200-300 W Load radius: 10-20 m Pond depth: 1-2 m
Water pump	Water pump	Power: 150-15000 W Maximum dynamic head: 200 m
Feeding machine	Automatic feeder	Maximum feed loading capacity: 400 kg

* Load water surface is the surface area of a pond that can be aerated by an individual aeration device.

Importantly, a decision must be made regarding connecting the photovoltaic panels to the national power grid, with two main options. In the first option, a stand-alone system uses photovoltaic panels to power the devices during the day, and a bank of batteries to store electricity for use during the night and non-sunny times. In contrast, a grid-tied system “sells” power to the grid during the day and “buys” power from the grid at night. There are benefits and constraints to both options. A stand-alone system can be used where the grid does not exist (for example, rural areas), and is fully independent from grid power outages. However, the battery bank is a significant expense. Grid-tied systems on the other hand are cheaper to install. However, some municipalities do not allow decentralized power production (in other words, the grid refuses to “buy” power). In addition, if the grid loses power, the farm also loses power, meaning it is subject to large scale outages. This decision should be based on a calculation of projected costs versus savings, adapted to the local conditions and objectives of the individual farm.

Solar power technologies still face certain challenges for application in aquaculture, including high costs, maintenance requirements and mechanical performance. Also, solar works best in places with consistent high levels of sunlight. This may preclude area in extreme latitudes, along with areas that are frequently overcast or cloudy. However, the technology has been improving rapidly, and is increasingly accessible, affordable and available around the world. In fact, the price of PV panels has dropped by over 50 percent in recent decades. Importantly, with the variety of solar-powered devices and the falling prices, these technologies are becoming increasingly attractive to small-scale farmers and providing opportunities for the sustainable intensification of aquaculture which otherwise may not have existed.

SEE ALSO

Hornborg, S. & Ziegler, F. 2014. *Aquaculture and energy use – a desk-top study.*

Regional Perspectives, with *Martin Van der Knaap*

FAN Magazine sits down with Martin one week after his retirement as an FAO Fisheries and Aquaculture Officer, reflecting on a career of development work in Africa, including marine and inland fisheries, aquaculture, and ranging from research to planning and governance. Taking the opportunity to speak with him before he starts his next evolution in his vibrant, extensive career, we ask Martin to share his take on a history of projects, the successes and disappointments, and his vision for the future.

Joining the Zoom call from his retirement home on the shores of Lake Victoria, Martin sits among a library of technical books interspersed with various African art collected from a lifetime of travel in the region. A few days after his retirement, Martin has the relaxed air of a man on his second cup of coffee, content in knowing that he has neither meetings nor deadlines to interrupt his day.

Starting as a fisheries biologist for FAO in 1984 in Dakar, Martin spent many years of his life working on fisheries and aquaculture projects in Africa, living and working in Burundi, Cameroon, Ethiopia, Ghana, Kenya, Senegal, Uganda, as well as in the Maldives and Sri Lanka in Asia. Considering only FAO projects, Martin had the largest number of projects in Kenya, including Aquaculture Farmer Field Schools for pond culture of tilapia. He worked on integrated rice and fish activities in Burundi, Ethiopia and Rwanda, and on the establishment of the Lake Victoria Fisheries Organization. From clam and oyster aquaculture in Djibouti to culture-based fisheries in Eritrean reservoirs to tank-based catfish culture in Ghana and Nigeria, the scope of his projects covered production, supply chains, post-production, institutional capacity development, and national and regional governance mechanisms.

When asked about trends in aquaculture in the region, Martin was pensive in his response. Noting positive developments in the increasing production and increased recognition by government authorities of the importance of aquaculture, he also reflected on root causes of the slow development, and the confines of what development and aid agencies are able to accomplish. Martin started by recounting two heartwarming stories, shared with satisfaction and hopefulness.



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First, on the topic of youth employment and urban migration, Martin talked about a project in Guinea-Bissau where youth were supported to start cage aquaculture in the river. Many of the youth, seeing the opportunities and income generated from fish farming, decided on staying in the village rather than moving to the city in search of work, or crossing the Sahara on the way to Europe. The village elders, seeing not only the availability of fresh fish but also the youth that stayed behind, thanked FAO for presenting these options to keep families together.

The second story took place in Nigeria, where he worked with internally displaced persons (IDPs) who had been chased from their homes by the conflict occurring along Lake Chad. Relationships among IDPs and the host community are often challenging, to say the least, but through the project activities some of the incoming people, specifically former fisherfolk from the lake, were



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Martin Van der Knaap stands next to a large biofilter at a youth cluster in Ghana.

introduced to tank-culture activities and provided with skills, tools and startup support to begin fish farming. Not only did this incentive provide job creation for IDPs, but it also directly addressed food insecurity in the community by producing fresh fish. Indirectly, relations improved with the host community, who could see these persons contributing skills and creating jobs rather than competing for existing resources; thus, this was a successful example of integrating IDPs into a host community. Listening to Martin tell these stories, I found myself reminded of the *human* impacts that these projects can have – it was obvious how much Martin cares for the people behind the sometimes cold indicators and bureaucracy.

At the same time, Martin did not shy away from discussing the challenges, identifying some difficult issues, many of which were tied to global and regional trade, national policy and large-scale forces. For example, he said that while development projects often include activities to improve local feed production, low-cost and low-quality feed dumped onto the global market, and imported even despite their poor quality, undercuts the progress of local feed producers. Likewise is the case with some frozen fish products, produced in countries where subsidies, macroeconomic forces, and loose production and labour standards yield a cheap product. Small-scale local farmers often cannot compete, unless quality control standards are implemented fairly to both local producers and imported feed and frozen products. Unfortunately, in his opinion, border rejections for quality are rare, and these topics are often beyond the scope and mandate of projects. Martin also raised another regularly encountered issue: land availability and land tenure. Whereas land is plentiful in rural areas, the labour force, especially youth, are located in urban areas. At the same time, many landholders are unwilling to lease their land to aquaculture activities, often fearing that users may not return the land or honour the stipulations in the contract. Relatedly, it can be difficult to encourage farmers to invest in aquaculture infrastructure if they know they cannot keep the land after the terms of the lease end. These two issues are compounded, in Martin's view, by project funding cycles with bounded time frames, inadequate anchorage and limited long-term support.

