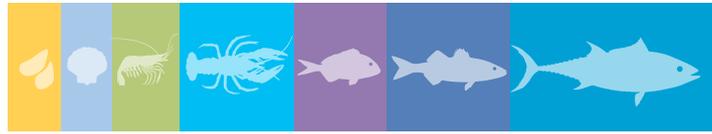




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FAO Aquaculture Newsletter



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J. RYDER



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Packing farmed gilthead seabream (*Sparus aurata*) in an aquaculture facility in Monastir, Tunisia

Aquaculture and Trade

Over 50 percent of all fish we consume globally is farmed. This has risen from only 28 percent in 1995 and the upward trend will continue as aquaculture plays an increasingly important role in providing fish for global consumers. Fish is an important source of high quality protein for people worldwide, as well as providing important micronutrients and omega-3 fats. Of course, this does depend on the species and some recent news about the lower levels of omega-3 fatty acids in some farmed salmon is a concern from the perspective of the healthy image that this fish enjoys. But the healthy image persists – a recent BBC story, based on peer reviewed work, listed the 100 most nutritious foods and fish and

shellfish species were very evident throughout the list, alongside fruits, vegetables, nuts and other plant based commodities. This reinforces the healthy reputation that fish generally has in consumers' minds and that positive image of fish drives demand, which in turn drives trade. The request for fish is increasing and farmed fish is well placed to respond to this demand.

According to the latest State of World Fisheries and Aquaculture (SOFIA, 2016) report, world trade in fish and fishery products has expanded significantly in recent decades – for fish destined for human consumption, the quantity has risen by more than 500 percent since 1976. However, there are no uniform total figures for the

amount of farmed fish that enters international trade but it is not unreasonable to assume that the levels of farmed fish being internationally traded will increase alongside the production increases.

So what are the issues aquaculture must address to make the most of this opportunity. Being a farmed commodity with control over production, aquaculture products benefit from a predictability of supply, a standardisation of product specifications and, likely, more stable prices than from capture fisheries. This is very attractive to buyers.

But entering international trade is not without its challenges. In general, import tariffs for fish and

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fish products are low in major developed importing markets but import requirements, both regulatory and voluntary, of the major markets are increasing. These are not only related to safety and quality issues, but also to labelling requirements – the EU has strict labelling laws covering fish and fish products – and over the last decade the voluntary certification for sustainability issues as well as social and labour conditions in the supply chain. Fish fraud is the most recent issue to face the supply chain and is now a significant concern in markets around the world, involving both farmed fish and captured fish. Technical solutions exist to authenticate species – species substitution being the main fraud problem, but not the only one – and as these technologies become more available, they will become part of the whole food control system. Companies are already using “fingerprinting” techniques to protect their brands.

Coming back to food safety issues, interruption of trade at international borders remains a concern. In this issue of FAN, you will find an analysis of the border control issues for fish in several major importing regions/countries, but suffice it to say that the main problem is the presence of veterinary drugs above maximum levels. As well as a food safety issue, this has implications for the development of anti-microbial resistance in micro-organisms, the latter now recognised as one of the main global threats to human health. Improved adoption of good aquaculture practices, including prudent use of veterinary drugs, will help reduce both these problems and will help to reinforce a positive image of the sector in general.

Finally, consumer perception plays a very important role in buying behaviour. There is what has been called a ‘perception gap’ between the way modern aquaculture is carried out and the public

understanding of the sector and its practices. It is therefore crucial to both ensure and communicate the adoption of good practices that lead to a responsible and sustainable aquaculture sector and emphasise the important role that the sector plays in addressing food security, employment and protection of the environment. If we do that, aquaculture will be well placed to meet the increasing demand for fish and fish products.

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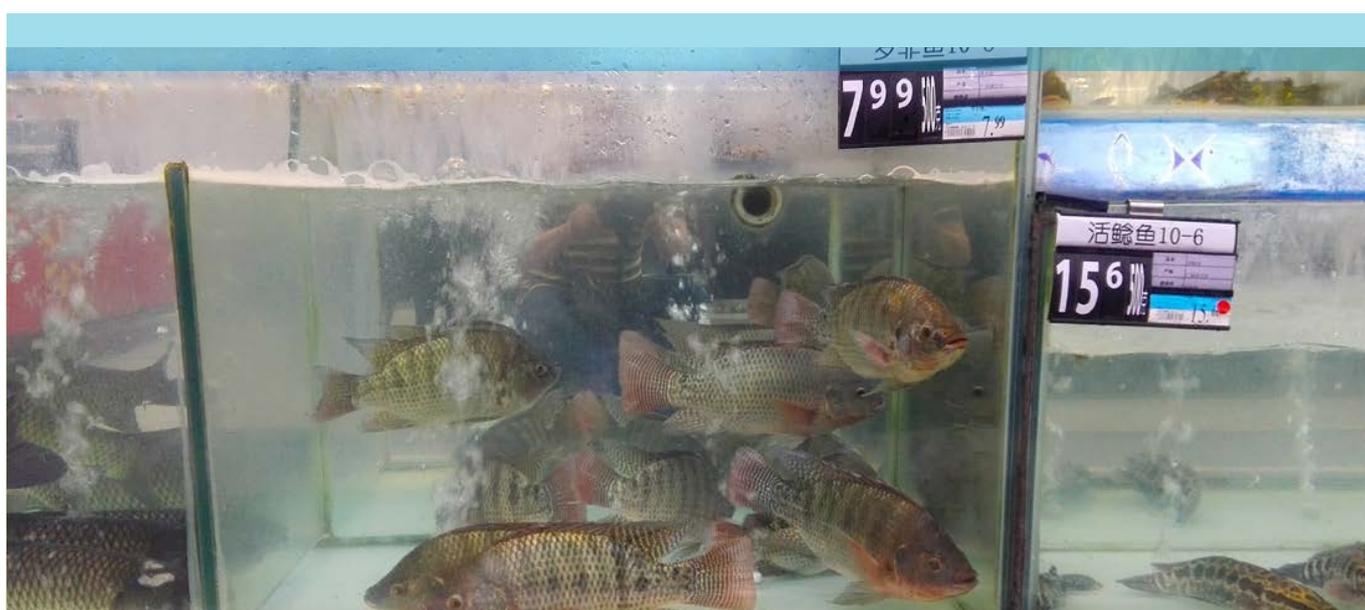
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SEE ALSO

FAO. 2016. *The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all*. Rome. 200 pp. www.fao.org/3/a-i5555e.pdf



Live Nile tilapia (*Oreochromis niloticus*) in a seafood market, China

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Women at the fish market of Cap-Haitien, Haiti



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Transfer of farmed gilthead seabream (*Sparus aurata*) in the lagoon of Orbetello, Italy

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Aquaponics farm producing tilapia fish and strawberries, Oman

GLOBAL AQUACULTURE UPDATES



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Notes from the Aquaculture Statistician

World aquaculture produced 80 million tonnes of food fish in 2016. Great disparity remains among countries

On 20 March 2018, FAO global aquaculture production quantity and value statistics with time series expanded to cover 67 years (1950-2016) were released for open access. The global statistics on capture and aquaculture annually updated and published by the FAO Fisheries and Aquaculture Department rank high among all FAO statistical related products for the number of worldwide users.

In 2016, a total of 80 million tonnes of farmed food fish (US\$231.6 billion) and



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30.1 million tonnes of aquatic algae (US\$11.7 billion) were produced in the world. Farmed food fish include 54.1 million tonnes of finfish (US\$138.5 billion), 17.1 million tonnes of molluscs (US\$29.2 billion), 7.9 million tonnes of crustaceans (US\$57.1 billion), and 938.5 thousand tonnes of miscellaneous aquatic animals (US\$6.8 billion) such as turtles, sea cucumbers, frogs and edible jellyfish. Non-food products (pearls, shells, etc.) were 37.9 thousand tonnes, valued at US\$214.6 million, in the same year.

Also for 2016, data show that the greatly uneven distribution of aquaculture production and disparity in the level of sectoral development across the world and within regions remains largely unchanged so far, with the majority of low income food deficit countries having an aquaculture production still too low to support the achievement of their national food and nutrition security.

In general FAO's aquaculture production volume data are of considerably higher reliability and accuracy than value data. Since last year, special effort was made to improve the previously understated production value for several major producers including China. World aquaculture value in the new published data is considerably higher than in previous releases.

Ideally, all FAO statistical data on aquaculture should have been reported by the competent authorities of producing countries and territories around the world. In reality this does not occur for all the producing countries. Published FAO data include official statistical data reported by governments, or harvested from known resources by FAO for a few countries that do not report to FAO, and estimates made by statistician for all the other countries with official data unavailable or unknown to FAO. FAO received just below 120 national data reports for the

2016 reference year, representing 84.3 percent (67.5 million tonnes, excluding aquatic plants) of total food fish production by volume; however, if China is excluded the percentage is much lower. FAO estimates for the non-reporting countries account for 15.1 percent (12.1 million tonnes) of the total production. On continental level, FAO estimates count high in the total production in Europe and South America due to lack of reporting to FAO by a number of regional major producers.

For many less produced species their worldwide production levels are understated by currently available data

In 2016, grass carp and Atlantic salmon were the most produced species in volume terms in inland fish farming and mariculture, respectively. Nile tilapia and common carp were among those most farmed species in terms of producing countries. Different from the "staple" species, for a large number of species produced

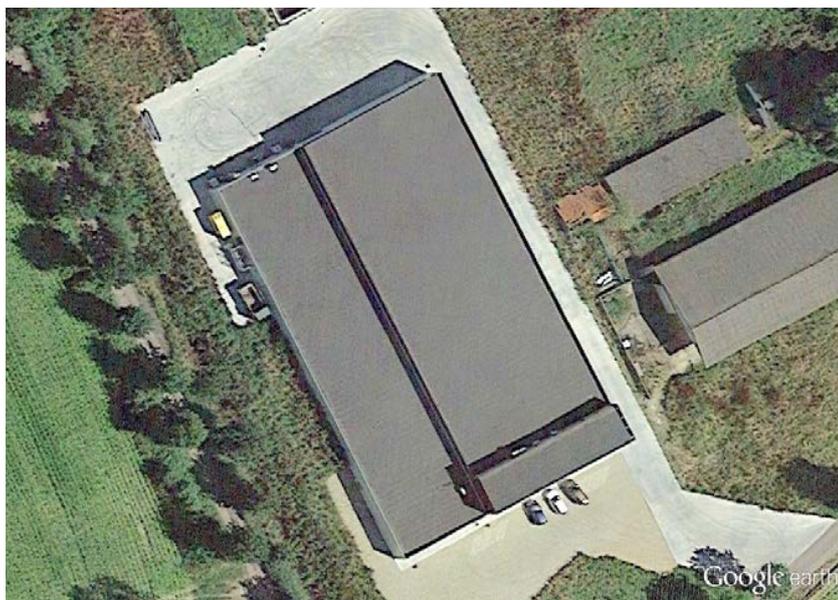


This Google satellite image dated 10 January 2015 shows the 102 x 80 meters blue roof of the farm's building for jade perch farming, along with an office building in Dongguan City suburb. As an established procedure at the farm, marketable size fish of around 500-600 grams are conditioned with reduced feeding ration for about three weeks until being totally starved for few days before being delivered directly to restaurants in nearby cities including Hong Kong. Jade perch produced from RAS facilities fetches a much higher price

in the world in less quantity, their real production levels are greatly understated by the national data currently available to FAO. One of such species is barcoo grunter (*Scortum barcoo*), an omnivorous freshwater fish endemic to Australia, where it

has been farmed as food fish for many years. This fish has been introduced to many places outside Australia as a target for aquaculture. Despite the common name "barcoo grunter" used in FAO statistics, it is popularly known as "jade perch" especially for marketing for its attractive appearance with dark coloured patches on its body. With a relatively small head, jade perch is a food fish favored by consumers. It is said to be rich in poly-unsaturated fatty acid.

As of 2016, FAO has only recorded no more than 38 tonnes of aquaculture production of jade perch reported by Malaysia since 2012 and 1 tonne reported by Singapore for 2016 for the very first time. In Australia's aquaculture production statistics the production of jade perch is not separately listed. Australian farmed jade perch production is most probably aggregated as part of silver perch (*Bidyanus bidyanus*) another freshwater fish farmed in relatively larger quantity in the country. It is known that some



This Google satellite image dated 19 July 2016 shows the dark grey roof building measuring 102 x 80 meters of a jade perch farm equipped with recirculating aquaculture system (RAS) in Europe. This farm was constructed in 2014 near the city of Deince in East Flanders province in Belgium. With a designed annual production capacity of up to 200 tonnes, the farm sells farmed jade perch locally through several marketing outlets, including sale contract with a supermarket

silver perch farmers in Australia also produce smaller volume of jade perch.

In Hong Kong, China, jade perch had been introduced to local fish farmers through a government extension programme several years ago. Sharing a border with Hong Kong, the province of Guangdong has more significant production of jade perch. The use of earthen ponds and cages is common to grow jade perch in Guangdong and several other provinces in China. In the suburb of Dongguan City in Guangdong, a farm with dozens of indoor tanks using recirculating aquaculture system (RAS) was built in 2012 for jade perch culture. This farm produces about 300 tonnes of jade perch annually.

In the Pearl River delta region, an interspecific hybrid between male jade perch and female black bream (*Hephaestus fuliginosus*) has been established for culture by a small number of aquaculture enterprises.

Seaweed as seafood

Seaweeds are traditionally consumed in quite a number of countries particularly in Asia as

food or cooking ingredient for special flavor or other efforts such as soup thickness.

Of the 30 million tonnes of seaweeds produced today from aquaculture, some species are produced almost exclusively as food for direct human consumption, although low grade products and scraps from processing factories are used for other purposes including feed for abalone culture. Such species include *Undaria pinnatifida*, *Porphyra* spp., *Sargassum fusiforme* and *Caulerpa* spp., etc. that are produced in East and Southeast Asia.

Other farmed specie like Japanese kelp, *Saccharina japonica*, is produced for human consumption as well as for extraction of iodine and alginate. One of the most farmed tropical seaweed species used by large for carrageenan extraction, *Eucheuma denticulatum*, is also popularly eaten fresh in salad in the Philippines.

Despite that seaweeds are yet to be included in FAO food balance sheets of fish and fishery products, because of the difficulties in obtaining historical data divided

by farmed or wild origin of the traded aquatic plants, the amount of seaweeds eaten every year can hardly be ignored. Seaweeds can be eaten as seafood, too.

Let's look at sea grape as an example. Wild grown sea grapes are traditionally collected as food by coastal communities in Southeast Asia and in small island States in the Pacific. They are also farmed there. FAO has recorded the production of farmed sea grapes from the Philippines since 1950 without disruption. Highest production was recorded in 1998 and 2000 with production over 28 000 tonnes in the country. The production has dropped with fluctuation in following years to the level of just below 600 tonnes in 2016. Cook Islands is the only other producer that has reported farmed sea grapes to FAO (*Caulerpa racemose*, 2 tonnes in 2016).

The sea grape species, *Caulerpa lentillifera*, has been farmed in Okinawa in Japan in land-based tanks for many years already. Farmed sea grapes and another farmed seaweed species *Cladosiphon okamuranus* (known as "mozuku" in Japanese), are famous seafood products from Okinawa. Farming of sea grapes has been introduced to Viet Nam from Japan for some years. In more recent years sea grape farming in coastal ponds has taken up by some shrimp farmer in a few provinces. In view of the high price of imported sea grapes, a number of companies in China have invested in sea grape farming the past few years.

Farmed sea grapes are not separately listed in national aquaculture statistics in Japan, Viet Nam or China. The annual production level is about 600 tonnes, 300-400 tonnes and over 1 000 tonnes in the three countries, respectively.



COURTESY OF Y-LI

A plate of seaweeds, nicknamed as "sea grapes" in English or "lato" in local language, on a dining table in the Philippines. The seaweed with smaller granules with translucent and shining appearance is *Caulerpa lentillifera*, which is also called as "green caviar" for its shape and size resembling caviar made sturgeon eggs. The other species with opaque appearance is probably *C. racemose*. Sea grapes are farmed primarily for human consumption

Progressive Management Pathway to Improve Aquaculture Biosecurity (PMP/AB)¹

The great potential of aquaculture to contribute to food and nutrition security and poverty alleviation has been hampered by significant animal disease outbreaks (exotic, endemic, and emerging) and biosecurity challenges. Transboundary aquatic animal diseases (TAADs) are highly contagious/transmissible agents with the potential for rapid spread irrespective of national borders and may cause serious socio-economic impact and possibly public health consequences. Three categories of infectious diseases affecting aquaculture include: **(1) Exotic diseases** that impact important traded species (e.g. finfish, crustaceans, molluscs, amphibians) and are governed by international standards or national regulations (e.g. OIE list of reportable diseases; a set of criteria needs

to be met to be included in the list and reporting/notification to OIE is recommended during an outbreak); **(2) Endemic diseases** that consistently affect aquaculture production at hatchery, nursery, and grow-out facilities (e.g. bacteria, parasites, fungi, or virus); and **(3) Emerging diseases**, that is a category including diseases having a significant impact on aquatic animal or public health resulting from a change of known pathogenic agent or its spread to a new geographic area or species, or a newly recognized or suspected pathogenic agent.

During the last three decades, the sector has faced a number of emerging and re-emerging diseases approximately every three to five years. Too often, there is a long-time lapse from the time that an emergent disease was observed in the field to the time when the disease was reported, a diagnostic method was developed, an etiologic agent was identified, and finally appropriate disease management or risk management measures were determined and implemented, which can then enable achievement of disease recovery or disease freedom. These time lapses have led to significant production losses and losses of revenue in aquaculture, in many occasions seriously collapsing the industry at local and national levels. Further to those direct impacts, recurrent losses have led to poor confidence in the sector

from potential investors. There are many examples of large aquaculture disease-related pandemics, e.g. white spot syndrome virus (WSSV), epizootic ulcerative syndrome (EUS), koi herpesvirus (KHV), acute hepatopancreatic necrosis disease (AHPND), *Enterocytozoon hepatopenaei* and most recently tilapia lake virus (TILV).