How then can projects be designed with the constraints, to enable youth to create businesses and aquaculture to

develop, considering the mismatch between land and labour availability and land ownership issues? I asked Martin. With a wry chuckle, he smiled, and then recounted a successful project on urban catfish aquaculture in Ghana and Nigeria (for the full story, see [FAN 62 link](#)). Compact tank culture addresses space constraints and provides landowners, who are often vegetable farmers, with nutrient-rich culture water. This synergy has helped smooth over some land use issues, with farmers welcoming the free fertilizer from the fish. Martin is hopeful this successful practice is extended and adopted in more cities and towns. When combined to FTT (FAO-Thiaroye Processing Technique) fish smoking kilns to add value to harvested fish, this practice offers a real opportunity for youth cooperatives to generate livelihoods in an urban environment.

Shifting gears slightly, the topic changed to the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022) and the importance of small-scale aquaculture in the region. A vast majority of aquaculture in sub-Saharan Africa is small-scale, an area where Martin has focused nearly all his attention. At the same time, a few large companies have entered the game, mostly in Lake Victoria. In fact, production has grown large enough that the issue of carrying capacity of the lake is the subject of a new project, the Truefish project, which is being implemented by FAO with the European Union and the Lake Victoria Fisheries Organization. Even so, Martin agreed that small-scale aquaculture is the foreseeable future in the region, and welcomed IYAFA 2022 for its spotlight on these artisanal producers.

Wrapping up the interview, I asked him what he was most proud of during his time at FAO. “Keeping Nile tilapia out of Lake Tanganyika!”, Martin erupts. Seeing the devastation of invasive, exotic species on the biodiversity of other African great lakes, and the pressures to grow this popular fish, this is no mean feat and certainly a legacy to leave. But Martin is modest, and he leaves a grander legacy – of institutions built, of farmers touched, of knowledge produced and of lives improved. While we are happy for Martin to take a well-deserved rest, we cannot help but feel the loss of his contributions. As we wish him the best in his retirement, we take the opportunity to thank him for all his work and promise to strive to continue all that he started.



Beach seining in Ghana.

©FAO/M. Van der Knapp

Colleagues in Motion



©FAO/J.G. Robinson (photo taken before the COVID-19 pandemic)



Kang Li

Aquaculture Specialist

Technology and Production Team for Sustainable Aquaculture

Kang Li is an aquaculture biologist; he most recently worked at Shanghai Ocean University in sustainable aquaculture management and fish artificial reproduction. He received his PhD from the University of Copenhagen with aquaculture and food safety in 2016, and was a member of the European Union-funded FP7 project “Sustainable Ethical Aquaculture Trade”, which focuses on aquaculture sustainability in Bangladesh, China, Thailand and Viet Nam. Following graduation, Kang went to work in China and Germany focusing on sustainable, ecologically sensitive farm practices and engaging in projects of pond effluent treatment and quality improvement of cultured fish. Kang is also dedicated to capacity building of fish farmers and aquaculture technology transfer in both China and ASEAN countries.

Kang has more than 10 years’ experience in aquaculture and related project works, ranging from farm management to food safety, and also has fundamental biotechnology and epidemiology knowledge. He supported the preparation of the Global Conference on Aquaculture Millennium +20 in 2021, including the poster session and the participation of youth scholars. He also contributed to the drafting of an initiative on promoting the South-South and Triangular Cooperation for sustainable aquaculture development with the Ministry of Agriculture and Rural Affairs, China.

Having worked in research institutes and government agencies, Kang understands how to bring technical expertise to different stakeholders, as well as how to provide suggestions for decision-making based on professional knowledge. Kang has written and co-authored peer-reviewed scientific publications on aquaculture-related research. He is also interested in public service and has served as a volunteer in both China and Denmark.

Christine Rolin

Aquaculture Specialist

Technology and Production Team for Sustainable Aquaculture

Christine Rolin joined the NFIAT team as a consultant in September 2021, contributing mainly with a background on seaweed farming but also more widely to the team’s aquaculture activities. She is originally from Denmark but was educated in Scotland at the University of Aberdeen as a marine biologist, graduating with a master’s degree in 2014. During the pandemic, she worked for FAO from the Highlands of Scotland, where she previously worked with the Scottish Association for Marine Science on developing research and commercial services of seaweed aquaculture, in particular the nursery stage of kelps such as *Saccharina latissima*, *Laminaria digitata* and *Alaria esculenta*.

At FAO, Christine is currently organizing the Seaweed Aquaculture Policy Dialogue, which will see 20 countries across Africa and Asia participating in May 2022. She is also supporting a number of ongoing projects, including an update to the Artemia manual and a new publication on good practices in seaweed aquaculture.

Ariadna Cheltuiala

Office Assistant

Aquaculture Technology and Production Team for Sustainable Aquaculture

Ariadna, a national from the Republic of Moldova, recently joined the Fisheries Division in November 2021 as an Office Assistant. She graduated in economics and business management from Roma Tre University in Rome, Italy. Before joining FAO as a temporary assistant, she spent the first years of her career in tourism-related fields, as she had studied hospitality and tourism management in high school. Ariadna started her FAO career in 2019 and has valuable administrative experience, which includes assignments in the Office of the Director of the Office of Strategy, Planning and Budget and most recently in the Front Office of the Legal Counsel, Legal Office.

New Publications



Highlights



FAO 2022 Report of the Global Conference on Aquaculture +20 - Aquaculture for food and sustainable development - Rome

Feeding an expected global population of 9 billion by 2050 is a daunting challenge that is engaging hundreds of millions of farmers, food processors, traders, researchers, technical experts, and leaders the world over. Fish and other aquatic products from aquaculture can and will play a major role in meeting the dietary demands of all

people, while also meeting the food security needs of the poorest. To realize the maximum contributions of the aquaculture sector toward achieving the targets set by the Sustainable Development Goals (SDGs) and Agenda 2030, coordinated and accelerated actions are required. Not only must these actions increase sustainable production, but also address the broader value chain, markets, and decent employment. Recognizing the critical importance of aquaculture, and the need to exchange and discuss reliable information to further enhance its contribution to sustainable development, the Food and Agriculture Organization of the United Nations (FAO), at the request of its Members, collaborated with the Network of Aquaculture Centres in Asia-Pacific and the Ministry of Agriculture and Rural Affairs of the People's Republic of China, to organize the Global Conference on Aquaculture Millennium +20 (GCA +20), 22–25 September 2021, in Shanghai, the People's Republic of China.

Under the theme "Aquaculture for food and sustainable development", the GCA +20 aimed to bring stakeholders from government, business, academia, and civil society together to identify the policy and technology innovations, investment opportunities and fruitful areas of cooperation in aquaculture for food and sustainable development. A key output from the GCA +20 – the Shanghai Declaration on Aquaculture for Food and Sustainable Development – highlights the principles and strategic pathways to maximize sustainable aquaculture in achieving the SDGs, with a special focus on "Leaving no one behind".

The PDF can be accessed directly at:
www.fao.org/3/cb9365en/cb9365en.pdf

The document card can be found here:
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FAO 2021 FAO Yearbook. Fishery and Aquaculture Statistics 2019/FAO annuaire. Statistiques des pêches et de l'aquaculture 2019/FAO anuario. Estadísticas de pesca y acuicultura 2019 - Rome

The FAO Yearbook of fishery and aquaculture statistics is a compilation of statistical data on capture fisheries and aquaculture production,

employment, commodities production and trade, apparent fish consumption and fishing fleets. It is structured into a booklet (containing summary tables, notes on major trends, concepts, classifications and a map of FAO major fishing areas), and a set of additional statistical tables available online.

L'Annuaire des statistiques des pêches et de l'aquaculture de la FAO est une compilation de données statistiques sur les captures, la production de l'aquaculture, l'emploi, la production et le commerce des produits halieutiques, les bilans alimentaires et les flottes. L'Annuaire est composé d'un fascicule (contenant des tableaux résumés, des notes sur les tendances principales, une description des concepts et des classements, ainsi qu'une carte des principales zones de pêche de la FAO) et des tableaux statistiques supplémentaires disponibles en ligne.

El Anuario de estadísticas de pesca y acuicultura de la FAO es una compilación de datos estadísticos sobre las capturas, la producción de acuicultura, el empleo, la producción y el comercio de los productos pesqueros, las hojas de balance de alimentos y las flotas. El Anuario se compone de un cuadernillo (con cuadros resúmenes, notas sobre las tendencias principales, conceptos básicos y clasificaciones, así como un mapa de las principales zonas de pesca de la FAO) y de un conjunto de cuadros estadísticos adicionales disponibles en línea.

The PDF can be accessed directly at:
www.fao.org/3/cb7874t/cb7874t.pdf

The document card can be found here:
www.fao.org/documents/card/en/c/cb7874t



FAO 2022 Report of the Thirty-fourth Session of the Committee on Fisheries - Rome

The Thirty-fourth Session of the Committee on Fisheries (COFI) was held in Rome, Italy, from 1 to 5 February 2021. This is a report of the Session reflecting the discussions which took place and containing all recommendations and decisions taken by the Committee. A synopsis of the outcome of the Session is presented in the abstract and all supplementary information is included in the appendixes.

The PDF can be accessed directly at:
www.fao.org/3/cb8322en/cb8322en.pdf

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FAO 2022
FAO Fisheries and Aquaculture Division
 - Rome

This booklet outlines the work of FAO on fisheries and aquaculture and the structure of its Division. It highlights the crucial and growing role of aquatic food in providing billions of people with essential protein and

nutrients, as well as livelihoods and other services, assisting society in overcoming hunger, malnutrition and poverty. FAO focuses its work on the opportunities provided by a further transformation of aquatic foods systems to become more efficient, inclusive, resilient and sustainable.

The PDF can be accessed directly at:
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Fisheries and Aquaculture Technical Manuals



FAO 2022
Benchmarking species diversification in global aquaculture - Rome

While diversified aquaculture could reduce both biological and financial risks, the private sector may lack incentives to diversify the species composition of aquaculture production because developing or adopting new species tends to be costly and risky. Conversely, concentrating on the most efficient species can benefit from economies of scale in both production and marketing. With

ever-growing concerns over climate change, disease outbreaks, market fluctuations and other uncertainties, species diversification has become an increasingly prominent strategy for sustainable aquaculture development. Policy and planning on species diversification require a holistic, sector-wide perspective to assess the overall prospect of individually promising species that may not be entirely successful when competing for limited resources and markets. The historical experiences of species diversification in global aquaculture can provide guidance for the assessment. This paper develops a benchmarking system to examine species diversification patterns in around 200 countries for three decades to generate information and insights in support of evidence-based policy and planning in aquaculture development. The system uses "effective number of species" (ENS) as a diversity measure that is essentially equivalent to, yet more intuitive than, the widely used Shannon Index. A statistical model is established to estimate a benchmark ENS for each country and construct a benchmarking species diversification index (BSDI) to compare a country's species diversification with global experiences. Key results are presented and discussed in the main text; and more comprehensive results are documented in Appendix II. The benchmarking system can be used in foresight analyses to help design or refine future production targets (including species composition) in policy and planning for aquaculture development; an example is provided in Appendix I to help practitioners better understand and utilize the system.

The PDF can be accessed directly at:
www.fao.org/3/cb8335en/cb8335en.pdf

The document card can be found here:
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FAO 2022
Producción de alimentos en acuaponía a pequeña escala - Cultivo integral de peces y plantas - Santiago