In a largely non-compensatory commodity production system like aquaculture, such production losses are detrimental to the sustainability of the industry and its future, especially because the large majority of aquaculture production still comes from rural smallholders with little or weak capacity to respond to disease outbreaks. Aquaculture is the fastest-growing food producing sector, and the biosecurity and aquatic animal health management strategies/actions/responses have not kept pace with such rapid development.

The recent increase in the emergence and spread of TAADs in aquaculture systems, along with their significant impacts, call for a new approach to aquatic animal health management that will bring together the required range of stakeholders to develop action plans that are applicable and beneficial both in the short-, medium- and longer-term timeframes to address the specific attributes/factors (drivers and pathways) contributing to the risk situation. However, the sheer number of cultured species (more than 500) and



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¹ This article is based on a Working Document intended to be presented during the Stakeholder Consultation on PMP for Improving Aquaculture Biosecurity, 10-12 April 2018, Washington DC, USA.

stakeholders/enterprises involved in the supply/value chain present an enormous challenge for management at all levels. This is complicated by the diversity of aquaculture containment (earthen ponds, tanks, cages), systems (recirculating systems, multitrophic, integrated, polyculture, nursery, grow-out, hatchery), environments (brackishwater, freshwater, marine), size of farming operation (backyard and subsistence to small-, medium- and large-scale commercial operations) and management (extensive, semi-intensive, intensive). Furthermore, there is huge variety in the pathogens themselves (single, multi-infection, cryptic), how they emerge and spread, and how they are transmitted.

Fish is also the most traded of all food commodities, and indiscriminate trading has contributed to the introduction and spread of pathogens along with host movement. While international standards are meant to assist countries in reducing the risks of TAAD introduction and spread, they are in constant change for many reasons including: (1) emergence of unknown diseases; (2) better understanding on dynamics and epidemiology of disease; (3) improved diagnostic and detection methods; (4) emergence of unknown diseases, and (5) changing trade patterns (political, social, industrial and economic environments). Such standards are also more widely applied by developed countries; developing countries generally face difficulties in its interpretation and implementation. There also exist regional and international

voluntary agreements or instruments aimed in reducing disease risks.

A planned self-funding stakeholder consultation² co-organized by FAO, Mississippi State University (MSU), and the World Bank (WB) to be held in Washington D.C., from 10-12 April 2018, will take stock of the current aquatic animal health and biosecurity situation in aquaculture with a view to identifying bottlenecks and root causes. Importantly, discussions will be conducted on the need for a paradigm shift and a new approach to deal with biosecurity challenges, and a Global Plan of Action will be developed if strong support and consensus can be reached during the consultation.

Aquaculture Biosecurity Progressive Management Pathway

The Aquaculture Biosecurity Progressive Management Pathway (PMP/AB) will be introduced during the above consultation. The PMP is a four-stage step-wise risk management framework that introduces the building blocks for biosecurity capacity that are relevant to national needs at every stage. The PMP is based on similar frameworks used to promote development and monitoring of national strategies for important livestock diseases [such as Foot-and-Mouth Disease (FMD), African animal trypanosomiasis, Peste des Petits Ruminants (PPR), or rabies]. **This approach is risk-based, collaborative, and progressive**, and typically includes the following: (1) defining the aquaculture risks (e.g. pathogen, antimicrobial resistance, ecosystem risks);

(2) developing a long-term national aquaculture biosecurity strategic plan; (3) implementing the plan, and (4) monitoring and evaluation (M&E) (see Figure 1). The next stage typically involves developing sector-specific and disease-specific risk management plans, controlling/responding to disease threats, establishing freedom/defending health status, and sustaining ecosystem health (e.g. productive aquaculture that is environmentally neutral and resilient in the long term). The approach also promotes active stakeholder engagement and collaboration, thus public-private sector partnership (PPP) is a cornerstone to its implementation. The PMP approach requires that the baseline for one stage must be maintained in subsequent stages, with progressive addition of biosecurity measures, surveillance, and response after the control stage.

What are the benefits of the PMP?

At the national level, the PMP approach addresses a lack of clear national plans by enabling a focus on national strategy development processes in the mid-to-long term, and it promotes the co-management approach. The greater use of planning processes that bring stakeholders together should have a variety of benefits in itself, and it should build the basis for national public and private co-management of biosecurity.

The process involves active stakeholder engagement. Specifically, it requires awareness and adoption of appropriate biosecurity action plans at the producer level that can lead

² At the time of writing this article, confirmation of participation were received from representatives: (i) governments (Brasil, Chile, China, Norway, India, Norway, the Philippines, South Africa, South Korea, Tanzania, and the United States of America); (ii) producer/private sector (ABCC/Brasil, National Aquaculture Group/Kingdom of Saudi Arabia, Aqua Global Environs Co. Ltd./Myanmar, ShrimpVet/Viet Nam, Nutreco/USA); (iii) regional and intergovernmental organizations (AU-IBAR, EU Sante/Mare, NACA, OIE, SADC, SEAFDEC-AQD); (iv) research/academe (CEFAS/UK, NVI/Norway, University of Ghent/Belgium, University of Florida/USA, World Fish/CGIAR); and (v) aid agencies and foundation (Gates Foundation, NORAD and USAID).

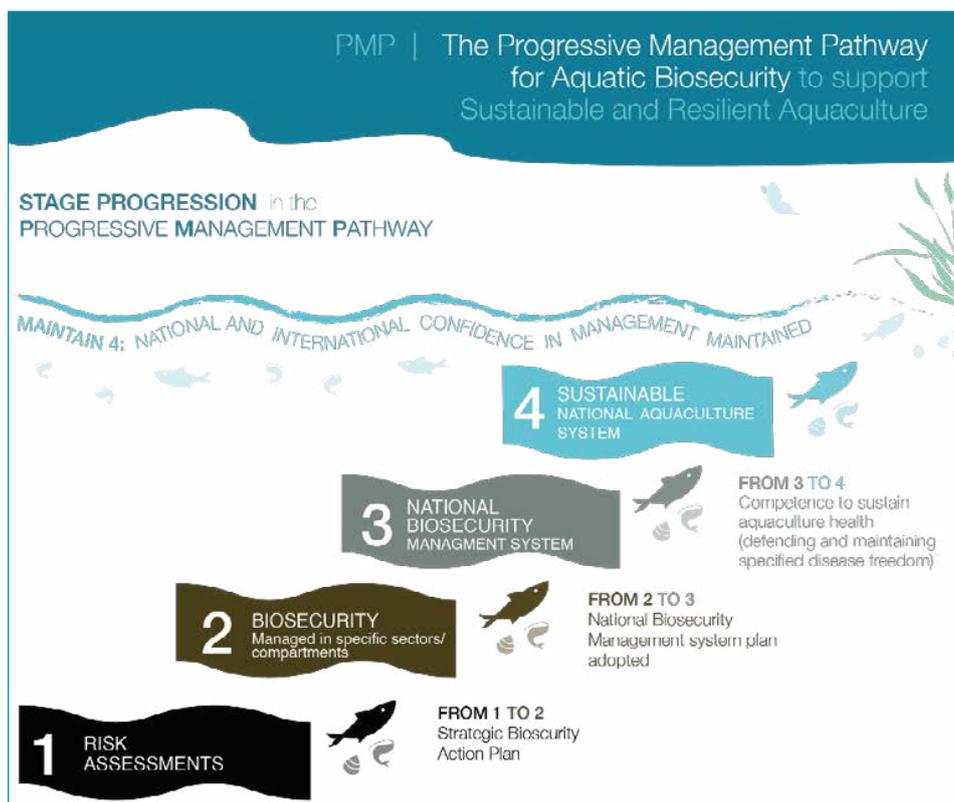


Figure 1 - Stage progression in the Progressive Management Pathway to improve Aquaculture/Aquatic Biosecurity (prepared by Enrique Anton, FAO/AGAH)

and has a set of principles to establish the Risk Management Framework at a national level. It establishes risk ownership and promotes the “plan-do-check-act” cycle of quality management to emphasize the central role for monitoring and evaluating that will enable problems or progress to be considered and actions taken.

Self-assessment is an essential part of the process of national ownership of the principles, responsibilities, and coordination with other activities required for management. As with any new tool, the PMP/AB and its associated

to reduction in the incidence and impact of targeted priority diseases. Thus, it promotes greater recognition of the important role of biosecurity.

Each stage provides a tangible benefit to stakeholders, and it will be part of the work within each stage to demonstrate, communicate, and advocate for activities that solve the challenges inherent in retaining commitment. Co-management principles at each stage should ensure the

problems are well recognized and management solutions are identified.

The approach also looks at establishing risk ownership and promotes active engagement and long-term commitment to risk management. Risk ownership is an important principle as described in the ISO Standard 31000 on “risk management frameworks” (www.iso.org/news/ref2263.html). The PMP is broadly in line with ISO 31000

guidance and training materials will require a period of testing through national application, and adaptation will be made as a result. The PMP/AB Stakeholder Consultation in Washington DC should help identify the level of global interest in the tool to support the development of a plan of action as well as the appropriate governance mechanisms to ensure the development of both the tool and the support system.



Eye ablation of Indian white prawn (*Penaeus indicus*) breeder, Jeddah Fisheries Research Center, Saudi Arabia

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Outcomes of the Ninth Session of the Sub-Committee on Aquaculture

The Ninth session of FAO's COFI Sub-Committee on Aquaculture was held from 24 to 27 October 2017 in Rome. The Sub-Committee meeting brought together close to 200 delegates from eighty-nine Members of FAO, two associate Members, representatives from two specialized agencies of the United Nations and observers from seven intergovernmental and six international non-governmental organizations to review a full agenda of aquaculture-related items.

The work of FAO's Fisheries and Aquaculture Department is governed by FAO's member country-driven Committee on Fisheries (COFI). In order to better inform its work, COFI maintains two sub-committees, the Sub-Committee on Fish Trade and the Sub-Committee on Aquaculture, which has been meeting every two years since its initial session in 2002.

Each session of the Sub-Committee includes both recurrent and new agenda items, agreed upon with member countries to reflect new opportunities and emerging challenges to the sector. For the 9th Session, these agenda items included FAO's Fisheries and Aquaculture Department's efforts in implementing the recommendations of past sessions of the Sub-Committee, discussion on progress on implementation of the Code of Conduct for Responsible Fisheries, aquaculture's role in Agenda 2030 and its Sustainable Development



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Goals (SDGs), aquatic genetic resources for aquaculture development, extension services in aquaculture, and aquaculture certification. Aquaculture provides over half of the fish we consume globally – and with the demand for aquatic food rising alongside a growing population, those numbers look set to increase. How to manage that growth sustainably, while simultaneously providing a nutritious source of food and creating employment for often vulnerable populations, was a recurrent theme that ran throughout the week's discussions.

The Sub-Committee underlined the important contribution of aquaculture to food security and nutrition as well as the importance of market access and post-harvest issues, and emphasized the need to support small-scale producers. It recognized the growing global significance of sustainable aquaculture development to the achievement of a wide range of SDG targets, while also recognizing that there is a growing need for implementation of best practices in aquaculture in many regions and countries. The Sub-Committee recommended that FAO should develop global guidelines for the sustainable development of the sector. It unanimously endorsed FAO's Common Vision for Sustainable Food and Agriculture as a useful framework for implementing the 2030 Agenda. It also endorsed FAO's Blue Growth Initiative, as part of FAO's Common Vision and its five principles, and stressed its relevance in supporting member countries to reach their SDGs. The Sub-Committee welcomed the forthcoming report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*.



Plenary session of the Sub-Committee on Aquaculture

It recognized the importance of extension for aquaculture development, and requested that FAO provide guidance and facilitate knowledge-sharing among Members. With regard to FAO's ongoing and planned activities related to aquaculture certification, the Sub-Committee welcomed the work of FAO, noting the increasing role of certification in national and international markets, and highlighting the need to strengthen the capacity of small-scale producers to attain certification and eventually improve market access.

A Special Event on aquaculture development and Blue Growth opportunities for Small Island Developing States (SIDS) generated substantial interest. The Sub-Committee recommended that FAO continue its work in aquaculture development in SIDS providing support through capacity development, technical assistance, facilitating the exchange of experiences on aquaculture and supporting possible regional approaches, building upon existing and emerging networks. The FAO Secretariat thanked the Ninth session's Chair, the Islamic Republic of Iran, all member countries and participants for making this session a success. The Sub-Committee welcomed the invitation of the Kingdom of Norway to host the tenth session in 2019, and the offer of the United Mexican States to host the eleventh session of the Sub-Committee in 2021.



SEE ALSO

Sub-Committee on Aquaculture:
www.fao.org/cofi/aq

Sub-Committee on Fish Trade:
www.fao.org/about/meetings/cofi-sub-committee-on-fish-trade

A Seminar on Aquaculture and Blue Growth Development Opportunities in Small Island Developing States

Since the Rio summit in 1992, the challenges faced by the Small Island Developing States (SIDS) have been widely acknowledged by the International community. Because of their small size and isolation, SIDS are particularly threatened by natural disasters and the impacts of climate change. Many have limited arable agricultural land and are dependent on small-scale agriculture, ocean resources and high-priced imports. FAO has been involved in supporting SIDS through many initiatives, the latest one being the Global Action Programme on Food Security and Nutrition in SIDS, launched in July 2017, during the 40th Session of the FAO Conference. As SIDS are by definition highly integrated in their maritime surrounding, the Sustainable Development Goal 14 sets a target to increase by 2030 their economic benefits from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism. FAO has committed to support the SIDS through its Blue Growth Initiative, an integrated



Traditional Polynesian coastal pond, Hawaii

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and holistic approach that aims at reconciling economic growth with improved livelihoods, social equity, and by strengthening transparent, reliable and more secure food systems.



SEE ALSO

Small Island Developing States and AMR focus of Day 2 at #COFlaquaculture
www.fao.org/blogs/blue-growth-blog/small-island-developing-states-and-amr-focus-of-day-2-at-coflaquaculture

<https://twitter.com/hashtag/coflaquaculture?f=tweets>

www.flickr.com/photos/faonews/albums/72157688295252023

Ninth Session FAO COFI Sub-Committee on Aquaculture

www.youtube.com/watch?v=yunKn3gH0Lk

Country and regional perspectives on aquaculture

www.youtube.com/watch?v=LhzvicBPCsl

P.B. Bueno, 2014. *Lessons from past and current aquaculture initiatives in selected Pacific island countries* - www.fao.org/3/a-i4139e.pdf

Global Action Programme on Food Security and Nutrition in Small Island Developing States: Supporting the implementation of the Samoa Pathway
www.fao.org/documents/card/en/c/43502426-7359-4894-b299-96bb09f76976/
The Blue Growth Initiative (BGI) and SIDS brochure - www.fao.org/3/a-i3958e.pdf
COFI: AQ/IX/2017/8 *"Blue Growth opportunities for SIDS in a changing climate"*
www.fao.org/cofi/30796-045895cc12e1a3ccb58fd3384f5d6536a.pdf

Previous FAN's articles:

Aquaculture in Small Islands Development States (SIDS). FAN 57, September 2017
www.fao.org/3/a-i7851e.pdf

Supporting Aquaculture Development in the Caribbean: Will a Regional and Shared Aquaculture Facility Work? FAN 47, June 2011
www.fao.org/docrep/014/ba0099e/ba0099e.pdf

Pacific projects updates; FAN 52, June 2014 - www.fao.org/3/a-h0028e.pdf

Small-scale cage aquaculture in Mauritius. FAN 53, March 2015
www.fao.org/3/a-i4504e.pdf

Micronesian Association for Sustainable Aquaculture established. FAN 54, March 2016 - www.fao.org/documents/card/en/c/BC866EN



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The seminar on “Aquaculture and Blue Growth development opportunities in SIDS” took place in Rome on 23 October 2017, the day before the start of the Ninth Session of the Sub-Committee on Aquaculture (COFI-SCA). Its purposes were to enable the sharing of experiences among SIDS countries and regions and to propose a roadmap to the FAO COFI-SCA during its special event on SIDS scheduled on 25 October 2017. Participants came from four SIDS from the Pacific, five from the Caribbean and eight from the Atlantic, Indian, Mediterranean and South China Sea Region (AIMS). The others were from three regional organizations (AU-IBAR, SPC, WECAFC), five institutions (World Bank, CIHEAM, EC EcoAqua project, IFAD, ACP secretariat) and a number of FAO staff members.

The programme alternated plenary sessions with working group discussions. During the plenary, the current state and challenges of aquaculture development in the different areas of SIDS (AIMS, Caribbean, Pacific) was reviewed, then six thematic presentations followed

on: (i) Blue Growth in action; (ii) Investing in the blue economy; (iii) Guidelines for the application of an ecosystem approach for development of sustainable aquaculture in outermost regions and overseas countries and territories; (iv) Fish value chain, (v) Livelihood opportunities from seaweed culture and (vi) Aquaponics in the Caribbean. During the group work, it appeared that the challenges faced by the countries were quite similar so that the consensus on priorities and roadmap was reached easily. However, it was also highlighted that it is necessary to acknowledge the diversity of SIDS and that not all countries have the same level of development, so that even though there was a consensus on the priorities among participants, the specific actions to be implemented will not necessarily be the same and therefore require adaptability and flexibility.

During the special event on aquaculture in the Small Island Developing States, the COFI-SCA emphasized the importance of this industry for SIDS considering the dietary importance of fish, the

provision of alternative livelihood opportunities for people and the increase of foreign exchange through high-value species for export. It stressed the importance of regional coordination within and among SIDS and recommended that FAO played a role in facilitating the exchange of experiences on aquaculture development in SIDS and in supporting possible regional approaches, building upon existing and emerging networks. Some members even noted that islands not designated as SIDS should be included in regional and global exchange of experiences and further recommended that a permanent exchange forum be established. The FAO Blue Growth Initiative was endorsed as part of FAO’s Common Vision on Sustainable Food and Agriculture, and the specific areas of work that the Sub-Committee recommended to FAO to consider included: diversification of species; good hatchery practices for quality seed; strategies for regional input supply; aquatic animal health; and integrated fish and plant farming, such as rice-fish farming and aquaponics.