Este documento técnico empieza introduciendo el concepto de acuaponía, incluyendo una breve historia de su desarrollo y su sitio en la amplia categoría de cultivos sin suelo y de agricultura moderna. Discute los conceptos teóricos principales de la acuaponía, incluyendo el ciclo del nitrógeno y el proceso de nitrificación, el rol de

las bacterias, y el concepto del equilibrio en una unidad de acuaponía. Luego cubre aspectos importantes de los parámetros de calidad de agua, pruebas de agua, y de dónde obtener el agua para la acuaponía, así como también los métodos y teorías del diseño de unidades, incluyendo los tres métodos principales de sistemas acuapónicos: camas de cultivo con sustrato, técnicas de flujo laminar con nutrientes y cultivo de aguas profundas. La publicación discute en detalle los tres tipos de organismos (bacterias, plantas y peces) que hacen al sistema de acuaponía. También presenta estrategias de manejo y prácticas para resolución de problemas, así como temas específicamente relacionados a fuentes de acuaponía local y sostenible. Esta publicación también incluye nueve apéndices que presentan otros temas claves: las condiciones ideales para que plantas comunes crezcan en acuaponía; control biológico y químico de plagas y enfermedades, incluyendo una guía de plantas compatible; enfermedades comunes y síntomas, causas y remedios relacionados; herramientas para calcular la cantidad de amoníaco producido y los medios de biofiltración requeridos para ciertas densidades de peces y la cantidad de alimento a agregar; la producción casera de alimento para peces; los lineamientos y las consideraciones para establecer unidades de acuaponía; un análisis de costo-beneficio de una unidad de acuaponía a pequeña escala; una guía completa para construir versiones a pequeña escala de cada uno de los tres métodos de acuaponía; y, un breve resumen de esta publicación designada como material suplementario para extensión y educación.

The PDF can be accessed directly at:
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Also Available in:
 Arabic
 Chinese
 English



FAO 2022
World review of capture fisheries and aquaculture insurance 2022 - Rome

This world review of capture fisheries and aquaculture insurance presents the findings of five regional and four national reports conducted in 2020. An estimated 450 000 fishing vessels worldwide are covered by marine hull insurance. Nearly all of the estimated 67 800 large-scale industrial fishing vessels are covered by marine hull insurance, as well as 50–60 percent of the

estimated 430 000 semi-industrial fishing vessels. However, over 95 percent of the 2.3 million motorized small-scale fishing vessels operate uninsured. Most small-scale fishers do not have access to adequate insurance services. Between 2009 and 2019, underwriting experiences in fishing vessel insurance were generally reported as "Good". What is more, access to accident, life and health insurance services for crew on fishing vessels and small-scale fishers in developing countries has improved in recent years.

In 2020, the number of aquaculture insurance policies in force was estimated at over 40 000 worldwide, with China and Indonesia the largest markets for this type of insurance. While large-scale aquaculture producers are well served by the insurance industry, the provision of insurance is inadequate for medium and small-scale farmers, particularly in Asia. Underwriting experiences for aquaculture stock mortality insurance were reported as "Good" to "Very good" (40 percent), or "Neutral" (36 percent). The insurance industry has consolidated the market and increased profitability in aquaculture insurance.

This world review contains information on the capture fisheries and aquaculture insurance market, the prevailing underwriting practices, perils covered, policies in force, risk management and claim handling procedures. Finally, it offers a series of recommendations for increasing insurance service provision to the fisheries and aquaculture industries.

The PDF can be accessed directly at:
www.fao.org/3/cb9491en/cb9491en.pdf

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FAO 2022
**Report of the Expert Consultation
 on the Development of Sustainable
 Aquaculture Guidelines - Rome**

The Expert Consultation on the Development of the Sustainable Aquaculture Guidelines was held in Rome, Italy from 17 to 20 June 2019 to come out with a proposal for developing the Sustainable Aquaculture Guidelines to be presented in August 2019 at the tenth session of the Sub-Committee on Aquaculture of the Committee on Fisheries

(COFI). The specific objectives of this Expert Consultation were to propose criteria for selecting case studies aimed at providing lessons learned for the development of the Sustainable Aquaculture Guidelines, and methodologies for documenting the case studies, for analysing the case studies to identify the lessons learned, and for developing the Sustainable Aquaculture Guidelines by also making use of existing guidelines. The consultation was attended by 15 experts, one resource person and FAO staff. The consultation was organized into both plenary and group discussions. The Experts agreed on a proposed methodology for identifying and selecting the lessons learned from strategies and experiences of aquaculture development worldwide; a methodology for documenting and analysing the lessons learned; a list of thematic modules; a gap analysis between existing guidelines and needs for new ones, and; an updated roadmap for the development of the Sustainable Aquaculture Guidelines.

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FAO 2022
**Report of the Second Expert
 Consultation on the Development of
 Guidelines for Sustainable Aquaculture
 (GSA) - Rome**

In line with the recommendation of the FAO Sub-Committee on Aquaculture of the Committee on Fisheries (COFI-SCA) made in 2017, as endorsed by the Committee on Fisheries (COFI) in 2018, regarding the preparation of the Guidelines for Sustainable Aquaculture (GSA), the FAO Fisheries and Aquaculture Division organized, virtually, the second Expert Consultation on the development of GSA from 18 to 22 October 2021. Thirteen experts from Africa, Asia, Latin America, the Middle East, and North America attended the consultation. They were supported by seven resource persons and the FAO Secretariat.

The objective of the consultation was to discuss and review the drafts of the GSA, the accompanying "Action-Oriented Guidance for Transforming Aquaculture for Greater Contribution to Achieve the SDGs: Key Interconnected Actions to Guide Decision-Makers and Practitioners (AOG)", and the background document used for the preparation of the GSA and the AOG. The consultation significantly improved these three documents and technically endorsed the drafts of the GSA and the AOG. The experts agreed to the next step of submitting these drafts to the next session of COFI-SCA for further guidance.

The PDF can be accessed directly at:
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FAO 2022
**Report of the Seventh Session of the
 Central Asian and Caucasus Regional
 Fisheries and Aquaculture Commission,
 Istanbul, Turkey, 11- 13 October 2021/
 Отчет седьмой сессии Региональной
 комиссии по рыбному хозяйству и
 аквакультуре в Центральной Азии и
 на Кавказе. Стамбул, Турция, с 11 по
 13 октября 2021 г. Доклад ФАО по**

рыболовству и аквакультуре - Ankara

The Central Asian and Caucasus Regional Fisheries and Aquaculture Commission (CACFish) held its seventh session physically in Istanbul, Turkey from 11 to 13 October 2021. Four Member States attended the CACFish session: Azerbaijan, Kyrgyzstan, Tajikistan, and Turkey. Seven invited States were present, namely: Georgia, Kazakhstan, the Republic of Moldova, Mongolia, the Russian Federation, Ukraine, and Uzbekistan. The EUROFISH International Organization and the Commission on the Protection of the Black Sea Against Pollution participated in the Session as intergovernmental organizations with observer status. The Commission was briefed on the main decisions and recommendations arising from the latest sessions of the FAO Governing Bodies, namely the Regional Conference for Europe and the Committee on Fisheries (COFI) as well as CACFish. Discussions took place about strategic approaches to increase the number of CACFish Members and further strengthen cooperation with non-CACFish Member States. The Commission decided to abolish the Five-year Regional Work Programme as suggested by the Technical Advisory Committee (TAC). The Commission reviewed the key outcomes and main recommendations of the Fifth Meeting of TAC.

Региональная комиссия по рыбному хозяйству и аквакультуре в Центральной Азии и на Кавказе (CACFish) провела свое седьмое заседание в очном формате в Стамбуле, Турция, с 11 по 13 октября 2021. В сессии приняли участие четыре страны-члена CACFish: Азербайджан, Кыргызстан, Таджикистан и Турция. Присутствовали также представители из семи приглашённых стран: Грузии, Казахстана, Республики Молдовы, Монголии, Российской Федерации, Украины и Узбекистана. В качестве межправительственных организаций со статусом наблюдателя в сессии приняли участие Международная организация ЕВРОФИШ (EUROFISH) и Комиссия по защите Черного моря от загрязнения. Комиссия была проинформирована об основных решениях и рекомендациях последних сессий руководящих органов ФАО, а именно Региональной конференции для Европы и Комитета по рыбному хозяйству (КРХ), а также CACFish. Состоялись обсуждения стратегических подходов к увеличению числа членов CACFish и дальнейшему укреплению сотрудничества со странами, не входящими в CACFish. Комиссия решила отменить Пятилетнюю региональную рабочую программу, как это было предложено Техническим консультативным комитетом (ТКК). Комиссия рассмотрела ключевые результаты и основные рекомендации пятого совещания ТКК.

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FAO 2022
FAO, Worldfish, University of Greenwich
2022 Socio-economic and biological
impacts of the fish-based feed industry
for sub-Saharan Africa - Rome

As populations grow and urbanize, demand also increases for animal-source foods, including farmed livestock and fish, and for feed products that can include fish-derived ingredients. Low- and middle-income countries are increasingly concerned about the fish-derived ingredient and

fish-based feed industry, as many of the fish species used for fish-derived ingredients and fish-based feed production are important for communities as a source of livelihoods and food and nutrition security. The objective of this study was to understand the drivers, outcomes, and trade-offs of the fish-based feed industry for sub-Saharan Africa. The study, using various information sources and mixed methods for data collection and analysis, found that fish-based feeds are mainly exported, offering some economic benefits to governments and fish workers throughout the value chain. At the same time, however, the study results suggest that the industry constitutes a threat to the livelihoods and food and nutrition security of local communities. Looking to the future, a range of actions that are required to ensure that the fish-based feed industry contributes to equitable social and economic development, nutritional benefits, and environmental sustainability were identified. Using a stakeholder Delphi assessment, the study prioritized recommendations for decision-making and future research and these included the establishment of and/or compliance with regulations for environmentally friendly and healthy/safe fish-derived ingredients and fish-based feed production, as well as continued efforts to identify and promote alternative efficient to use feed products that do not rely (or rely less on) fish-based ingredients.

The PDF can be accessed directly at:
www.fao.org/3/cb7990en/cb7990en.pdf

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www.fao.org/documents/card/fr/c/CB7990FR



FAO 2022
World Aquaculture 2020 - A brief
overview - Rome

This document provides a synthesis of six regional aquaculture reviews: Asia-Pacific, Europe, Latin America and the Caribbean, Near East and North Africa, North America and sub-Saharan Africa. Global aquaculture production, including aquatic plants, in 2018 was 114.5 million tonnes, with an estimated value of USD 263 billion. The Asia-Pacific region

continued to be the major producer. Globally, aquaculture provides over 50 percent of fish for human consumption. In 2018, aquaculturists were reported to farm about 622 species or species items including 387 finfishes, 111 molluscs, 64 crustaceans, seven frogs and reptiles, ten miscellaneous aquatic invertebrates and 43 aquatic plants. From 2000-2018, aquaculture production in freshwater, brackish water and marine water increased at a compound annual growth rate of 5.7 percent, 7.7 percent and 5.2 percent respectively while total aquaculture production grew at an annual growth rate of 5.6 percent. Global food supply and per capita consumption of fish and fish products continued to increase faster than human population growth. Aquaculture is striving to innovate in order to increase production and sustainability. Progress in biosecurity and fish health management, feed formulation and utilization, and genetic resource management are showing good, but uneven progress. The aquaculture sector faces challenges including competition for land and water resources, as well as external factors such as climate change, conflict, economic uncertainties and most recently the COVID-19 pandemic. The pandemic and other stresses such as droughts and tsunamis, revealed that the aquaculture industry has not engaged sufficiently in disaster preparedness. International and national mechanisms are being put in place to increase the sustainability, good governance and social license of the sector to address these challenges. The diversity of the sector, the opportunities for good jobs and commitments by governments to good governance will help the sector meet these challenges.

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FAO 2022
Regional review on status and trends in
aquaculture development in Asia and
the Pacific - 2020 - Rome

The Asia-Pacific region is remarkably diverse and wide ranging, geographically, in its flora and fauna, culturally, institutionally and economically. The region includes the two most populous countries in the world, China and India, a greater part of the Asian continent, the Australian continent, and many small islands, mostly in the

Pacific Ocean, which are some of the smallest island nations in the world. Fisheries and aquaculture are socio-economically important sectors to most nations in the Asia-Pacific region and most nations in the region have high rates of fish consumption, mostly sourced from aquaculture although the small island nations depend to a greater extent on capture fisheries. This review entails analyses of the aquaculture sector in Asia-Pacific including the status and trends, progress made in achieving sustainable development, salient challenges, issues and anticipated future development. Status and trends are based on data extracted from the FAO Fishery and Aquaculture Statistics (FAO, 2020a; FAO, 2020b), unless stated otherwise, and are mostly for the period from 2008 to 2018 and occasionally for the period from 1990 to 2018 for relevant historical comparison and longer-term contextual analyses.