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Broodstock of spiny lobster (*Panulirus homarus*), Oman

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FAO/APFIC¹ Regional Consultation on Building Climate Resilient Fisheries and Aquaculture in Asia-Pacific

Fisheries and aquaculture, part of the Blue Economy, make significant contributions to economic growth, food and nutrition security and livelihoods of millions of people in the Asia Pacific region. Around 48 million (87 percent of the global total) people are engaged in fisheries and aquaculture production, with an estimated 170 million directly and indirectly engaged in the value chains. Strikingly, more than 90 percent of the region's capture fishers are small-scale fishers and the amount of fish that people consume continues to rise and averaged over 23 kg/capita per year in 2013, which contributed



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23 percent of people's animal protein intake.

Despite relatively stable capture fisheries production and the rapid growth of aquaculture in the past 20 years, both subsectors are facing a number of major challenges in the region, especially from the direct and indirect impacts of climate change and increasing climate variability. The APFIC Regional consultative workshop "Implications of climate change on fisheries and aquaculture: challenges in the Asia Pacific", conducted in 2011, acted as a platform to raise awareness of different national and regional players to the threats of climate change impacts to capture fisheries and aquaculture and to identify common strategy and actions to address the challenge. Since then there have been

many important developments relevant to the subsectors, including global, regional and national strategy development (for example the 2016 Paris Agreement). Good progress has been made in terms of improving our understanding of climate risk, vulnerability and resilience. Policies and mechanisms to meet the mitigation and adaptation targets have been developed in many countries while the threat of climate change and variability has become the major risk to capture fisheries and aquaculture in the region.

Following the recommendation of the 76th EXCO of APFIC, a FAO-APFIC regional consultation on "Building climate resilient fisheries and aquaculture in Asia-Pacific" was convened from 14 to 16 November 2017 in Bangkok. The Regional consultation aimed

¹ Asia-Pacific Fishery Commission (website: www.fao.org/apfic).

to support the efforts of national governments and regional partners to build resilience of capture fisheries and aquaculture through more effective actions on climate change mitigation and impact adaptation. The regional consultation focused on: (i) Assessing country level progress in planning and implementation of climate change actions; (ii) Sharing technological advances and good managerial practices in strengthening the climate resilience and Greenhouse Gas (GHG) mitigation actions of fisheries and aquaculture sectors; (iii) Identifying capacity gaps and other constraints of the APFIC member countries in effectively coping with climate change challenges to and strengthening climate resilience of fisheries and aquaculture sector in the region; and (iv) Recommending strategy and actions for APFIC and member countries to move forward for increased resilience and contributing to GHG mitigation of fisheries and aquaculture in the Asia-Pacific region.

The regional consultation gathered nearly 70 policy makers, managers, scientists and practitioners who are



Working group discussion during the regional consultation

engaged in development and implementation of policies and programme on climate mitigation and adaptation in capture fisheries and aquaculture, representing governments of 16 countries, 11 regional partners and leading private sector GEF projects focusing on climate change adaptation and mitigation, individual expertise and an FAO technical team. The regional consultation extensively shared the latest knowledge, technological advancement and successful practices for increasing climate resilience of fisheries and aquaculture in

the region and major efforts by national governments, regional and international organizations and private sector to support small-scale fishing and fish-farm holders to adapt to the climate change and reduce GHG emission from their activities, through two key presentations, 10 plenary presentations and 31 country presentations. More importantly, the regional consultation further identified the key challenges and gaps and recommended major policy strategies and actions to increase climate resilience of fisheries and aquaculture in the region.



Harvesting Nile tilapia (*Oreochromis niloticus*) from a fish pond, China

Regional Evaluation and Dissemination Workshop of TCP/RAS/3511 “Support pilot application of Aquaculture Planning and Management Tools in Selected ASEAN Member Countries”

Asian aquaculture industry has achieved outstanding growth in the past three decades. While contributing to over 90 percent of global aquaculture production, as of 2015, the sector is now supplying over 60 percent of food fish for human consumption and provides livelihoods to some 18 million fish farmers and a lot more job opportunities along the entire aquaculture value chain in the region (FAO, 2016). However, it is generally recognized that Asian aquaculture has been mainly developed without proper planning and management.

Projections indicate that the world demand for food fish will increase by 30 million tonnes by 2025 as the result of anticipated population and economic growth. Capture fisheries production has remained stagnant over the past two decades, therefore sustainable growth of aquaculture is considered as the most feasible way to meet the increasing demand for food fish globally.

An FAO Regional Initiative on “Sustainable Intensification of Aquaculture for Blue Growth in Asia-Pacific” has been implemented since 2014 to support the sustainable growth of aquaculture in the Asia-Pacific region. Furthermore, in order to improve planning and management of aquaculture for sustainable development in Asia, FAO implemented a regional TCP project (TCP/RAS/3511) entitled “Support pilot application of aquaculture planning and management tools in selected ASEAN member countries”, namely Indonesia, Thailand and Viet Nam in 2016 based on an FAO initiative from 2013 to develop aquaculture planning and management tools for the Asia-Pacific region.

The implementation of the regional TCP project included four aquaculture planning and management tools for piloting by the three participating countries: (i) Ecological carrying capacity estimates for aquaculture; (ii) Feasibility studies for aquaculture development; (iii) Aquaculture farm biosecurity plan; and (iv) Aquaculture traceability system. The FAO international consultants prepared manuals for the tools based on the draft tools developed in 2013. Technical capacity building for piloting the selected tools were carried out at regional and national levels. The four tools were effectively piloted in the three participating countries (two of the tools were the same for each country and one tool was different) with the support of international and national consultants in 2017.

A regional evaluation and dissemination workshop of the project took place in Kamphaen Phet, Thailand from 6 to 8 December 2017 with the support of Thai Department of Fisheries and the Kamphaeng Phet Inland Aquaculture and Development Center. The



Participants at the workshop of TCP/RAS/3511

objective of the workshop was to produce three main outputs: (i) An evaluation of the project implementation at regional and country level; (ii) Tools for aquaculture planning and management in Indonesia, Thailand and Viet Nam; and (iii) Recommendations for finalization of the manuals for the tools for wider application in the region.

The workshop achieved its objectives and included the participation of national project coordinators and national consultants supporting the tool piloting from each of the three participating countries, and representatives from 11 non-project participating countries, the Network of Aquaculture Centre in Asia-Pacific (NACA), FAO staff and international consultants. The national project coordinators reported on the implementation of the project in their respective country focusing on: the implementation process, results achieved, lessons learnt and the recommended strategy to promote the wider application of the tools. The national consultants who technically led the piloting of individual tools reported on the piloting of each tool, focusing on the process, results and difficulties encountered. The international consultant responsible for each tool provided recommendations to further refine the tool manuals and on how to scale up the adoption of the tools. The workshop participants expressed their expectation for FAO to continue to support member countries to promote the wider adoption of these tools in the region.



SEE ALSO

FAO. 2016. *The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all*. Rome. 200 pp. – www.fao.org/3/a-i5555e.pdf



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Support Scaling up of Integrated Mangrove-Shrimp Farming for Blue Carbon and Blue Growth in the Southern Coastal Provinces of Viet Nam

Viet Nam's farmed shrimp production has seen a rapid growth; it reached 550 000 tonnes in 2015 making the country the world's third largest producer after China and Indonesia. Currently, production is mainly from intensive and semi-intensive culture of whiteleg shrimp (*Penaeus vannamei*) in the southern provinces of the country, such as CaMau, Bac Lieu and Soc Trang. The rapid development of intensive and semi-intensive shrimp culture in Viet Nam has been at the cost of coastal mangrove and the environment. It has brought serious disease problems as well.

In order to maintain the sustainable production of farmed shrimp, which is one of the key exporting aquaculture commodities, the government of Viet Nam is supporting the diversification of shrimp farming systems and practices. Integrated mangrove-shrimp farming is one of the emerging alternative in the Southern provinces of Viet Nam, which can contribute to reduced emission of greenhouse gases (GHG) from shrimp farming while achieving environmental sustainability. In the recent years,



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Integrated Mangrove-Shrimp Farming in the Southern Coastal Provinces of Viet Nam

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local government institutions and NGOs have been working on different aspects of integrated mangrove shrimp farming. However, there has been lack of coordinated efforts and holistic approach in promoting mangrove-shrimp farming based on solid studies on its environmental benefit, economic viability and good practices. In order to support sustainable shrimp farming in Southern Viet Nam, FAO started a project to promote scaling up of good practices of integrated mangrove-shrimp farming for blue carbon and blue growth in Bac Lieu and CaMau Provinces with extra-budgetary funds (Multidisciplinary Fund support).

The project is designed to achieve the following outputs: (i) Development of technology package for integrated management of Mangrove-Aquaculture for blue carbon

and blue growth; (ii) Human capacity building for scaling up of integration of mangrove rehabilitation and environmental friendly shrimp farming systems in Southern coastal provinces of Viet Nam; and (iii) Development of a national project proposal for scaling up integration of mangrove rehabilitation and environmental friendly shrimp farming systems in Southern coastal provinces of Viet Nam.

A national stakeholder consultation was convened in July 2017, which was well participated by concerned government agencies, representative of local shrimp farmers and non-government organizations engaged in promoting mangrove-shrimp farming. The project concept was presented to the different stakeholders. The project focus areas of work, scope of the project activities and implementation mechanism

were discussed among the stakeholders. The following priorities were agreed by the participants:

- Conduct a comprehensive assessment on the technical and socio-economic performance of mangrove-shrimp farming practices in the project areas.
- Develop good practices of integrated mangrove-shrimp farming in the Southern Viet Nam based on the assessment study.
- Conduct comparative study on contribution of integrated mangrove-shrimp system to

reduced GHG emission and carbon sequestration against intensive shrimp farming.

- Conduct resource mapping exercise for scaling up of good practices of integrated-mangrove system in the project covered areas.
- Strengthen the community capability including technical capacity for scaling up good practices of integrated mangrove-shrimp farming.
- Develop a national program to support scaling up integrated mangrove-shrimp farming in

Southern Viet Nam based on the project studies.

With the technical support from Agricultural Development Economics Division of FAO, comparative study on contribution of integrated mangrove-shrimp system to reduced GHG emission and carbon sequestration was conducted and draft report was produced. National and local institutions and consultants are currently implementing different project activities. It is expected the project will be completed in the first half of 2018.

A New Global Farmer Field Schools (FFS) Platform

Farmer Field Schools (FFS) use hands-on, experiential learning that integrates scientific and indigenous knowledge to promote sustainable agriculture approaches adapted to local contexts. The FFS approach, which has been proven to contribute to individual, household and community empowerment, is currently implemented in over 90 countries. Relevant examples to aquaculture include reports from Rice-Fish interventions in Suriname and Guyana, pesticide reduction in rice fields in Lao PDR with resulting aquatic biodiversity improvements, and seaweed culture in the Philippines.

FAO set up the Global FFS Platform in 2017 to connect the growing network of practitioners and organizations using FFS worldwide. The aim of the platform is to strengthen the quality of FFS by facilitating the exchange of knowledge, expertise and innovation among its users. It also serves as a gateway to identify the impact, achievements and current challenges in FFS. The platform includes:

- A library of more than 300 FFS resources (including aquaculture and seaweed culture);

- Online profiles of FFS experts; and
- A global email discussion group with over 900 practitioners from 100 countries.

You can access the platform here:

www.fao.org/farmer-field-schools



A Strategy for the Sustainable Development of Mediterranean and Black Sea Aquaculture

Aquaculture is a flourishing industry which plays a major role in Mediterranean and Black Sea countries in achieving food security, employment and economic development while reducing the dependence on the often overexploited wild stocks. According to current trends in aquaculture production and to some national aquaculture strategies, the production of farmed seafood is expected to substantially increase in the region over the next decades. This needs careful planning for the long-term social, economic and environmental sustainability of the sector. At the international level, crucial steps have been made to promote sustainable development and cooperation, in light of emerging global challenges.

In the Mediterranean and the Black Sea, the need to promote Blue Growth and develop sustainable aquaculture to ensure food security in the region has been reiterated on several occasions¹. Acknowledging this



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Floating cages for seabream and seabass in Turkey

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growing trend and in line with its mandate to ensure the sustainable development of aquaculture in the Mediterranean and the Black Sea, the General Fisheries Commission for the Mediterranean (GFCM) adopted, at its forty-first session (Montenegro, October 2017) Resolution GFCM/41/2017/1 on a strategy for the sustainable development of Mediterranean and Black Sea aquaculture. This strategy was developed following an extensive consultation and participatory process within a dedicated Task Force². The strategy aims at achieving a level playing field and promoting a

more sustainable, competitive, and equitable aquaculture in the region by helping countries accomplish their national aquaculture strategic plans.

In line with SDG 14 ("Life below water") and FAO Strategic Objective 2 ("Make agriculture, forestry and fisheries more productive and sustainable"), the strategy intends to help Mediterranean and Black Sea countries in formulating harmonized aquaculture activities and action plans with special attention to regional, subregional, national and local aquaculture priorities and emerging challenges

¹ FAO. 2017. Regional Conference "*Blue Growth in the Mediterranean and the Black Sea: developing sustainable aquaculture for food security*"; 9–11 December 2014, Bari, Italy, edited by Fabio Massa, Riccardo Rigillo, Dominique Bourdenet, Davide Fezzardi, Aurora Nastasi, Hélène Rizzotti, Wasseem Emam and Coline Carmignac. FAO Fisheries and Aquaculture Proceedings No. 46. Rome.

FAO. 2017. *Report of the fortieth session of the General Fisheries Commission for the Mediterranean (GFCM)*. St. Julian's, Malta, 30 May – 3 June 2016. GFCM Report No. 40. Rome, Italy.

FAO. 2018. *Report of the forty-first session of the General Fisheries Commission for the Mediterranean (GFCM)*, Budva, Montenegro, 16–20 October 2017. GFCM Report No. 41. Rome, Italy.

² FAO. 2016. *Report of the thirty-ninth session of the General Fisheries Commission for the Mediterranean (GFCM)*, Milan, Italy, 25–29 May 2015. GFCM Report No. 39. Rome, Italy.

while taking into account existing national and supranational strategies.

This multiannual strategy is based on the subregional approach to fisheries management and aquaculture development to better address the specificities of the Mediterranean and the Black Sea region. It provides guidance to unlock the potential of the sector by ensuring that it meets the growing need for aquaculture products and contributes to food security, nutrition and poverty reduction, with particular attention to coastal communities.

The aquaculture strategy is structured around three targets that address a wide range of cross-cutting and transboundary issues, and it is based on the pillars of sustainable development. For each target, a series of outputs (see Box) and related activities are proposed.

The strategy is in line with the principles and approaches enshrined in modern international instruments governing fisheries and aquaculture. Its implementation will be guided by the following principles: sustainability; best available

knowledge; objectivity and transparency; timeliness; participation, cooperation and efficiency; and adaptability and level playing field.

Target 1 - Build an efficient regulatory and administrative framework to secure sustainable aquaculture growth

The main challenges to aquaculture development in the Mediterranean and the Black Sea include: the lack of streamlined administrative management; scarce regulatory frameworks that specifically account for coordinated spatial planning to enable the selection of suitable areas for aquaculture; overlapping legislations and authorities; insufficient long-term planning; and lack of participatory and transparent decision-making processes.

Target 1 aims at ensuring that aquaculture in the region is: (i) Regulated by a sound and functioning system and by the implementation of specific regulations governing the sector, in line with the principles of the FAO Code of Conduct for Responsible Fisheries (CCRF) and

with the support of strategic plans; (ii) Built on functioning and transparent participatory mechanisms for the decision-making; and (iii) Based on integrated coastal zone management processes.

Target 2 - Enhance interactions between aquaculture and the environment while ensuring animal health and welfare

The Mediterranean and the Black Sea share a unique aquatic ecosystem and are characterized by complex aquaculture-environment interactions. The lack of regional cooperation in addressing transboundary issues and poor harmonization of environmental norms and standards contribute to the increasing difficulty to monitor such interactions. Other hampering factors include: the lack of harmonized environmental impact assessments and monitoring programmes for aquaculture; poor capacity in implementing risk analysis (e.g. biosecurity); scarce guidelines on control and prevention (e.g. disease, use of antibiotics, escapees); the lack and poor application of standards for the prevention and control of contaminant processes along the value chain; and insufficient harmonized environmental monitoring and regulatory frameworks.

Target 2 aims at ensuring that aquaculture in the region is: (i) Fully integrated into an environment where ecological services provided are preserved; (ii) Able to secure adequate health and welfare to farmed aquatic animals; and (iii) Supported by a thriving cooperative research and technological development that is based on aquaculture-environment interactions led by industry and farmers needs.

BOX

TARGET 1

- Output 1.1. Improved aquaculture regulatory frameworks and streamlined public sector management.
- Output 1.2. More integrated aquaculture in coastal zones.

TARGET 2

- Output 2.1. Mitigated impacts on the environment and improved environmental protection.
- Output 2.2. Responsible aquatic animal health and welfare management.
- Output 2.3. Enhanced research and knowledge sharing on aquaculture-environment interactions.

TARGET 3

- Output 3.1. A market-driven aquaculture sector development.
- Output 3.2. Improved safety and quality of Mediterranean and Black Sea aquaculture products.
- Output 3.3. Enhanced aquaculture and aquaculture products marketing and communication.

Target 3 - Facilitate market-oriented aquaculture and enhance public perception

In the Mediterranean and the Black Sea, aquaculture remains a highly fragmented sector with uneven negotiation of power along the value chain, as the retail sector seems to benefit from a disproportionate share of the value created. Producers still lack the ability to proactively respond to emerging market issues and to government regulatory initiatives, due to a lack of coordinated marketing strategies and promotional initiatives and to low levels of collective actions and cooperation in production. In addition, there is a general lack of systematic market data collection and dissemination to enable production planning, marketing plans and supply-demand forecasts. The sector also suffers from competition on domestic and global markets, and

there is insufficient awareness of corporate social responsibility.

Target 3 aims at ensuring that aquaculture in the region is: (i) A flourishing industry based on a level playing field and producing safe and healthy food products that are sold to informed consumers; (ii) A market-oriented sector based on efficient market data collection methods and dissemination tools; and (iii) A sector integrated into modern supply chains and supported by efficient aquaculture farmers organizations through advocacy, technical and economic services.

The strategy is intended to be implemented as part of a process that aligns with national and supranational aquaculture strategies in the region. The GFCM, through its Scientific Advisory Committee on Aquaculture (CAQ) and subsidiary

bodies, and together with relevant partners, will be responsible for implementing the strategy and will make sure that technical assistance is provided where there is a need to build national capacities.

The strategy will be implemented sharing knowledge and results with institutions as well as national and regional projects. The achievement of the targets, activities and outputs will be regularly monitored and, as appropriate, expected outputs will be revised and updated.

A first regional meeting to operationalize the strategy took place from 14th to 15th March 2018 in Trabzon, Turkey.



SEE ALSO

Full text of the strategy:
www.fao.org/gfcm/activities/aquaculture/strategy



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Coastal lagoon of San Teodoro, Sardinia, Italy

The Twenty-Ninth Session of the European Inland Fisheries and Aquaculture Advisory Commission (EIFAAC)

The European Inland Fisheries and Aquaculture Advisory Commission (EIFAAC) was established in 1957 by the FAO Council under Article VI of the FAO Constitution. EIFAAC promotes long-term sustainable development, utilization, conservation, restoration and responsible management of European inland fisheries and aquaculture, consistent with the objectives and principles of the FAO Code of Conduct for Responsible Fisheries and other relevant international instruments, and to support sustainable economic, social, and recreational activities. This goal is achieved by Member institutions through:

- Providing advice, information and coordination;
- Encouraging enhanced stakeholder participation and communication; and
- Delivery of effective research.

EIFAAC is composed of 34 Members. The Secretariat is in the FAO Regional Office for Europe and Central Asia (REU), Budapest. The Committee Sessions are held every two years. The twenty-ninth session of EIFAAC was hosted by Poland in Stare Jablonki, 6-8 September 2017 with 12 Member country delegations: Croatia, Czech Republic, Finland, Germany, Hungary, Iceland, Ireland, Latvia, Netherlands, Norway, Poland, Sweden and Switzerland, plus a representative of the World Aquaculture Society.

The 29th Session made significant revisions to the general objectives of the Commission. It was agreed that the impact of the work of the Commission, especially the availability of financial resources to carry out the projects, will be greater if synergies can be identified between EIFAAC objectives and objectives of the other actors. Below are the more policy-oriented objectives:

- As a leading Pan-European Organization, EIFAAC provides policy and management advice in Inland Fisheries and Aquaculture consistent with the objectives and principles of the FAO (strategic objectives, regional initiatives, SDGs) and other relevant international instruments;
- EIFAAC delivers technical and managerial advice, information and coordination on matters related to Inland Fisheries and Aquaculture to its members and



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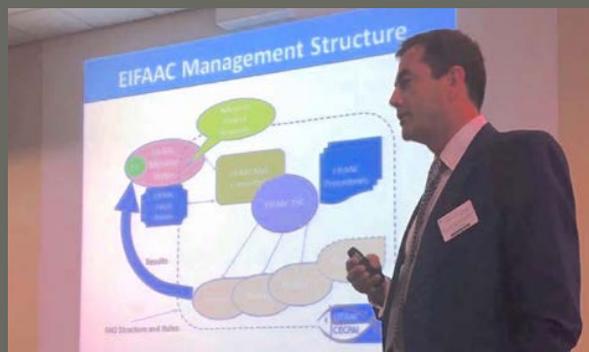
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Cathal Gallagher (Ireland), Chair, 29th Session of EIFAAC

serves as an international network of organizations, stakeholders, communities and intergovernmental organizations;

- EIFAAC via its structures, processes and procedures implements efficient delivery of its organizations and Members' objectives in accordance with FAO principles and best international practices.

The Members adopted the intersessional Work Plan 2017-2019, adding two new topics on: (1) Social and economic aspects of inland fisheries and aquaculture and (2) Citizens to support fisheries science. New officers were elected for the Management Committee and the Technical and Scientific Committee, as well as the Chair and Vice-Chairs of EIFAAC. The election results are posted on the EIFAAC website. Germany offered to host the 30th Session of EIFAAC in September 2019, along with the EIFAAC International Symposium.

The 29th Session provided the following recommendations for consideration by EIFAAC Members in the management of inland fisheries and aquaculture:

- EIFAAC recommended that Members should coordinate to support an EIFAAC project to identify definitions and indicators on the social and economic valuation of inland fisheries and aquaculture for the region.
- The Commission requested the EU considers, as a member of EIFAAC, the dissemination of EIFAAC information and advice through its Common Fisheries Policy Data Collection Framework national correspondents and aquaculture contact points. This action would be to the benefit of EIFAAC and the sector.



SEE ALSO

Final Report of 29th Session of EIFAAC

www.fao.org/3/a-bu269e.pdf

EIFAAC website – www.fao.org/fishery/rfb/eifaac

EcoAqua Summer School on Marine Spatial Planning

The five year (2014–2019) EU EcoAqua project is aimed at building a centre of excellence and a networking hub for research into sustainable aquaculture, for application in the EU's outermost regions (ORs) and in overseas countries and territories (OCTs) that comprise 34 states located across all major regions of the globe, from tropical to polar latitudes. The ORs and OCTs have a shared interest in developing their maritime areas in order to grow their economies, while having to balance the competing interests of biodiversity conservation, tourism, shipping, resource extraction, fishing and aquaculture. The EcoAqua project aims to provide the tools that these island nations need in order to meet their maritime challenges; one of these tools is Marine Spatial Planning (MSP).¹

The Summer School on Marine Spatial Planning took place at the University Rectorate in the City of Funchal, Madeira, Portugal from 4 to 8 September 2017. It was organized by the EU EcoAqua project, the University of Las Palmas de Gran Canaria and the Oceanic Observatory of Madeira. The main objective of the Summer School was to provide participants with an understanding of the fundamental principles and processes of MSP. It was attended



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Shown here are some of the activities for inclusion in marine spatial planning in the vicinity of Taliarte, Gran Canaria, Canary Islands: port activities, algae production in plastic tanks and culture of sea bream and sea bass in cages

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by researchers and professionals (Masters and Ph.D. degrees) interested in blue growth, blue economy, coastal tourism, sustainable aquaculture, marine conservation, the maritime spatial planning directive and related EU directives. It included 29 participants from seven countries (Finland, Greece, Italy, Poland, Portugal, Russia and Spain).

The course was structured around the presentations from different institutions and enterprises working on MSP, but it also included exercises so that participants could experience and discuss the meaning and implications of different MSP scenarios according to blue growth and blue economy frameworks. FAO gave a presentation entitled "Transitioning Towards Blue Aquaculture" and chaired the session on "Aquaculture and Fisheries Stakeholders".

The huge demand for maritime space, coupled with the lack of an integrated approach, leads to conflicts between uses, and between human use and the natural environment. FAO's ecosystem approach to aquaculture and blue growth initiatives provide useful frameworks in this context.

The main follow-on action is to share the experiences and lessons learned through FAO's support to Small Island Developing States (SIDS) with the EU's ORs and OCTs through the Eco-Aqua project, and vice-versa. Some of the difficulties faced by SIDS are similar to those encountered by the ORs and OCTs, especially with regard to climate change, freshwater availability, biodiversity, competing sectors (tourism, aquaculture, conservation, etc.) and their remoteness.



SEE ALSO

EcoAqua project
<http://ecoaqua.ulpgc.es>

EU's outermost regions
<https://tinyurl.com/jyqsmly6>

Overseas countries and territories
<https://tinyurl.com/k4jczun>

Haroun, R., Kaushik, S., & Courtois de Viçose, G. 2017. *Guidelines for the application of an ecosystem approach for development of sustainable aquaculture in ORs and OCTs*. Research Institute ECOAQUA, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain. 26 pp.

Meaden, G.J., Aguilar-Manjarrez, J., Corner, R.A., O'Hagan, A.M. & Cardia, F. 2016. *Marine spatial planning for enhanced fisheries and aquaculture sustainability – its application in the Near East*. FAO Fisheries and Aquaculture Technical Paper No. 604. Rome, FAO. 89 pp.

www.fao.org/3/a-i6043e.pdf

¹ There are many definitions of marine spatial planning. A useful one is that given by Ehler and Douvere (2009), who describe MSP as "a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process".

International Symposium on Adaptation of Inland Fisheries and Aquaculture to Climate Change



Presentation by Anna Moskwa, Deputy Minister, Ministry of Maritime Economy and Inland Navigation, Poland



Participants of the EIFAAC Symposium

An International Symposium was held in Stare Jabłonki, Poland, 4-6 September 2017, immediately preceding the 29th Session of the European Inland Fisheries and Aquaculture Advisory Commission (EIFAAC). The Symposium was organized jointly by EIFAAC Member research institutions and the host country Poland, under the direction of Professor Piotr Parsiewicz. The topic of the Symposium was "Adaptation of inland fisheries and aquaculture to climate change". There were sixty-four participants from twenty countries. A report of the Symposium findings is attached as an Appendix to the Final Report of the 29th Session of EIFAAC¹. Abstracts of the Symposium will be published in a special issue of Fisheries Management and Ecology journal.

The Symposium recognized the importance of biological, environmental, social and economic aspects of climate change impact on inland fisheries and freshwater aquaculture. It was mutually agreed by participants that the impact on inland fisheries and aquaculture should be expected

to be substantial and that the need for action is immediate.

During the discussions, the following research and management priorities were identified: (i) Conduct demonstration studies; (ii) Develop synergies between the two sectors; (iii) Coordinate the use of existing tools and founding programs; (iv) Add inland fisheries and aquaculture into the Sustainable Development Goals (SDG)s; (v) Create habitat type specific diagnostic tools; (vi) Establish process flow charts based on Driver-Pressure-State-Impact-Response (DPSIR) and ecosystem services scenarios simulation tools.

Attention of aquaculture producers was also raised to some specific issues resulting from climate change namely, the water use in fish ponds, replacement of lost water and its economic consequences.

The following recommendations were provided by the Symposium and presented to the EIFAAC Session for consideration and advice:

- Climate Change is affecting fish, inland fisheries and aquaculture.
- Focused actions of adaptation to Climate Change has to begin immediately and need to be:
 - Embedded in other environmental improvement activities.
 - Included into resource management policies.
 - Embedded in evidence based adaptive and predictive management framework including economic and social aspects.
- Include cooperation and effective communication strategies.
- Long-term resources assessment, adaptation and mitigation measures need to be developed.



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¹ Final Report of 29th Session of EIFAAC
www.fao.org/3/a-bu269e.pdf

Implementation of Guidelines for Streamlining Aquaculture Authorization and Leasing Processes in the Mediterranean and the Black Sea

Aquaculture production in the Mediterranean and the Black Sea has steadily grown in recent decades and this trend is projected to continue. The industry is a key player to achieve food security, employment and economic development in the region. It is characterized by a wide range of production systems, farmed species and technologies in use.

Authorization and leasing processes are among the main constraints hampering the development of the sector in the region. Indeed, they tend to be lengthy and cumbersome and constitute *de facto* barriers to development. Acknowledging the regulatory constraints facing aquaculture as well as the need to coordinate and streamline authorization processes, the General Fisheries Commission for the Mediterranean (GFCM) recently adopted, at its forty-first session (Montenegro, October 2017), Resolution GFCM/41/2017/2 on guidelines for the streamlining of aquaculture authorization and leasing processes.



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Floating cages aquaculture, Monastir, Tunisia

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The guidelines are the result of a collaborative effort which enabled to analyse regulatory frameworks and administrative procedures for aquaculture licensing and leasing, as well as current and future initiatives in different countries to simplify them. The guidelines take into account the main challenges and critical points identified.

The overall objective of the guidelines is to support GFCM contracting parties and cooperating non-contracting parties in streamlining authorization and leasing procedures in order to facilitate the development of aquaculture. These guidelines are advisory in nature and consistent with existing national, regional and international instruments. They rely on the principles of good governance, efficiency, transparency, accountability and social responsibility and are based on the best available knowledge and good practices in administrative and public sector

management, efficient regulatory and administrative frameworks and participatory policy-making.

More specifically, the guidelines aim to: (i) Propose common definitions, concepts, standards and reference documents to contribute to enabling regulatory frameworks; (ii) Support coordination among the various bodies responsible for aquaculture-related matters; and (iii) Promote soft-law mechanisms to simplify administrative procedures for authorization and leasing processes.

Streamlining aquaculture authorization and leasing processes encompasses the following:

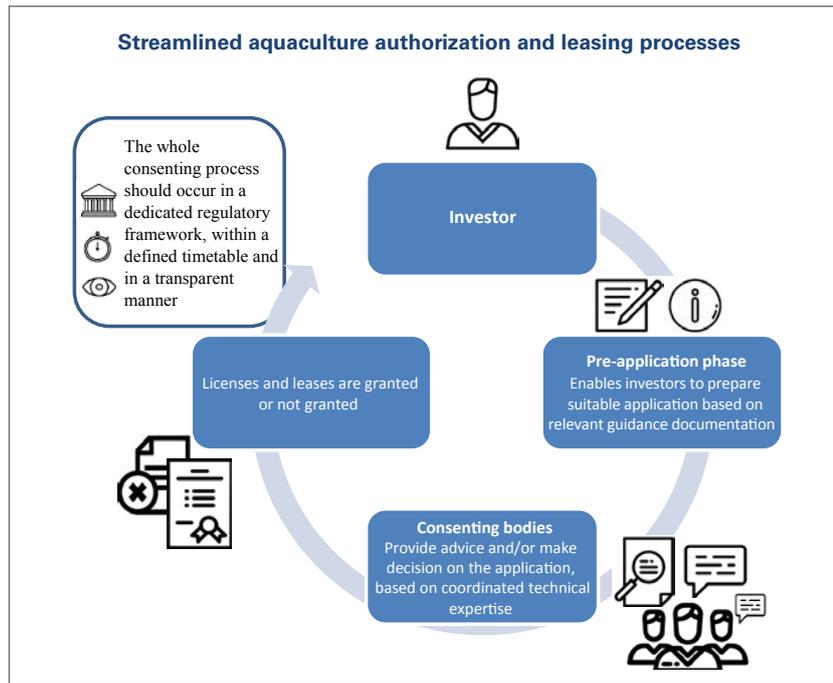
- Regulatory and administrative framework, in order to reinforce the legal certainty of the aquaculture industry and enshrine its sustainable development in an appropriate governance framework.
- Consenting bodies, whose number should be kept to a minimum in order to reduce the

duration of license facilitation and consultation processes, and avoid effort duplication.

- Reference contact points, following the “one-stop-shop” or “single-window” approach;
- Consenting processes, which should be facilitated by the formal establishment of allocated zones for aquaculture (AZAs).
- Institutional capacity and coordination, and participation of the general public, so as to enhance awareness on the relevance of aquaculture development for local and coastal communities.

The GFCM will engage with contracting parties and cooperating non-contracting parties at various levels in order to address implementation needs. For example, it is foreseen to provide technical assistance to help countries build their capacities to better implement the guidelines.

In implementing the guidelines, regional and national specificities



should be taken into account and the capacity of developing states in the region should be considered. Moreover, in order to ensure effective implementation and secure a level playing field in the Mediterranean and Black Sea region, it is important that these guidelines are adopted. The Mediterranean and Black Sea

riparian countries are encouraged to facilitate the implementation of the guidelines to unlock the potentiality of aquaculture development.



SEE ALSO

GFCM website: www.fao.org/gfcm



Work at shellfish facilities in Chioggia, Italy

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Sharing Innovative, Water-Saving Agri-Aquaculture Experiences Across the Near East and North Africa

Water scarcity is a persistent concern around much of the world, and particularly in the Near East and North Africa region. FAO has responded with the Regional Water Scarcity Initiative, managed by FAO's Regional Office in Cairo, Egypt and a part of FAO's Common Vision for Sustainable Food and Agriculture. As part of this initiative, experts are documenting examples of the smart use of water and best management practices for integrated agriculture-aquaculture farming systems in focus countries from the Near East and North Africa region including Algeria, Egypt and the Sultanate of Oman.

A farmer-to-farmer study tour was held 6-16 November 2017, when FAO facilitated farmers and Aquaculture Officers from Algeria, Egypt and Oman to come together and travel to more than ten integrated aquaculture and agriculture farms in Algeria and Egypt.

Through this exchange of experience, funded by the Water Scarcity Initiative and South-South Cooperation with Non State Actors program, farmers learned water saving practices and were able to share what works, and what does not, in a local context.



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Participants of the farmer-to-farmer study tour in Algeria

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The scarcity of availability and access to water has led to the development of innovative, integrated aquaculture-agriculture systems that make the best and most complete use of precious water resources. Water should not be wasted, and integrating different systems to produce multiple products with the same or an even lesser quantity of water is crucial in this water-scarce region.

There are many ways to combine aquaculture and agriculture, but commonly farmers use closed systems to maximize their use of water resources. Often, vegetables are irrigated with the same water used to raise fish.

The added bonus is that the water is fertilized from the fish waste, becoming rich in organic nutrients, and this 'fertilized' water increases plant production and decreases the need for and costs of additional fertilizers. Most importantly, the limited water

resources are used efficiently. Indeed, some integrated farms boast of reducing water consumption by 90 percent compared to traditional agriculture.