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www.fao.org/3/cb8400en/cb8400en.pdf

The document card can be found here:
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FAO 2022
Regional review on status and trends in
aquaculture development in Europe -
2020 - Rome

This review reports on aquaculture development trends and challenges during 2000–2018 in the European Region covering 51 countries including European Union member states.

Aquaculture production in the European Region is composed of marine molluscs and diadromous, marine and freshwater fish. It reached 3.4 million tonnes in 2018, while having a value of USD 16.6 billion. Atlantic salmon and rainbow trout combine to give nearly two million tonnes, with molluscs providing 0.7 million tonnes; marine fish species supplied 0.4 million tonnes and freshwater fish 0.3 million tonnes. In Europe, the strongest aquaculture growth has been seen in non-European Union states (e.g. Norway, Turkey, Russian Federation) while several European Union states have diminished production (e.g. France, Netherlands, Italy). The growth in value (5.8 percent) is higher than production (0.9 percent), which is now dominated by salmonids (nearly 60 percent), primarily Atlantic salmon. Mediterranean marine fish farming is mainly for gilthead seabream and European seabass. European cyprinid production in freshwater has increased slightly, where the Russian Federation, Czechia and Poland are the biggest producers. Mussels are the principal shellfish reared, led by Spain, followed by oysters in France and clams in Italy. While publicly quoted companies have led salmon development in Northern Europe, elsewhere aquaculture is done, with few exceptions, by SMEs and micro-enterprises. Mechanisms for financial support exist for aquaculture development throughout Europe but these have not been matched by anticipated results. When unpredictable and time-consuming licensing procedures are combined with extreme competition for space and strict environmental regulations, both growth and investments are discouraged. Technology development focus has been given to structures appropriate for marine off-shore or 'open ocean' operation. The use of recirculating aquaculture systems (RAS) for large operations has also developed, both for hatcheries and for farms. Treatment for diseases and parasites remains problematic. Use of the same vaccines, veterinary treatments and disinfectants is not standardised, restricting the best health and welfare practices. Access to appropriate and efficient ingredients for formulated feeds remains a key issue for European fish farming, directly influencing productivity and profitability. The European Union is the world's largest single market for seafood and the most important destination for European aquaculture production. With preferences declared for wild products vs. farmed, the habits of the European consumer have been studied, indicating evolving influences on purchase decisions. These include the use of additives, food miles, climate change, acceptance of manufacturing practices, cost and access as well as health benefits.

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FAO 2022
Regional review on status and trends in aquaculture development in the Near East and North Africa - 2020 - Rome

The Near East and North Africa (NENA) region covers 18 countries and territories: Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates, Western Sahara and Yemen with a total land area of 9.8 million km². The region

is mostly arid or semi-arid but has extensive coastlines and includes a wide range of different economies from high income, hydrocarbon-rich countries to low-income states, some of which have been severely impacted by conflict in recent years. NENA aquaculture production was worth USD 2.3 billion in 2018, two-thirds of which came from Egypt and around one-quarter from Saudi Arabia. Production has grown rapidly since the 1980s, more than doubling over ten years and increasing by 50 percent over the five years preceding 2018 to reach 1.7 million tonnes. Egyptian fish farms accounted for 92 percent of production and Saudi Arabia for 4.2 percent while other significant producers included Iraq (25 737 tonnes), Tunisia (21 826 tonnes), Algeria (5 100 tonnes), the United Arab Emirates (3 350 tonnes) and the Syrian Arab Republic (2 350 tonnes). Although current aquaculture production levels are low, all these countries have high ambitions with further developing the sector, often for improved food self-sufficiency.

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The document card can be found here:
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FAO 2022
Regional review on status and trends in aquaculture development in Latin America and the Caribbean - 2020 - Rome

This document reviews the development of the aquaculture industry in the Latin America and the Caribbean region over the past decade. In 2018 aquaculture production in the region amounted to an estimated 3.1 million tonnes of aquatic products (excluding seaweeds)

worth USD 17.2 billion at first sale. This food sector is vastly concentrated in a few countries with the combined output from Brazil, Chile, Colombia, Ecuador and Mexico representing over 85 percent of the total regional production. Atlantic salmon, rainbow trout, tilapia, whiteleg shrimp and the Chilean mussel collectively contributed 80.4 percent and 85.9 percent of the regional production by volume and value, respectively. Marine aquaculture has been the dominant production environment in the region for the past two decades, accounting for 70.1 percent of the farmed output in 2018. Production models vary widely, with a concentration of large-scale companies in Chile, while primarily small- and/or medium-size operations in Brazil, Peru and several other countries. Introduced species remain top on the list among those farmed such as tilapia and the different salmonids both of which have contributed to local livelihoods and employment. Tilapia farming has contributed significantly to food security in many countries of the region while the largest proportion of farmed salmonids have been destined to the export markets. Production prospects remain promising, however the industry requires in general better governance, the adoption at all levels of appropriate technologies and best practices, and renewed efforts to guarantee environmental sustainability and social acceptance as well as competitiveness and foresight to deal with climate and market changes. The small island developing states (SIDS) face additional challenges including limited expertise, high production costs, poor seed supplies, as well as extreme and destructive weather events. The report discusses issues that require wider regional attention for the aquaculture sector to grow. Key recommendations focus on governance-related improvements highlighting the need for solid sectoral development plans, support policies, and effective rules and regulations. The promotion of a stronger cooperation among the countries in the region as well as further afield on technical matters, species diversification and equal support to small and large-scale farming operation are identified as key elements to foster investment and help the region gain a solid position among world aquatic food producers.

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The document card can be found here:
www.fao.org/documents/card/en/c/cb7811en



FAO 2022
Regional review on status and trends in aquaculture development in North America - 2020 - Rome

This document summarizes the status and trends of aquaculture development in North America, focusing on Canada and the United States of America, with some discussion on Bermuda, Greenland, and Saint Pierre and Miquelon. Relevant aspects of the social and economic background of each country are followed by

a description of current and evolving aquaculture practices and the needs of the industry in terms of resources, services and technologies. Impacts of aquaculture practices on the environment are discussed, followed by a consideration of the response by the industry to market demands and opportunities, and its contribution to social and economic development at regional, national and international levels. External pressures on the sector are described, including climate change and economic events, along with associated changes in governance. The review concludes with an analysis of the contributions of North American aquaculture to the Sustainable Development Goals, the FAO Strategic Objectives, and the FAO Blue Growth Initiative. Throughout the review, outstanding issues and success stories are identified, and a way forward is suggested for each main topic.