"Water scarcity is a real concern in our region", according to Pasquale Steduto, Regional Programme Leader for FAO's Regional office for the Near East and North Africa. "This study tour is part of a Regional Collaborative Strategy, where countries exchange knowledge and experiences on common issues. In this specific case, the tour provided the opportunity for farmers to learn from each other enhanced ways of producing more food for their countries' growing population, while simultaneously using less of the scarce water resources. The integrated aquaculture-agriculture systems included on this study tour are quite innovative for efficient water use, and the farmers from Algeria, Egypt and Oman not only have learned from

these examples but have also initiated an important dialogue about how we can scale up these practices across the region."

In Algeria, farms visited included a fish farm producing North African catfish (*Clarias gariepinus*). The water for this project was obtained from groundwater deep in the desert. Once fertilized by the fish waste, the water was used to grow palm trees producing dates.

Various sites were visited in Egypt as well, including some aquaponics projects. Aquaponics is a closed production system that integrates aquaculture with hydroponics, the soil-less cultivation of plants.

The fertilized water from the fish pond travels through tubes to water crops and returns back to the ponds. Egyptian aquaponics projects raised Nile tilapia (*Oreochromis niloticus*) and North African catfish, while using the water in which those fish were farmed to water high-quality crops of lettuce, basil, mint and chives.

As illustrated in Photo 1, one aquaponics 'unit' is estimated to produce enough fish and vegetables to feed a family of four.

Another interesting project visited in Egypt was a large, almost entirely contained aquaculture-agriculture farm. Tilapia are grown in the fish tanks, which are connected to ponds growing a special water-fern called *Azolla*, which cleans the nutrients from the water while fixing atmospheric nitrogen, literally creating fertilizer from thin air.

Simple practices, such as using net-bags in the ponds as biological filters, are among the techniques the farmers were able to share.



Photo 1 – Aquaponics unit producing enough fish and vegetables to meet the dietary needs of a family of four

Finally, this water is used to irrigate grapes, olive trees, oranges and mangoes.

According to Valerio Crespi, FAO Aquaculture Officer, who took part in the study tour, *"One of the interesting aspects we saw was how the farmers are creating their own fish feed. Considering that fish feed represents a major cost for fish farmers – often accounting for 60-70 percent of total expenditures – reducing feeding costs increases the farmer's autonomy and profit. Not surprisingly, this was of great interest to the participants. On this farm, the fish feed was made from larvae of the black soldier*

fly (Hermetia illucens). These larvae, grown on agricultural by-products, comprise nearly 50 percent protein and provide a safe and efficient tool to recycle wastes (Photo 2). Larvae are cleaned, dried and ground into powder to create protein meal, which is then mixed together with other ingredients grown on the farm such as the Azolla, and formulated into pellets for fish."

And what did the farmers think about their experience? Rabab Hashim, a woman from Oman focused on developing integrated agri-aquaculture farms said, *"Systems and materials used differ from one farm to another, and so*



Photo 2 – Black soldier fly's larvae are used as main source of protein for the production of fish feed

these trips allow us to be exposed to different ideas. I will take this knowledge and implement it in my farm and follow the same procedures we saw in both countries."

Egyptian agri-aquaculture farm owner Gabr Hossny added, "I noticed that my fish farm is not as developed as others and so I decided to join the project to learn the newest technologies and best management practices. I learned how to grow healthy fish efficiently with limited waste of water and to earn the greatest profit with at the lowest cost. This will not only benefit me, but it will also benefit the market in general."

Nora Ourabah Haddad, the FAO Representative to the Sultanate of Oman added "I must say that the objectives of this South-South cooperation project with Non State Actors between the three countries have been met, and have gone beyond our initial expectations. In particular, after

hearing the positive feedback from all participants including the Omanis, these visits demonstrate once more the added value of peer to peer exchanges. These exchanges turn out to be beneficial to both parties, hosts and guests. Sharing knowledge, experiences, innovative achievements and best practices on integrated agri-aquaculture helps strengthen the capacities of farmers, fisher folks associations and cooperatives making an increased contribution to the fisheries sector in the region in a sustainable way".

Paula Anton, Aquaculture Officer at FAO's Regional Office for North Africa and the Near East added, "We received a lot of positive feedback from participants who took part in this study tour. This was an excellent opportunity to learn from the experiences of others working in the field, to exchange ideas, and to return to their countries armed with new techniques and approaches. The

farmers will continue to exchange ideas and knowledge, and we will be working to develop methodologies to guide us in producing a road map for possible upscaling across the region."

A third study tour will be organized in Oman and it will be followed by a Regional workshop to be held in Cairo in May to discuss next steps for strengthening integrated agri-aquaculture farming systems in the region. We will report on this project in the next issues of FAN to inform our readers on progress made on this interesting area of work.



SEE ALSO

FAO Water Scarcity Initiative:
www.fao.org/neareast/perspectives/water-scarcity

Crespi, V. 2015. **Support to sustainable aquaculture development through the smart use of water in desert and arid lands.** FAO Aquaculture Newsletter. No. 53, pp. 50-51.
www.fao.org/3/a-i4504e.pdf



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Visiting an aquaponics farm in Egypt

Outcomes of a Project on Fish Loss and Waste in Egypt

Egypt is a leading fish producing country with an annual production of 1.5 million tonnes (El Ganainy *et al.*, 2017). Fish loss and waste (FLW) however remains a critical challenge for the fisheries and aquaculture industry.

As a result of this and in response to the FAO 2013 Regional Conference on Food Security and Income Generation through Reduction of Losses and Waste in Fisheries in the Islamic Republic of Mauritania Nouakchott Declaration (FAO 2016), Egypt requested FAO support for FLW assessment and reduction.

A nine month project (April to December 2017) on Fish Loss and Waste in Egypt was launched under the framework of FAO Multi-Partner Programme Support Mechanism (FMM), Global Initiative on Food Loss and Waste Reduction. Key project partners were FAO Egypt, the General Authority for Fish Resources Development (GAFRD) of Egypt and the Arab Academy for Science Technology and Maritime Transport (AASTMT).

Value chain fish loss and waste assessments were conducted in the Nile Delta region. Representatives from the Mediterranean semi-industrial fisheries; small-scale lagoon fisheries and tilapia aquaculture were selected at the first stakeholder workshop held in Alexandria, Egypt in April 2017. Led by AASTMT, field assessments were undertaken between August and September 2017 using FAO recommended methodologies.

The value chain assessments focussed on the use of Exploratory Fish Loss Assessment Method (EFLAM), a qualitative research method which is used to provide an initial understanding of losses occurring in a particular value chain or location. Data collection relies on semi-structured interviews guided by a checklist or specific questions backed up with qualitative rural appraisal tools such as observation, seasonal calendars and flow-diagrams.

Data were used to provide indicative, preliminary, economic projections of the value of important fish loss and waste occurrences and ideas for potential



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Fish market in Alexandria, Egypt

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prevention and reduction solutions. The project has provided information strengthening national strategic, policy and regulatory frameworks as well as developing the capacity of various actors in the sector to better understand and identify sustainable solutions to FLW.

The results were presented and discussed at a final stakeholder workshop in December 2017 attended by public and private sector stakeholders. As well as data on FLW, potential solutions were discussed such as the use of square mesh netting in trawls, the promotion of value addition and processing and the use of aeration paddles to improve water quality during aquaculture production. It was agreed that the project provided an example of good inter-agency collaboration and it represents an approach that should be replicated in other important fishery and aquaculture value chains in the country.

Interventions for reducing discards, mortality in tilapia aquaculture and improving fish handling and quality were identified. Implementation will require a multidisciplinary approach with a supportive environment oriented policy, appropriate technology, improved skills and knowledge, access to adequate services and infrastructure, a supportive regulatory environment, social and gender equity and good market access.

It is envisaged that the project outputs will be used to design and implement a National Fish Loss and Waste Road Map as well as being of interest for all fisheries and aquaculture stakeholders in the country.



SEE ALSO

Diei-Ouadi, Y.; Mgawe, Y. I. - *Post-harvest fish loss assessment in small-scale fisheries: A guide for the extension Officer*. FAO Fisheries and Aquaculture Technical Paper. No. 559. Rome, FAO. 2011. 93p.

El Ganainy A, Mahmoud Saber M, Mawla A. 2017 - *Post-harvest fish losses in the Gulf of Suez fisheries Egypt*. FAO workshop Fish Loss and Waste in Egypt Alexandria, Egypt 11-12 April 2017. Presentation.

FAO, 2016 - *Regional Conference on food security and income generation through the reduction of losses and waste in fisheries*. Nouakchott, Mauritania, 15-17 December 2013. FAO Fisheries and Aquaculture Proceedings No. 43. Rome. Italy.

FAO, 2018 - *Fish loss and waste in selected value chains in northern Egypt*. Fisheries Circular (under preparation).

Ward, A.R., Jeffries, D.J. 2000 - *A manual for assessing post-harvest fisheries losses*. Chatham, UK. Natural Resources Institute. <http://gala.gre.ac.uk/12095/>

Fourth Edition of the Sub-regional Workshop on Aquaculture in the North African Countries

Even though aquaculture development is now a priority for most Maghreb-North African countries, the production still remains low with Tunisia accounting in 2016 alone for 16 166 tonnes equivalent to 86 percent of the sub-regional production in quantity and 88 percent in value, compared to other neighboring countries: Morocco 1 142 tonnes and Algeria 1 361 tonnes (FAO-Fishstat: www.fao.org/fishery/statistics). In this context, the fourth edition of the Sub-regional Workshop on Sustainable Aquaculture Development in the North African Countries ("Journées Maghrébines de l'Aquaculture") that took place in Monastir, Tunisia from 20 to 22 November 2017, allowed sharing experiences and formulating national/regional recommendations on the management and development of a sustainable North African aquaculture industry. The workshop consisted of lectures, working group discussions and a final round table discussion for adoption of main outcomes and recommendations.

One day was dedicated to a field visit to a mariculture farm, one nautical mile far from the port of



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Monastir. This farm operates many floating cages (3 500 m³ per cage) farming European seabass and gilthead seabream.

Promoted jointly by the Tunisian Ministry of Agriculture, Aquatic Resources

and Fishery, the Technical Center for Aquaculture and FAO, the event was very well attended, with over 60 participants originating from the public and private sectors of Algeria, Libya, Mauritania, Morocco and Tunisia, and 13 guest international speakers. Plenary and thematic group sessions, as well as a nearby marine fish farm visit allowed the participants to share experiences and formulate recommendations to be tackled at the sub-regional level. The diversity of the audience was a strong asset for the discussions, with policy makers, researchers, representatives from technical centers, fish health inspectors and also private aquaculture operators and investors exchanging views and experiences. Among the topics discussed were the National reports on the current state of aquaculture development in each member country, the policies and investment opportunities in aquaculture, the production technologies and aquaculture markets, as well as the fish health and aquaculture resilience to emergencies. The workshop concluded that the sub-region has a good potential for aquaculture development particularly marine and desert aquaculture. Stagnation of the capture fisheries sector and an increasing demand for



Dolphins met during the visit to the aquaculture facility in front of Monastir, Tunisia

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animal fish protein, is shared by all the countries of the sub-region. Although the contribution of aquaculture sector to the national economies in the region is still low, there is a common feeling that more institutional and financial support along with strengthening sub-regional cooperation should be given to the sector in order for it to grow.



SEE ALSO

Morocco: A maritime fishing nation works to develop its aquaculture sector. www.fao.org/blogs/blue-growth-blog/morocco-a-maritime-fishing-nation-works-to-develop-its-aquaculture-sector

P. Anton and H. Fersoy, 2017. **Enhancing the Quality of Fisheries and Aquaculture Emergency Preparedness and Response in the Near East and North Africa Region.** FAO Aquaculture Newsletter No. 56, pp.19.

C. Toueilib and V. Crespi, 2017. **The Importance of Aquaculture in North Africa is Increasing.** FAO Aquaculture Newsletter No. 56, pp. 23-25.

L. Dabbadie, M. Beveridge and L. Ababouch. **Support to the National Agency for the Development of Aquaculture (ANDA) in Morocco.** FAO Aquaculture Newsletter No. 57, pp. 24.

G. Abouyoub and B. Kuemlangan. **Summary of National Aquaculture Legislation Overview (NALO) of Morocco.** FAO Aquaculture Newsletter No. 57, pp. 51.

High Level Meeting to Launch the Blue Growth Initiative for Latin America and the Caribbean

Latin America and the Caribbean (LAC) contribute to 11 percent of the global capture fisheries production about 3 percent of the global aquaculture production. Capture fisheries have experienced a sharp decline over the past 25 years (from 21 tonnes in 1994 to 14 tonnes in 2015), aquaculture growth rate is one of the highest in the world (an average of 16 percent per annum over the past 15 years). Moreover, the region possesses vast surface areas suitable for aquaculture expansion, coupled with ample water resources; a large aquatic biodiversity and a range of climates suitable for a wide range of aquatic species.

Although fisheries and aquaculture are socially and economically important activities in the region, these sectors have only been part of national development agendas since the late 1960's and hence research, policies and sectoral development, are still behind their agriculture counterparts. Within this context FAO's Blue Growth Initiative becomes an important beacon to improve the sustainable management of fishery resources and to increase the sustainable contribution of aquaculture to food security and local economies.

On November 27 to 28, 2017, the first International Meeting on the Blue Growth Initiative for Latin America and the Caribbean was held in Mexico City. Sixty delegates of 15 LAC countries and Spain attended the meeting. Among them there were Ministers, Vice ministers, Regional Fisheries Organizations and Fisheries and Aquaculture Directors. This two-day meeting was co-organized by FAO and the National Aquaculture and Fisheries Commission of Mexico. The Assistant Director General of Fisheries and Aquaculture of FAO and the Minister of Agriculture, Livestock, Rural Development, Fisheries and Food of Mexico, chaired the opening ceremony.

The overall objective of the meeting was to identify potential mechanisms for joint action towards



Arni Mathiesen Assistant Director-General of FAO Fisheries and Aquaculture Department, delivering his speech

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improving the sustainable management of fishery and aquaculture resources and increasing the contribution of both sectors to food security and to the enhancement of local economies.

Four thematic discussion sessions were organized; namely: (i) South-South Cooperation (SSC) mechanisms to strengthen the fisheries and aquaculture institutional and productive capacities of LAC countries; (ii) Collective regional international actions to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU); (iii) Opportunities to increase fish consumption and fish trade in the LAC region and (iv) Fisheries and aquaculture as a means to strengthen food security and nutrition, and poverty alleviation.

Some of the final agreements derived from this meeting included: (i) Analysis to identify national strengths and weaknesses for fisheries and aquaculture development as a basis for a regional SSC strategy, including capacity building offered by many countries for fisher folk, farmers and government technicians; (ii) Stock assessment campaign to be led by the Government of Mexico to support Central American countries using Mexico's new research vessel; (iii) Strengthening the newly formed regional network for IUU fishing and; (iv) Support to the reactivation of the Network of Aquaculture of the Americas. The first step of a Latin American Blue Growth Initiative is already being made.



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Working on Increasing Fish Consumption among the Chileans

Launching of a National Plan

Chile is one of the top countries in the world when it comes to landings of edible fish as well as an important nation when it comes to aquaculture production. The vast majority of the landings are however exported either for direct food consumption or as fishmeal. The annual fish consumption in this Southern American nation according to FAO is well below (estimated at 13 kg/capita) the world average of approximately 21 kg/capita. Both the public and private sectors in Chile have been aware that renewed efforts are needed to promote consumption of seafood among the Chileans. Although over the past decade and, increasingly so in the past few years, a number of actions had been taken to promote seafood consumption, an overall national strategy had not been developed.

Even though Chile is endowed with excellent quality marine and aquaculture resources throughout its territory, eating traditions of its inhabitants are more closely associated with the consumption of products derived from the land. There is a growing need to educate the average Chileans on



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Working group of the "From the Sea to My Table" project

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the benefits of consuming marine products particularly as over the years there has been an increase in health related issues due to poor eating habits, including an increase in obesity mainly among the younger generations. The availability of marine products has been growing at a compound rate of 4 percent over the last 10 years, reaching 1 million tonnes in 2016, with fish species making up 70 percent of the landings, followed by molluscs (29 percent) and marine seaweeds (1 percent). If we consider that the fishery and aquaculture sectors generated a volume of 3 100 000 tonnes in 2016, achieving an internal consumption of 20 kg/capita would require 340 000 mt/year, i.e. representing 11 percent of the total fish landed. As the largest percentage of aquaculture products are currently exported, internal consumption should be promoted as a substitute for exports. Furthermore more products and fish species from the fishery sector should be offered in the national market.

With the financial support of the Government of Chile, the Fundación Chile (www.fch.cl) was commissioned to develop a National Strategic Plan with the specific goal to increase national consumption of seafood by 7 kg/capita over the next decade. The work started in March 2017 and after eight months of hard work, including the organization of eight workshops and the participation of 60 different institutions, the Strategic Plan called "Del Mar a Mi Mesa" (From the Sea to My Table) was finally launched with a well-defined roadmap to 2027. The Strategic Plan was officially launched in December 2017 in the premises of "Fundación Chile" with the participation of key authorities such as the Undersecretariat for Fisheries and Aquaculture, the National Fisheries and Aquaculture Service, the Ministry of Education, as well as representatives of international organizations among which the Food and Agriculture Organization of the United Nations, trade associations and companies linked to the initiative.

Mr Alejandro Gertosio, Head of the Fisheries Development Division of the Undersecretariat for Fisheries and Aquaculture, and representing the authority that lead the development of the plan, argued during the launching event that *“increasing consumption by seven kilos per capita over 10 years will require an important cultural change that cannot be achieved in isolation: a persistent and systematic public-private alliance will be required if the result is to be achieved”*. Ms Olaya Cambiaso, Food and Aquaculture Business Development Director of “Fundación Chile”, who lead the development of the plan, emphasized the importance of generating this change during the childhood stage, which is when eating habits occur. She concluded that *“It is very important that children are familiar with these resources, understand their benefits and feel privileged of having them available.”* During the event, Mr Néstor Salinas, Head of the School Feeding Department of the Ministry of Education, informed that starting in 2018 fish recipes will be included in school menus so to encourage seafood acceptability among school children.

FAO was permanently represented by Mr Alessandro Lovatelli, Sub-Regional Fisheries and Aquaculture Officer, who was part of the program's Technical Committee. He assisted in validating the assumptions and the diagnosis on which the roadmap was built. Furthermore, FAO contributed the necessary statistics to compare Chile's consumption with the rest of the world, which was key in defining the metrics associated with the overall plan. As an international organization, FAO was considered a strategic partner in the process in providing benchmarking

information and guidelines that allowed complementing the strategic plan with experienced international practices. FAO also facilitated Chile's participation at the *“III International Forum on Introduction of Fish in Infant and School Feeding”* that took place in November 2017 in Buenos Aires, Argentina, where experiences were shared among the invited Latin American nations generating an important apprenticeship and information exchange at the regional level. Mr Lovatelli also shared his critical view of the Chilean seafood industry, saying that *“it is focused on export”*, which is reflected by the poor availability of products offered in the local market and at affordable prices.

The Strategic Plan identifies 12 solutions grouped in four major areas:

Nutritional and Culinary Education

1. Increase the supply of seafood products in institutional, educational and private refectories.
2. Train food processors in food safety, nutritional benefits of seafood, attractive product packaging and food loss and waste.
3. Incorporate in relevant educational curriculum issues related to healthy food intake, the importance of seafood consumption and information on the available aquatic resources of Chile.

Sustainable Use of Natural Resources

4. Ensure the design and effective implementation of natural aquatic resources exploitation and conservation measures.
5. Development of programs and good practices standards associated with the sustainability of fishery and

aquaculture products along their value chains.

Promotion and Communication

6. Support a multisector action to ensure the promotion of a coordinated national campaign on seafood consumption.
7. Development of a detailed national communications plan to inform customers of the importance of consuming fish.
8. Generate consumer confidence and security when purchasing seafood, reducing existing perceptions on risk and prejudice in relation to seafood consumption.
9. Inform seafood consumers on product origin and food safety standards along the value chain.

Product Innovation and Marketing

10. Improve access to seafood products, with greater geographic and socio-economic coverage, diversifying sales channels.
11. Innovation in the preparation and presentation of seafood dishes to improve acceptability and reduction of food waste.
12. Improve food chain efficiency with the view of placing products at accessible prices.
13. Promote entrepreneurship for innovation and product development, taking into account food loss and waste throughout the value chain.

The Strategic Plan proposes a series of concrete actions to be implemented in the short, medium and long-term.



SEE ALSO

www.subpesca.cl/portal/617/articles-99164_documento.pdf

<https://fch.cl/subpesca-lanza-plan-estrategico-aumentar-consumo-productos-del-mar>

Alternative Low-Cost Fish Feeds to Strengthen the Economic Sustainability of Resource-limited Aquaculture Farmers in Latin America Countries

The costs of most major sources of protein and lipids for aquaculture feeds have increased substantially over the past ten years, as they became international commodities (e.g. fish meal; fish oil; soybean meal and others). Consequently, the overall cost of commercial aquaculture feeds has increased, thus reducing profit margins and competitiveness of thousands of small to mid-scale farmers in Latin America, where it is estimated that there are more than 500 000 micro (less than 1 Hectare) and small (1-3 Hectares) aquaculture producers who culture a wide range of native and exotic species and whose livelihoods are threatened due to their inaccessibility to such an important production input.

Within the above context, the aquaculture authorities of five countries; namely Argentina, Colombia, Costa Rica, Guatemala and Paraguay, requested FAO's assistance to help them develop low-cost, farm-made aquaculture feeds, based on locally available ingredients, in order to reduce production costs in small-scale aquaculture, thus strengthening the sustainability of these livelihoods. In response, a regional Technical Cooperation Programme (TCP) was formulated and implemented between 2016 and 2017. The specific objectives of the project were four-fold: (i) Elaborate a national (regional in the cases of Argentina and Colombia) catalogue of locally available plant and animal potential sources of nutrients; (ii) Formulate low-cost, farm-made diets based on the ingredients surveyed and included in the catalogue; (iii) Test such diets against commercial diets in small-scale farms, with direct involvement of local farmers and (iv) Train farmers in formulation and manufacturing of farm-made feeds. These activities were achieved through agreements with local Universities.



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Example of elementary solar driers of raw materials for fish feed

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The results have been extremely encouraging. Overall reduction of production costs ranged between 15 and 65 percent in all cases, by including non-traditional, low-cost plant nutrient sources. Farmers participated in all steps of the process, thus acquiring a series of technical and managerial capabilities which were in turn transferred to their peers, as part of the agreement when selected as part of the project. While farmers in Paraguay increased profit margins by 35 percent in pacú (*Piaractus mesopotamicus*) pond culture, by including 50 percent of an alternative, farm-made diet, in Colombia, cachama (*Piaractus brachypomus*) farmers were able to shift completely from commercial to farm-made diets, given the similar growth rates resulting from using either diet. Moreover, one farmer started mass-producing feed to sell to other farmers, using low-tech, inexpensive equipment including rudimentary solar driers of raw materials (see photo).

The sustainability of the project is based on the *in situ* construction of farmers' capacities through a demonstration process which allowed them to realize the benefits of manufacturing farm-made feeds. Consequently this has had a replication effect in the areas of incidence of the project, with more farmers starting to use alternative diets. It is the turn of national aquaculture authorities, to expand those benefits through policy-based national actions and support.

The Construction of a Hatchery with a Production Capacity of 200 000 Fry to Strengthen the Aquaculture Value Chain in the North-East of Haiti

SUMMARY

Under the aquaculture component of project GCP/HAI/030/EC: "Improving food security in the North East of Haiti", a new hatchery has been built in the area of Ferrier just in front to Boeuf Lake, with a potential production of 20 000 fingerlings a year of red tilapia hybrid. Locally produced tilapia fingerlings will be used by the members of Farmer Field Schools (FFS) to growing up tilapia in the 15 floating cages located in the Lake. Other fingerlings will be used for restocking small artificial water bodies

in the North East and the rest will be made available for farmers and aquaculture producers in the region. The advantage of this hatchery is to do not depend on fingerlings coming from Port-au-Prince reducing the high rate of mortality due to the long distance transportation. Furthermore the presence of the hatchery will generate additional income for FSS members and local communities as well as facilitate the development of aquaculture in the North of the country.

La construction d'une écloserie d'une capacité de production de 200 000 alevins pour renforcer la chaîne de valeur aquacole dans le Nord-est d'Haïti

Le Grand Nord d'Haïti, incluant les Départements de l'Artibonite, du Nord, du Nord-Est et du Nord-Ouest, dispose d'une écloserie d'une capacité de production de 200 000 alevins (tilapia rouge *Oreochromis mossambicus* x *Oreochromis niloticus*) par an. Cette écloserie construite dans la commune de Ferrier, localité de « Lagon aux Boeufs », se réalise dans le cadre du projet « Amélioration de la sécurité alimentaire dans

le Nord-Est d'Haïti », financé par l'Union européenne et co-piloté par l'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO) et le Ministère de l'Agriculture, des Ressources Naturelles et du

Développement Rural (MARNDR), à travers notamment la Direction Départementale Agricole du Nord-Est.

L'écloserie contient 5 étangs, dont un bassin de reproduction d'une



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Construction de la nouvelle écloserie dans la commune de Ferrier
Construction of the new hatchery for fingerling production in Ferrier

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Transport d'une cage flottante dans la Lagon aux Bœufs
Transfer of a floating cage in the lake aux Bœufs

superficie de 400 mètres carrés, où les géniteurs vont produire les alevins, et 4 bassins de 175 mètres carrés, chacun ayant en moyenne une capacité de production de 15 000 alevins par mois.

Un total de 140 aquaculteurs et aquacultrices, et 30 femmes faisant le commerce du poisson, vont bénéficier de cette infrastructure dont l'objectif vise à produire des alevins (« ti bebe pwason », en créole) et empoissonner les cages de grossissement sur place (voir article de FAN 55).

La construction de cette éclosérie de production intensive d'alevins, vient dynamiser et développer la chaîne de valeur aquacole, avec un impact sur tout le Grand Nord. Ce système va doubler la capacité moyenne de production des aquaculteurs et aquacultrices, regroupés en Champs Écoles Paysans (CEP), passant de 25 à 50 kilos de poissons marchands, par personne par an.

Sur les 200 000 alevins à produire : 50 pour cent sont destinés aux aquaculteurs et aquacultrices de la communauté

exploitant le lac du « Lagon aux Bœufs », 25 pour cent serviront à empoissonner les lacs collinaires du Ministère de l'Agriculture (MARNDR) dans le Grand Nord, et 25 pour cent seront réservés à la vente aux aquaculteurs et aquacultrices du Nord-Est et d'ailleurs.

Il importe également de signaler que la mise en place de cette éclosérie vient systématiser et standardiser l'aquaculture comme activité supplémentaire pour les communautés dont l'activité principale de base est la pêche. Celle-ci va permettre aux pêcheurs de générer des revenus, de manière régulière et stable, avec des marges de profit additionnel à celui découlant des activités de pêche, pouvant aller jusqu'à 70 pour cent.

M. Eric Auguste, Directeur Départemental de l'Agriculture du Nord-Est, applaudit la réalisation de cette éclosérie, la première à être construite dans le Grand Nord. « *D'un point de vue économique, il s'agit d'une grande opportunité, en ce sens que celle-ci va alimenter la région et générer plus de revenus*

aux groupements de pêcheurs/aquaculteurs-aquacultrices. En outre, elle permettra d'empoissonner les lacs collinaires construits par le Ministère de l'Agriculture », a mentionné M. Auguste, tout en soulignant la nécessité de former les groupements d'aquaculteurs et d'aquacultrices qui vont exploiter cette infrastructure aquacole, sur la gestion technique et administrative, afin d'en garantir la rentabilité et la durabilité.

M. Paul Andy Joseph, Aquaculteur et Facilitateur de Champ École Paysan, se réjouit de la construction de l'éclosérie qui va rentabiliser leurs activités aquacoles. « *Avant la construction de l'éclosérie, nous obtenions les alevins de Port-au-Prince. L'activité était peu rentable à cause du taux élevé de mortalité lié aux conditions et à la longue durée de transport. Maintenant, nous avons grand espoir qu'avec cette infrastructure, les géniteurs vont générer des alevins sur place, ce qui va réduire considérablement le taux de mortalité et augmenter notre capacité de production. Nous sommes très reconnaissants envers la FAO, le Ministère de l'Agriculture et l'Union européenne, pour cette éclosérie qui vient renforcer nos activités et améliorer nos conditions de vie ».*



SEE ALSO

Crespi, V. and Mercius, M. 2016. *Improving Food Security in the North East of Haiti: Aquaculture Component of Project GCP/HAI/030/EC*. FAO Aquaculture Newsletter. No 55 pp. 39-41. www.fao.org/3/a-c0382e.pdf

A Fish Cage Champion in Kenya

During a study tour to Uganda and Kenya, specially organized for the National Coordinators of a project funded by the Africa Solidarity Trust Fund on the generation of youth employment in aquaculture and cassava value chains, the Kenyan hosts (the Kenya Marine and Fisheries Research Institute) took the team to Kadimu Bay, one of the remote bays of Lake Victoria, where a certain Mrs Winnie, on request, organizes guided tours on her fish farm. She explained the evolution of her farm, which started when the lake stopped supplying fish due to severe depletion of the fishery resources because of overexploitation.

A foreign friend sent her drawings of simple fish cages which could be used for small fish to grow in. With her own funds she had four small cages (2.5 x 2.5 meters) built, which were kept afloat by waterproof drums tied to a square metallic frame.



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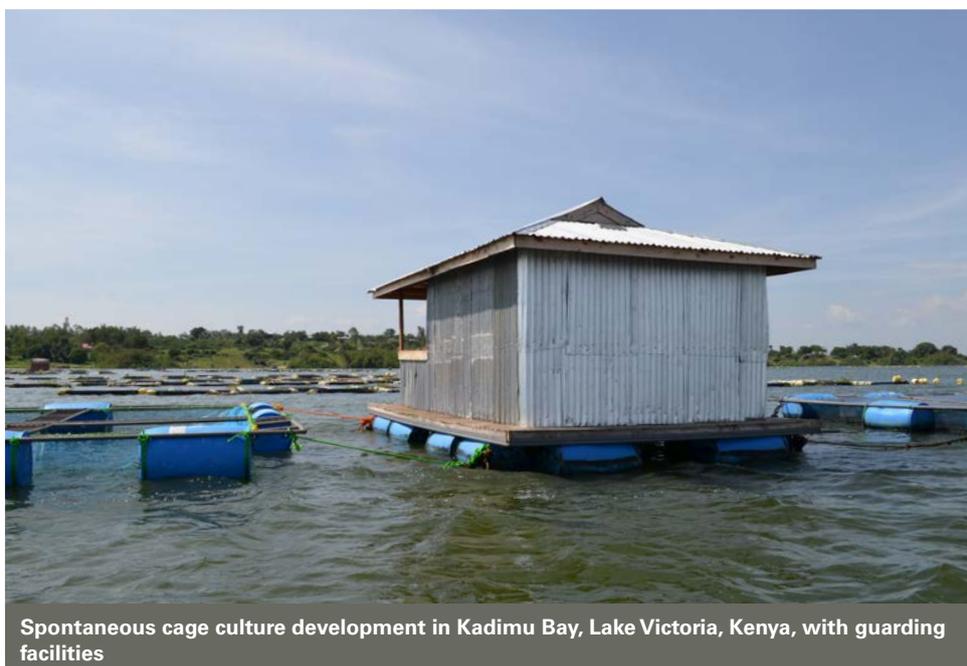
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Spontaneous cage culture development in Kadimu Bay, Lake Victoria, Kenya, with guarding facilities

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Inside the frame netting material in the shape of a pouch with a depth of approximately two meters was fixed. She purchased tilapia fingerlings, which she fed regularly with locally available fish feed, as imported feed was too expensive. She obtained a small canoe to shuttle up and down from shore to cages for fish feeding and regular maintenance of the cages.

The first harvests attracted considerable attention from the inhabitants of her village as for a long time hardly any Nile tilapia (*Oreochromis niloticus*) had been spotted in this part of the lake. The proceeds of the first harvest were then used to purchase more fingerlings and feed, and also to increase the number of cages. All her life Mrs Winnie had been very entrepreneurial and she decided to invite small-scale investors to participate in the exercise, under her guidance. Numerous villagers invested in the purchase of these cages, which increased

in number rapidly. One investor, a local member of parliament, drew considerable attention when he started a school feeding programme for pupils in primary schools from his constituency and decided to invest in 150 cages in total. No dirty hands, the school council insisted. They left the management completely to Mrs Winnie and her group. This group had grown to a total of 18 full-time employees, attending to fish feeding, harvesting, cage maintenance, and security.

The total number of cages at the time of the visit had increased to 700. The finances generated by the school cages were used to provide daily meals for all school children in the district next to the lake. Interestingly, the tilapia did not end up in the diets of the school kids; instead they received meals on the basis of the much more nutritious small-sized dagaa (*Rastrineobola argentea*), which was still caught in the lake during dark nights (as this fish is

attracted by storm lamps and then scooped up).

The above sounds like a success story, but there definitely are challenges to this enterprise. Security has proved one such issue. The local community has been keen to fish in between the cages, as wild fish are attracted by the feed falling through the bottom of the cages. A further challenge is on the side of fishers, who claim that the cages have been placed on their route through which they go fishing. Though this is not yet a major problem it may well lead to future conflict unless resolved now.

Another challenge is theft. A mitigating measure is the presence of watchmen. Among the cages two platforms may be identified, one with a hut-like structure for the night watchman, who is in direct contact with a rapid intervention team that remains on the second platform.

The deployment of cages has also become an issue, and their density in the relatively shallow waters may one day result in negative environmental effects, as the bays where the cages are located are only 6 meters deep. Water hyacinth (*Eichhornia crassipes*) poses a further real threat to the cages. Scattered individual plants are not a problem. However, the plants can be pushed together by the wind forming thick mats, which may then cover the cages, eventually pushing them under water and resulting in structural damage or allowing the caged fish to escape. By occluding cage mesh and reducing water flows the weed may also starve the cages of dissolved oxygen, eventually resulting in fish kills.

A further challenge is the tilapia originating from Ugandan fish farms, which are marketed mainly at Kenyan markets in the larger

cities and are strongly competitive with those produced by Mrs Winnie's group. There is also the challenge of cheap, frozen Nile tilapia arriving in Kenya (and in many other African countries) from Asia.

How can the tilapia business, with all the above challenges, become a sustainable one? One of the solutions is to reduce production costs, for instance by becoming self-sufficient in fish feed production through a fish feed manufacturing unit. It is also essential to try to mitigate the impact of negative environmental effects due to the high cage density by spreading the cages

through planned deployment using FAO technical guidelines over a bigger surface area

The study tour group crossed to the cages to have a closer look. All operations at the farm have been very well streamlined, which is of utmost importance, as every week an average of 14 cages has to be harvested. Mrs Winnie, through her initiative, has created 18 full-time jobs, contributes to food and nutrition security, indirectly feeds hundreds of school children and has created much self-confidence and self-reliance in her's and other nearby villages. In other words: a champion in aquaculture!



Mrs Winnie (right)

©FAO/IM. VAN DER KNAAP

Youth Participation in Aquaculture in Sub-Saharan Africa

Documenting of aquaculture practices in Sub-Saharan Africa

Africa has seen a sustained growth in aquaculture production of about 18 percent over the past two decades, which points to the huge potential of the sector (FAO, 2016). The proliferation and intensification of privately owned small- and medium-scale enterprises across the region are among the factors responsible for this positive trend, along with increased local and foreign investment, and an increase in technical capacities. The continent, especially the sub-Saharan region (SSA), is however yet to fully exploit the potential of fish farming for development despite the abundance of land, water, human, and native aquatic genetic resources.