The PDF can be accessed directly at:
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www.fao.org/documents/card/en/c/cb7659en



FAO 2022
Regional review on status and trends in aquaculture development in sub-Saharan Africa - 2020 - Rome

This review provides an overview of the status, trends, challenges and projections for aquaculture in sub-Saharan Africa (SSA) and evaluates the major trends during previous five years. While the sector still faces various internal and external challenges, the inherent natural potential of the region and rapidly

increasing demand for fish has resulted in increased prioritization of aquaculture in almost all SSA countries and the African Union and subsidiary bodies have given special attention to the sector development. In order to realize its full potential, the SSA region needs to address a combination of overarching factors limiting aquaculture development so far, such as ineffective development approaches, weak governance frameworks, underdeveloped value chains and low availability as well as the high cost of key production inputs. Strengthened value chains for tilapia and catfish, promotion of new species, improved biosecurity, continued development of certification and associated harmonized best practices, improved information systems and innovations to address climate-change related impacts are some of the matters to be addressed. Financial institutions and private sector (national and international) have equally started investing, even though in the global picture such interventions may seem negligible, which makes the continent to call for more and higher levels technical and financial assistance from international partners. Upscale the status of production and productivity via healthy investments would help the sector to generate a variety of benefits including food security, livelihoods, employment, domestic and intra-regional markets, foreign currency income and other socio-economic benefits.

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FAO 2022

Preliminary investigation on the impact of COVID-19 on aquaculture in China - Rome

In order to investigate the impact of COVID-19 on the entire aquaculture sectoral chain and understand what strategy and measures have been taken to mitigate the impact of the pandemic on the sector, the Freshwater Fisheries Research Centre (FFRC), carried out a preliminary investigation in China with the support of FAO.

The investigation focused on channel catfish (*Ictalurus punctatus*) farming in Hubei Province and tilapia farming (*Oreochromis* spp.) in Guangdong Province. It was expected the investigation would provide information for FAO and its Members to better understand the impact of the pandemic on aquaculture in view of developing appropriate strategies to cope with the pandemic and similar risks in the future.

The PDF can be accessed directly at:
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The document card can be found here:
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FAO 2022

A review of governance and tenure in inland capture fisheries and aquaculture systems of India Madras - Chennai

Being able to access fish and other aquatic resources in inland waters for nutrition and food security is essential for rural populations in many developing countries and inland fisheries contribute significantly to achieving the Sustainable Development Goals. The Voluntary

Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, and the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication, are tools allowing governments to strengthen governance and develop policies that secure equitable distribution of benefits and empower stakeholders. This document examines the tenure systems, rights and governance issues in the vast, diverse and complex inland fisheries of India. The objective is to highlight how inland fisheries have been changing and the associated challenges for governance and tenure. The legal and policy contexts, within which fishing in rivers, wetlands and estuaries takes place, are described as well as the diversity of fishing activities and practices in the different environments found in India, which include inland capture fisheries, culture-based fisheries and freshwater aquaculture systems. Multiple drivers of change that affect inland fisheries are discussed from within the fisheries sector and from wider social, economic and environmental contexts. The ways in which formal and informal institutional arrangements and customary access regimes interact with each other are highlighted. The potential outcomes of institutional change and emerging policies for ecological sustainability, economic equity and social justice are discussed, with a focus on capture fisheries within India's inland fisheries.

The document card can be found here:
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Other FAO publications



FAO 2021

Thematic Background Study - Incorporating genetic diversity and indicators into statistics and monitoring of farmed aquatic species and their wild relatives - Santiago

Regular reporting and monitoring of fishery and aquaculture production using genetic information, i.e. using information on stocks, breeds, monosex groups, polyploids, products

of modern biotechnology and hybrids, would allow aquaculturists to assess which breeds or strains could be most useful for production, and help fishery managers better manage and trace products from capture fisheries. Genetic information would be useful to both aquaculturists and fishery managers in assessing which stocks are under threat or endangered and in traceability requirements for the origin and handling of aquatic food products. However, the capacity and information requirements for incorporating genetic information into national and global statistics are significant and, in many cases, currently prohibitive.

A key source of information for this paper was the reports currently being submitted to the FAO Fisheries and Aquaculture Department by countries as part of the process to produce the first report on The State of the World's Aquatic Genetic Resources for Food and Agriculture (SoW AqGR). Through this country-driven process, FAO is receiving information on stocks, varieties, strains and other farmed types that are currently being used in aquaculture and fisheries or that are being actively researched for future use. The country reports will further attempt to include relevant policies and constraints relating to the collection and monitoring of genetic data.

The PDF can be accessed directly at:
www.fao.org/3/cb7951en/cb7951en.pdf

The document card can be found here:
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FAO 2021

Thematic Background Study - Genetic resources for farmed seaweeds - Rome

The increasing global population needs to source food from the ocean, which is a much greater area than the land. The ocean is rich with diversified flora and fauna, and both are sources of proteins, vitamins, minerals, phytohormones, and bioactive compounds. Thousands of species of macroalgae (seaweed) dominate the vegetation of the seafloor from the intertidal to the subtidal zone.

The domestication of several economically important seaweed such as *Saccharina*, *Undaria* and *Pyropia* in China, Japan and the Republic of Korea, and *Kappaphycus* and *Euclima* in Indonesia, Malaysia, the Philippines and the United Republic of Tanzania led to the intensive commercial cultivation of these seaweeds. Except for the United Republic of Tanzania, the commercial farming of seaweed, both temperate and tropical species, is centred in Asia. Despite the presence of several economically important seaweeds outside Asia, commercial farming is practised only in a few of non-Asian countries. These include Chile for *Gracilaria* and *Macrocystis* (Buschmann *et al.*, 2001); France for *Palmaria palmata*, *Porphyra umbilicalis* and *Undaria pinnatifida* (Netalgae); and Canada for *Saccharina latissima* in integrated multi-trophic aquaculture (IMTA) (Chopin *et al.*, 2013) and *Chondrus crispus*. Trial cultivation of *Saccharina* spp. and *P. palmata* is now taking place in Western Europe. Seaweeds are farmed mainly for food such as sea vegetables and food ingredients (Bixler and Porse, 2011), as well as feed (Wilke *et al.*, 2015; Norambuena *et al.*, 2015). However, there is increasing interest in their use for biorefinery products that require a vast amount of biomass which must be farmed.