The FAO Sub-regional office for Eastern Africa (FAO-SFE) has undertaken various initiatives to advance aquaculture development mainly in Eastern Africa, but also in the entire SSA. In an effort to provide workable alternatives in terms of aquaculture in the sub-region, FAO-SFE has documented good practices in various aspects of aquaculture, including youth employment. Countries visited for this analysis included Ghana, Kenya, Nigeria, Rwanda, and Uganda. In this article, we provide



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A group of youth grading fish in Akosombo, Ghana

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an example of local governance from Nigeria.

Perception: Youth are not interested in agriculture!

The African Union defines 'youth' as persons from 15 to 35 years old. In most visited countries, it is widely accepted that persons within this age category are generally not interested in farming, mostly due to the arduous nature of farming in SSA and the time it takes to earn any income. For fish farming, this period of waiting without an income could be from 5 months to 1 year. A number of proposals have been made to attract youth to agriculture as whole, and aquaculture in particular.

How can youth be roped in?

Youth represented in this study were more interested in economic activities that provides a quicker turnaround of investment and also higher levels of profit. Hence,

for technical and economic reasons, and also as a way to attract and retain youth, one way is the promotion of specializations within the aquaculture sector, for example on seed production, nursery farming, grow-out farming, pond construction, transportation of production inputs (raw ingredients for feeds for instance), fish market, etc.

Youth could be engaged in production of fingerlings, which has a shorter turnaround than grow-out. Hatchery owners were observed to be mostly young people, who were very interested and motivated on finding solutions and addressing typical hatchery issues in SSA. Hatchery operation is arguably the most technical stage of production cycles of aquaculture. Therefore, educated youth who are more trainable and motivated to make the system work, need to be targeted.

Feed ingredient supply is another area that could be attractive to youth. A large proportion of fish feed is locally-made by farmers on their farms. Besides vitamins and other micronutrients (applied in powder form), all other ingredients such as rice bran, peanut cake, and coconut cake are obtained as wastes from the agro-industrial sector. In some cases, cereals such as maize are also included in the feed mix. Ingredient supply usually involves travelling to areas of production around the country or sub-region in some cases. Youth undertake these long journeys to acquire and transport the raw materials which they sell to the aquaculture farmers at a higher price.

Youth could also develop IT-Apps on market information to aide farmers in different areas such as market information systems and extension services, much like two university students in Ghana whose App, *Farmerline*¹, provides such information to farmers via their mobile phones in local languages.

Enabling environment: an example of local governance model from Nigeria

The Ijebu Development Initiative on Poverty Reduction (IDIPIR) is located in the Ogun State of Nigeria, and is overseen by a traditional king. About 10 years ago, the Paramount Ruler of Ijebuland commissioned the IDIPIR in a bid to tackle the extreme poverty that existed in the area. The traditional leader serves as the chairman of the initiative's board of directors. He formed a group of national and international volunteers that serve as board members in this poverty reduction initiative. Membership to the Initiative is open to all, regardless

¹ <http://farmerline.co/products>

of gender, religion, tribe, or social standing.

Availability of land is a pervasive barrier to youth involvement in agriculture in SSA. In order to overcome this barrier, the Initiative primarily buys large tracts of land and then leases plots to members. The Initiative started with fish farming but has currently diversified into other areas, such as microfinance, transport tricycles ("Tut tuts"), pineapple farming and bee-keeping.

Members are given training and the needed production supplies to ensure successful enterprises. Members are grouped in cooperatives, each with a maximum of 10 members, which allows good group dynamics and higher benefits/profit than if in bigger groups, as usually seen in Africa.

The common problem of the lack of capital is also tackled by the IDIPIR. Financial institutions in SSA are reluctant to give out loans to small-scale farmers due to a number of factors, including the small amounts requested and the associated high risk. Therefore, the IDIPIR, which is a registered entity, obtains loans of 500 000 USD and above. It then disburses this loan as smaller amounts to members. In addition to other motivations to repay loans, the mix of fear and respect for the king works as a form of social policing, which encourages timely repayment of loans by members. Therefore, the Initiative is noted for repaying all loans in advance.

The IDIPIR has instituted a central marketing system, whereby all produce is marketed solely through the Initiative's account. Fish, for example, is sold at the sales point located in the farm village. This system benefits all

parties: members are assured of a market for their produce, buyers are assured a constant supply of produce due to the coordinated sales, and the Initiative is able to recoup all outstanding loans and rents from the revenues of individual farmers.

The Initiative maintains annually audited accounts with publicly-available reports, in addition to an annual general assembly in which all members participate. A small number of salaried staff is also employed to provide all the central services to members.

The IDIPIR has several success stories. For example, a beneficiary who overcame poverty through the initiative has instituted a scholarship to encourage students in the area. Many members have acquired their own means of transportation. The initiative has also built a clinic and a feed mill for members, in addition to regular maintenance of roads in the farm village.

A number of lessons can be gleaned from this model. Almost all national and international aquaculture projects and programs are formulated and overseen by various levels of national governments. However, due to the main fact that all levels of national governments have tenures, these programs are not sustained by subsequent governments. Even within the same government, the high turnaround of the tenures of government officers poses the same problem. Additionally, there is a perception that youth employment programs only serve political agendas to obtain votes, without any specific mechanisms to sustain youth employment. It is common knowledge that the institution of chieftaincy is well-respected across the SSA region. A traditional ruler (Chief

or King) does not have a tenure and has the lifelong responsibility of improving the lives of his constituents.

Therefore, the provision of assistance by international development organizations to SSA, needs to harness the huge opportunity that lies in traditional governance to ensure successful and sustainable interventions. Mechanisms need to be identified to, at the least, actively involve the traditional rulers in projects and programs in the sub-region. The IDIPR model is one that can be adopted by any development agency engaged in poverty alleviation, especially targeting the youth. This model will ensure the provision of land and capital, which are among the main barriers to the participation of youth in aquaculture in SSA.



The sign of IDIPR farm village along the Lagos-Ijebu highway in Nigeria

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SEE ALSO

FAO 2016. *The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all*. Rome. 200 pp. www.fao.org/3/a-i5555e.pdf



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A box with Nile tilapia (*Oreochromis niloticus*) just harvested from a fish pond, China

THEMATIC ARTICLES



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Border Rejection Trends of Fishery and Aquaculture Products in European Union, United States of America and Japan

Seafood is one of the most traded food commodities internationally. The trade is likely to increase in the future to meet the ever increasing demand for fish and fishery products.

These products can be detained, destroyed or rejected at borders if they do not meet the regulations applicable in the importing country, and veterinary border controls are key to ensure that the products are safe when entering the markets. This article presents a trend analysis of border rejections of fishery and aquaculture products in the European Union, United States of America and Japan from 2010-



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2017 with a particular focus on 2017. The selection of the areas was made based on the volume of trade and data accessibility. The analysis is categorized into six "risk categories": (i) chemical; (ii) microbiological; (iii) histamine; (iv) toxins; (v) parasites; and (vi) other causes (Figure 1). In the other user's category, we include all the general causes, such as: packaging issues, allergens, improper health certificate, poor temperature control, labelling issues etc.

The alerts and border rejections¹ in the European Union through the Rapid Alert System for Food and Feed

According to FAO statistics, the European Union imported 54.9 million tonnes of fish and fishery products in 2017. The EU has high food safety standards to protect consumers. The Rapid Alert System for Food and Feed (RASFF)

web portal contains relevant data on alerts and border rejections at the EU borders.

In 2017, there were 359 alert and border rejections recorded through the RASFF system for fish, fishery products, bivalve molluscs, crustaceans and cephalopods. The main rejections were due to chemical causes, with 159 cases reported; followed by "other causes" with 115 cases; then microbiological with 41, followed by histamine with 30 cases. Rejections due to the presence of toxins and rejections due to the presence of parasites were respectively 11 and 3 each one. Chemical causes account for 44 percent of the total, others causes for 32 percent, microbiological for 12 percent, histamine for 8 percent, toxins for 3 percent and parasites for 1 percent of the total.

In 2017, there was a peak of chemical causes compared to

¹ The alerts and border rejections described are focused on fish and fishery products, including bivalve mollusc, crustaceans and cephalopods, and the notifications categorized as information for attention and information for follow-up are not included in the analysis.



Figure 1 – The "risk categories" for USA, EU and Japan

the previous two years and the "other causes" category have been increasing since 2014. The RASFF portal has also reported a trend of histamine detections since 2015, recording 30 cases in 2017. The products where histamine limits were found above the maximum level are mainly tuna and tuna-like species, which are considered to be of a higher risk due to their high contents of muscular histidine (precursor in the creation of histamine).

Conversely, the frequency of parasitic causes was decreasing, with a peak of 87 detentions recorded in 2011 and only 3 products rejected in 2017. Of these 3 products, 2 were rejected for *Anisakis* spp. and one for *Trypanorhyncha*, a parasite commonly called "spaghetti worm".

² with the FDA's import refusal report (IRR).

Three were the main causes among the chemical rejections and alerts: (i) presence of mercury above the maximum limits with 95 cases accounting for 60 percent of chemical causes and 26 percent of all causes, and mainly found in swordfish; (ii) detentions for residues of veterinary drugs with 95 cases, such as nitrofurans and sulphites, recorded mainly in shrimps; and (iii) presence of cadmium above the maximum limits with 25 cases, mainly reported in cephalopods. In 2017, no rejection cases have been reported for benzo(a)pyrene, additives, dioxins and pesticides; in previous years these were significant causes of rejections and detentions.

Among "other causes" category, the main problem was represented by poor temperature control with 61 cases; followed by products

unfit for human consumption with 18 cases and attempt to illegally import with 14 cases.

Regarding microbiological causes, there has been a decreasing trend since 2014. The rejections and detentions went from 78 in 2014 to 41 in 2017. The main bacteria is *Escherichia coli* with 12 cases, especially recorded in clams and mussels, followed by *Listeria monocytogenes* with 11 cases found mainly in smoked salmon. The third microbiological cause was *Norovirus* with 11 cases, most of them in oysters.

Data show that among the 11 rejections due to toxins, Amnesic shellfish poisoning was the group of biotoxins that appears to be the largest with 7 cases. Others group of biotoxins detected were: Diarrhetic shellfish poisoning with 2 cases and 1 Paralytic shellfish poisoning with 1. Lastly, Ciguatera rejections were only observed with 1 occasion in 2017 in red snapper.

In general, the main rejected products in the European Union in 2017 were swordfish with 51 cases, then tuna with 49 cases, shrimp with 42, squid with 26 and shark with 24.

Border control of fishery products in the United States of America²

According to FAO statistics, United States of America imported 21.8 million tonnes of seafood in 2017. Health and hygiene checks are conducted by the Food and Drug Administration (FDA), who provides a monthly report called Import Refusal Report where it is possible to find all the causes of rejections.

During 2017, FDA reported 1 577 cases of import refusal at the US borders. "Other causes" were the main category with 1 114 cases, representing 70 percent of the rejections, followed by microbiological, chemical causes and histamine above the limits, with 281, 156 and 25 rejections

respectively, and a only case reported for toxins.

The prevalence of the “other causes” was stable in the last years whereas microbiological, chemical and toxins causes are decreasing.

Among “other causes”, the main problem was the category named “Filthy”. According to the FDA Violation Code Translation, “filthy” is defined as a condition where “The product appears to consist in whole or in part of a filthy, putrid, or decomposed substance or be otherwise unfit for food.” This was the top issue with 556 cases, however, this category decreased in recent years. Conversely, the rejections due to the category named MfrHACCP, increased with 279 cases in 2017 compared to 46 in 2016. According to the FDA Violation Code Translation, “MfrHACCP” is defined as a condition where “The product appears to have been prepared, packed, or held under insanitary conditions, or it may be injurious to health, due to failure of the foreign processor”. Misbranding, adulteration and packaging issues are also included within “other causes”, with 115, 78 and 59 cases respectively.

The microbiological causes were the second in the ranking, with *Salmonella* accounting 246 cases and representing 88 percent of this category; followed by *Listeria*

monocytogenes with 33 cases and by Hepatitis A Virus with 2 cases registered in tuna.

Chemical causes, with 156 products rejected, were the third; almost the total number of detentions was linked to residues of veterinary drugs.

In general, the main rejected products in the United States of America in 2017 were tuna with 186 cases, followed by shrimp with 141, common dolphinfish (*Coryphaena hippurus*) with 134, lobster with 67 and tilapia with 67.

Border rejections in fishery products in Japan with the Ministry of Health, Labour and Welfare

According to FAO statistics, Japan imported 15 million tonnes of seafood in 2017.

The Ministry of Health, Labour and Welfare of Japan provides information on its website about the number of cases of rejected imports.

In 2017, there were 143 rejections recorded in Japan. The majority of rejections were due to microbiological causes, with 99 cases, followed by chemical causes with 36 cases and by “others causes” with 8 cases. Microbiological causes account for 6 percent of the total rejections, chemical for 25 percent and “others causes” for 6 percent.

In recent years, the detentions due to microbiological causes were showing an increasing trend since 2014, while the chemical causes decreased from 140 cases in 2012 to 36 cases in 2017.

The main microbiological hazard is represented by Coliform with 50 cases, it is followed by live bacteria with 29 cases and by *Escherichia coli* with 19 cases.

Regarding the chemical causes, the main risks are residues of veterinary drugs such as Furazolidone with 12 cases, Enrofloxacin with 11 cases; both detected mainly in shrimps. Among “other causes” there are 6 cases of unfinished disposal of offal and 2 cases of allergens. As reported by the Ministry of Health, Labour and Welfare, the most rejected products in 2017 were shrimps with 35 cases, others seafood products³ with 27 cases, followed by crab, salmon and squid with 13, 9, 8 cases respectively.

The European Union, United States of America and Japan have different structures and mechanisms, which are reflected in the profile of the rejections and detentions of fishery and aquaculture products, but they all contribute to food safety prevention and management and have similar objectives.

The trend analysis of the rejections and detentions provides FAO with a good overview of the global situation and problems that different stakeholders (primary producers, processors and competent authorities) are facing, and help FAO to react to certain food safety issues. The rejections and detentions have economical, logistical and administrative consequences, as well as multiple benefits for consumers and importers, by allowing them to explore global imports/exports and be more aware of the current issues.

FAO works for the dissemination of information to facilitate trade through seminars, conference, web resources such as Globefish: www.fao.org/in-action/globefish



SEE ALSO

Border rejections: www.fao.org/in-action/globefish/fishery-information/border-rejections

International regulatory framework: www.fao.org/in-action/globefish/market-assets

RASFF Portal: https://ec.europa.eu/food/safety/rasff_en

FDA Import Refusal: www.accessdata.fda.gov/scripts/importrefusals

Japan Ministry of Health, Labour and Welfare: www.mhlw.go.jp/english/topics/importedfoods/index.html

³ "Others seafood products" are products where it is possible to find more species of fish not specified.

Aquaculture, the 2030 Agenda for Sustainable Development and FAO's Common Vision for Sustainable Food and Agriculture

The 2030 Agenda and its Sustainable Development Goals offer a vision of a fairer, more prosperous, peaceful and sustainable world in which no one is left behind, as it strives for a world that is just, rights-based, equitable and inclusive. The Agenda not only calls for an end to poverty, hunger and malnutrition and for universal access to health care - all with major emphasis on gender issues - but also demands the elimination of all forms of exclusion and inequality everywhere. Inclusive and sustainable economic growth,



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as well as full and productive employment and decent work for all, are to be promoted. The commitment to leave no one behind in fisheries and aquaculture is a call to focus action and cooperation on efforts that will help to achieve the core ambitions of the 2030 Agenda for the benefit of all fish workers, their families and their communities.

The 2030 Agenda is highly relevant for policy-making, planning and management for sustainable development of aquaculture. In particular, SDGs 1 (end poverty), 2 (end hunger), 5 (gender), 6 (water), 8 (growth, employment, decent work), 12 (production and consumption), 13 (climate change), 14 (marine resources & ecosystems) and 15 (biodiversity) have all significant bearing for aquaculture.

Aquaculture will also contribute to the achievement of many SDGs.

Available international guidance focusing on aquaculture development, such as the Code of Conduct for Responsible Fisheries, and its Technical Guidelines, the 2000 Bangkok Declaration and the 2010 Phuket Consensus, and the FAO Blue Growth Initiative, including the Ecosystem Approach to Fisheries and Aquaculture - are generally well aligned with the 2030 Agenda and will generally support the delivery of the SDGs. However, implementing the SDGs in aquaculture will require additional efforts to address key challenges, such as:

- Integration of aquaculture development efforts in increasingly complex contexts and processes;
- Adaptive planning and management systems;

Sustainable Development Goals



- Human and labour rights, decent work;
- Capacity development of institutions;
- Stakeholder participation and empowerment especially of women and youth.

FAO will assist efforts of mainstreaming the 2030 Agenda in national aquaculture development policy-making and planning. Emphasis will be given to capacity development efforts, especially those strengthening the policy environment, institutional arrangements and collaborative processes. FAO will continue to provide assistance in a range of areas including:

- National aquaculture development and investment policies, plans and strategies;
- Aquaculture zoning, site selection and area management based on the ecosystem approach to aquaculture;
- National strategies on aquatic animal health and biosecurity;
- Integrated extension approaches and farmer field schools;
- Decent work, occupational safety and health, youth employment and gender mainstreaming.

FAO promotes the Common Vision for Sustainable Food and Agriculture as a framework to address sustainable development

in agriculture, forestry, fisheries and aquaculture in a more effective and integrated way. The Common Vision proposes the following five principles as a basis for the policy dialogue and governance arrangements needed to identify sustainable development pathways across the SDGs, across sectors and along related value chains:

1. Improving efficiency in the use of resources.
2. Conserving, protecting and enhancing natural ecosystems.
3. Protecting and improving rural livelihoods, equity and social well-being.
4. Enhancing the resilience of people, communities and ecosystems.
5. Promoting responsible and effective governance mechanisms across natural and human systems.

The COFI Sub-Committee on Aquaculture in 2017 discussed the 2030 Agenda and endorsed the Common Vision. It recommended that FAO develop guidelines for sustainable aquaculture by integrating lessons learned from successful aquaculture developments worldwide. The UN Development Group and FAO provide general guidance for mainstreaming of the 2030 Agenda and related integrated programming at country level.