The PDF can be accessed directly at:
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Calendar of Events



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MAY 2022

11th Session of the COFI Subcommittee on Aquaculture

Virtual meeting, 24-27 May 2021

Information: COFI-Aquaculture@fao.org

World Aquaculture 2022

Mérida, Mexico. 24-27 May 2022

Information: www.was.org

JUNE 2022

18th Session of the COFI Sub-Committee on Fish Trade

Written correspondence procedure: 8 April – 8 May

Plenary sessions: 7, 8, 9 and 20 June 2022

Information: COFI-Fishtrade@fao.org

31st Session of the European Inland Fisheries and Aquaculture Advisory Commission (EIFAAC)

22-24 June 2022

Information: EIFAAC-Secretariat@fao.org

SEPTEMBER 2022

Aquaculture Europe 2022

Rimini, Italy, 27-30 September 2022

Information: www.aquaeas.org



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Raising the Visibility of Aquaculture Through FAO STORIES

www.fao.org/home/stories-archive/en/



A new kind of fishing in Uganda

Diversifying income and skills to rebuild livelihoods on Lake Victoria

On the Ugandan shores of the largest lake in Africa, fishers were increasingly coming up empty-handed. Lake Victoria once boasted 500 species of fish but in recent years overfishing and poor fishing practices have taken a heavy toll on fish stocks, the environment and the communities who depend on them. For the past two years FAO has been working with Uganda's Ministry of Agriculture, Animal Industry and Fisheries on a joint project to reshape the lake's fisheries and aquaculture sector. The project is timely as FAO marks the contribution of small-scale fishers, fish farmers and fish workers during 2022, the International Year of Artisanal Fisheries and Aquaculture (IYAFA).

Read the FAO Story here:
www.fao.org/fao-stories/article/en/c/1505340/

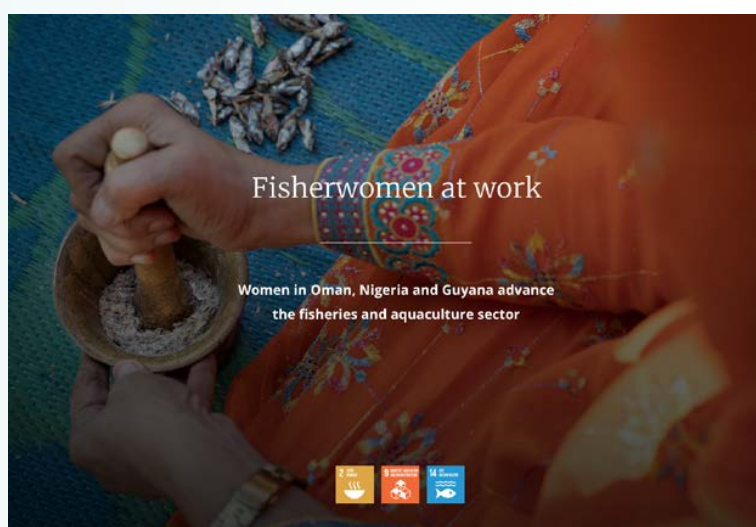
Fisherwomen at work

Women in Oman, Nigeria and Guyana advance the fisheries and aquaculture sector

For generations, it was mistakenly viewed as a man's world. Women have always been there, but fisheries and aquaculture are now seeing a surge in women starting their own businesses in all areas of the sector.

Today, more than 50 million women are involved in fisheries and aquaculture around the world and their contributions to household incomes and communities cannot be overlooked.

Read the FAO Story here:
www.fao.org/fao-stories/article/en/c/1475652/



Sustainable Aquaculture
FAO Fisheries and Aquaculture Division
Food and Agriculture Organization of the United Nations
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The United Nations General Assembly declared 2022 the **International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022)** and identified FAO as the lead agency.

Celebrating the Year in 2022 follows a trend of highlighting that fisheries and aquaculture is about people as much as it is about fish. **Its objective is to focus world attention on the role that small-scale fishers**, fish farmers and fish workers play, thereby increasing global understanding and action to support them.

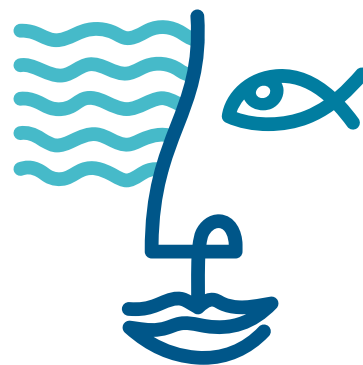
This special edition of *FAN* is dedicated to IYAFA, and the small scale fish farmers and fish workers around the world.

Artisanal fisheries and aquaculture **make significant contributions to global food security, nutrition and healthy diets, livelihood generation, youth employment and sustainable development.**

Small scale fishers and fish farmers are proof that small actions can have big impacts, and IYAFA is all about supporting and empowering them.

Join FAO in celebrating IYAFA 2022!

**Small in scale,
big in value.**



**INTERNATIONAL YEAR OF
ARTISANAL FISHERIES
AND AQUACULTURE**

2022

www.fao.org/artisanal-fisheries-aquaculture-2022/home/en/

FAO Aquaculture News (FAN) is issued twice a year by the FAO Fisheries and Aquaculture Division, Rome, Italy. It presents articles and views from the FAO aquaculture programme and discusses various aspects of aquaculture as seen from the perspective of both headquarters and the field programme. Articles are contributed by FAO staff from within and outside the Fisheries Division,

from FAO regional offices and field projects, by FAO consultants and, occasionally, by invitation from other sources. FAN is distributed free of charge to various institutions, scientists, planners and managers in member countries and has a current circulation of about 1 300 copies. It is also available on the FAO webpage: www.fao.org/fishery/publications/fan

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