SEE ALSO

FAO. 2014. *Building a common vision for sustainable food and agriculture – principles and approaches* Rome. www.fao.org/3/a-i3940e.pdf

FAO. 2017. *Food and agriculture - driving action across the 2030 Agenda for Sustainable Development*. Rome. www.fao.org/3/a-i7454e.pdf

FAO. 2017. *Aquaculture, the Sustainable Development Goals (SDGs)/Agenda 2030 and FAO's Common Vision for Sustainable Food and Agriculture*. COFI Sub-Committee on Aquaculture. Ninth Session, 24-27 October 2017. COFI:AQ/IX/2017/5. www.fao.org/cofi/30794-011acfd6d140b8ede06f0b184c8e5fd4.pdf

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Harvesting Indian white prawn (*Penaeus indicus*) in a lined earthen pond, Jeddah Fisheries Research Center, Saudi Arabia

Fish as a Poor People's Food

World per capita fish consumption¹ increased from 12.6 kg in the early 1970s to 14.2 kg in the early 1990s and 19.8 kg in the early 2010s.² Fish consumption for countries vary greatly, ranging from less than 1 kg per capita per year in some inland countries to over 100 kg per capita per year in some island economies. Fish accounted for 15.6 percent of global animal protein intake in the early 1970s. The ratio declined slightly to 15.1 percent in the early 1990s and bounced back to 16.3 percent in the early 2010s. The fish share in the early 2010s is higher than poultry meat (16.1 percent), pig meat (14.5 percent), bovine meat (11.0 percent), and mutton & goat meat (2.2 percent).

These numbers are obtained from the World Aquaculture Performance Indicator (WAPI) module on fish consumption developed based on FAO Food Balance Sheet data.³ The module contains similar information at the country (more than 200 countries or territories) and regional (nearly 40 country groups) levels. This article uses a chart template in the module to illustrate some interesting patterns of the contribution of fish to animal protein in different countries or territories.

Early 1970s

Figure 1 shows the early-1970s scenario of fish's contribution

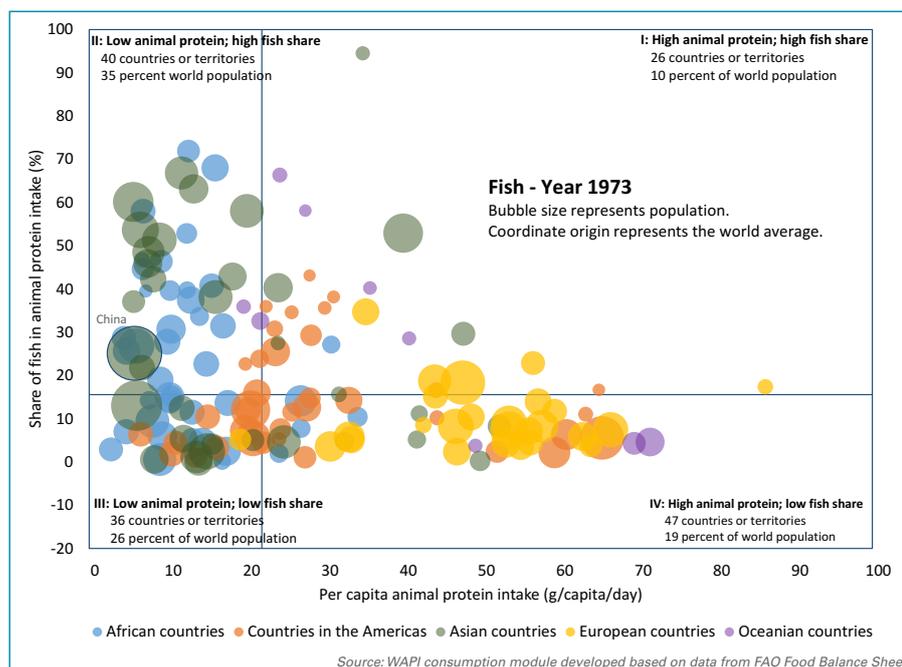


Figure 1 – Contribution of fish to animal protein in the early 1970s

to animal protein (y-axis) in 149 countries or territories with respect to their per capita animal protein intake (x-axis). Bubble size measures each country's population,⁴ and the origin is set at the world average.

First let us look at countries or territories on the left side of the coordinate plane (i.e. quadrant II and III). Generally speaking, these were relatively poor countries or territories in developing regions⁵ with below-average animal protein intake. While their fish share (in their animal protein intake) vary from close to zero to nearly 80 percent, most of these countries or territories are located in quadrant II, which means that countries or territories with low

animal protein intake tend to have a high fish share. The 40 countries or territories in quadrant II accounted for 35 percent of world population in the early 1970s, and China (accounting for 21 percent of world population at that time) was one of them.

In contrast, countries and territories on the right side of the coordinate plane are concentrated in quadrant IV, which means that countries or territories with above-average animal protein intake tends to have below-average fish share. The 47 countries or territories in quadrant IV are mostly countries or territories in developed regions or relatively rich countries or territories in developing regions.



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1 Fish include finfish, shellfish and other aquatic animals. Fish consumption is measured in live weight equivalent.

2 At the time of this writing, FAO data on fish consumption are updated to 2013. Thus we use the situation in 2013 to represent the scenario in the early 2010s and accordingly use the situation in 1993 and 1973 to represent the scenario in the early 1990s and the early 1970s, respectively.

3 Requests for test use of the module can be sent to: WAPI@fao.org

4 Countries with data unavailable do not appear in the figure; thus countries' share of world population does not add up to 100 percent.

5 According to the United Nations designation, developed regions include Europe, Northern America, Japan, Australia and New Zealand, whereas other countries or territories are considered developing regions.

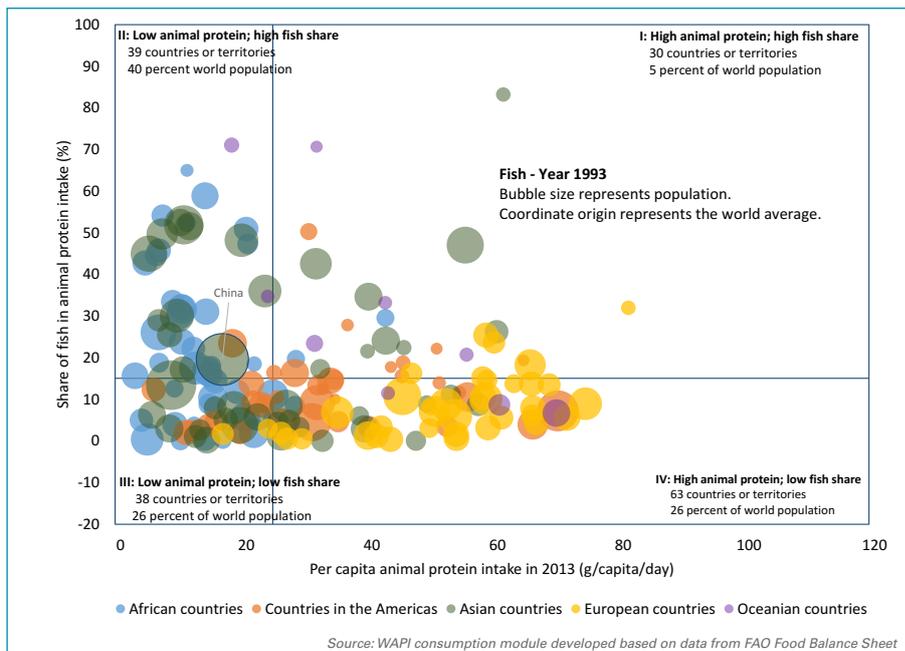


Figure 2 – Contribution of fish to animal protein in the early 1990s

In summary, Figure 1 reveals an L-shape pattern indicating that fish was a relatively more important source of animal protein for relatively poor countries or territories yet a relatively less important source of animal protein for relatively rich countries or territories. In this sense we can say that fish were a poor people’s food in the early 1970s.

Early 1990s

The L-shape pattern continued after 20 years in the early 1990s and actually became more pronounced. As indicated in Figure 2, countries or territories in quadrant II accounted for 40 percent of world population in the early 1990s (compared to the 35 percent in the early 1970s), whereas those in quadrant IV accounted for 26 percent of world population in the early 1990s, much higher than the 5 percent for countries or territories in quadrant I.

Early 2010s

A first look at Figure 3 may give you an impression that the “fish being a poor

people’s food” pattern continued in another 20 years later in the early 2010s. But the numbers beg the difference. Countries or territories in quadrant II of Figure 3 accounted for only 19 percent of world population in the early 2010s (far below the 40 percent in the early 1990s), whereas countries or territories in quadrant IV and I of Figure 3 accounted for the same percentage (24 percent)

of world population in the early 2010s. All these changes were caused by the move of China (which accounted for 19 percent of world population in the early 2010s) from quadrant II in the early 1990s to quadrant I in the early 2010s. Economic growth has driven China’s animal protein intake from far below the world average in the early 1970s (Figure 1) to a little below the world average in the early 1990s (Figure 2) and then to above the world average in the early 2010s (Figure 3), whereas its fish share has maintained at a level slightly above the world average. In this sense we may say that China has made fish less a poor people’s food.

Including China, there are four countries that have moved from other quadrants in the early 1990s to quadrant I in the early 2010s. The other three are Myanmar (from quadrant II to quadrant I) and two small island developing states (SIDS), Jamaica and Saint Kitts and Nevis (from

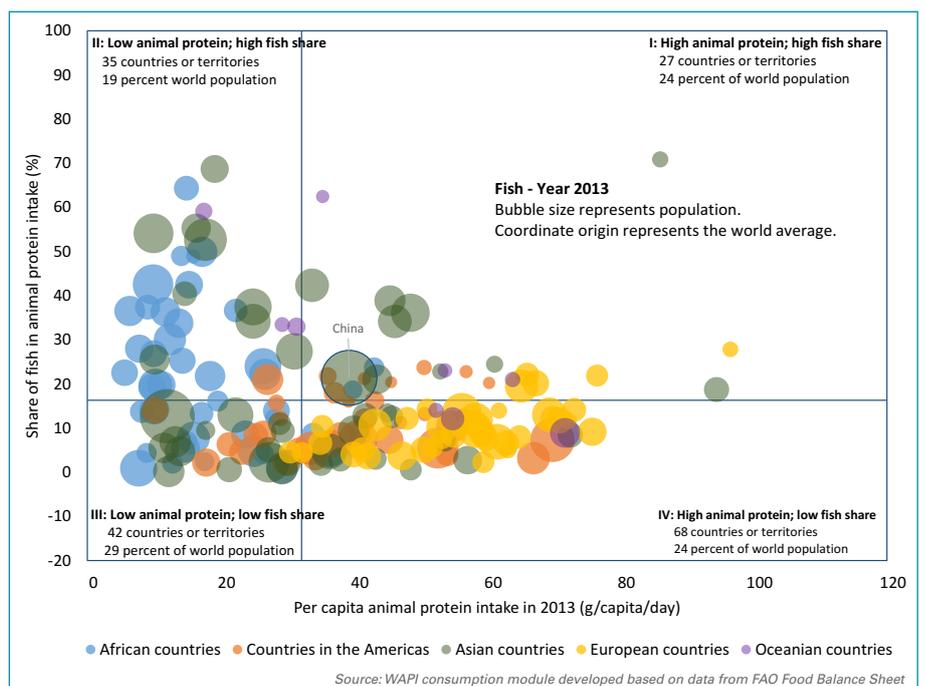


Figure 3 – Contribution of fish to animal protein in the early 2010s

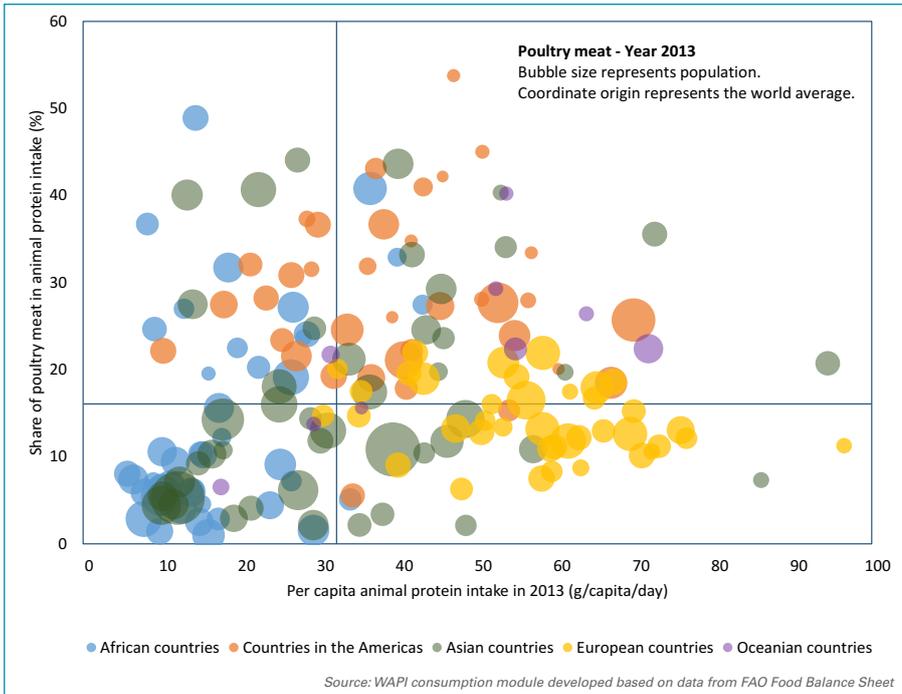


Figure 4 – Contribution of poultry meat to animal protein intake in the early 2010s

and Tobago), Ecuador and Saudi Arabia. Conversely, four countries moved from quadrant IV to quadrant III, including one land-lock developing countries (Uzbekistan), one SIDS (Belize), Jordan and Lebanon.

Looking into the future, what would the pattern look like in 20 years (i.e. in the 2030s) or 40 years (i.e. in the 2050s)? It is difficult to predict. Past experience indicates that the L-shape pattern for fish's contribution to animal protein has been persistent for 40 years from the early 1970s to the early 2010s. However, China's move from quadrant II in the early 1990s to I in the early 2010s may foretell some change. Instead of taking a wild guess, let us settle with using the pattern of poultry meat in the early 2010s (Figure 4) to show that the L-shape pattern is not a norm for all animal protein sources.

quadrant IV to I). However, four SIDS have moved from quadrant I in the early 1990s to other quadrants in the early 2010s, including Fiji (to quadrant II), Suriname (to quadrant III) and Bahamas and Dominica (both to quadrant IV). Finland, Oman and Venezuela are the other three countries moving from quadrant I to IV.

Two land-lock developing countries, Burkina Faso and Rwanda has moved from

quadrant III in the early 1990s up to quadrant II in the early 2010s, whereas five countries dropped from quadrant II to quadrant III, including Cabo Verde (a SIDS), Liberia, Madagascar, Namibia and Yemen.

Five countries have moved from quadrant III in the early 1990s to quadrant IV in the 2010s, including two land-lock developing countries (Armenia and the former Yugoslav Republic of Macedonia), one SIDS (Trinidad



SEE ALSO

FAO 2014. *Report of FAO Expert Workshop on Assessment and Monitoring of Aquaculture Sector Performance*. Gaeta, Italy, 5–7 November 2012. FAO Fisheries and Aquaculture Report No. 1063. Rome, Italy. www.fao.org/3/a-i3539e.pdf



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Liberian youth harvesting tilapia from a fish pond



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Necessary Elements for the Development and Management of Genetic Resources in Aquaculture

Aquatic genetic resources (AqGR) represent a valuable reserve of biodiversity for food and agriculture and play a crucial role in contributing to global food security and nutrition world-wide. However, in various international fora, many FAO Member countries have highlighted their limitations and difficulties in assessing their national capacities to responsibly use, manage and conserve their AqGR.

For these reasons, FAO is developing a Framework or guideline of minimum requirements for the sustainable use, management and conservation of AqGR of relevance for aquaculture. The Framework is a document that countries can use to evaluate objectively their national capacities, infrastructures and governance tools regarding the sustainable use of AqGR.

In February 2017, with the support of the German

Government, a process towards the development of the Framework started and the document has been refined through several rounds of close consultation with international experts. The outcome of this consultation is a set of guidelines structured into the following five main components: (i) Information and databases; (ii) Governance, policy and planning; (iii) Infrastructure and equipment; (iv) Capacity building and training; and (v) Enabling the private sector. Mapping the current elements characterizing their national aquaculture context onto the Framework, countries should be able to identify possible gaps and constraints and, consequently, set priorities and strategies for a sustainable development and management of their AqGR used in aquaculture.

In order to assess the effectiveness of the Framework, one country

was selected for a field test; the Republic of Zambia was chosen as an ideal pilot case. A workshop was held in Lusaka, Zambia, 25-29 September 2017, co-organized by FAO, the Southern African Development Community (SADC) and WorldFish, in collaboration with the Ministry of Fisheries and Livestock of the Republic of Zambia. It was the first meeting of the Regional



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Reared Nile tilapia larvae in Kafue Fisheries farm, Kafue, Zambia

Genetics Platform in the Southern African Region and it included, among its tasks, the review and validation of the Framework. Although Zambia was specifically chosen as target country and the Framework is designed to be a national policy document, countries should strive to engage international, regional or sub-regional entities or countries in

order to harmonize policies and practices. For this reason, the SADC has been involved in the validation of the guideline due to its strong commitment to pursue sustainable management and use of AqGR in the region.

After an extensive discussion and validation of its five components, the workshop participants concluded that the Framework

contains a comprehensive set of criteria necessary for the development and management of AqGR that are useful in identifying gaps in existing conditions as well as opportunities for future action. Further, the workshop recommended that, once finalized, the guideline should be distributed within a country to the fishery and aquaculture sectors for refinement based on specific national conditions.

Following on these recommendations, a second round of discussion on the Framework will be held in Malawi, next April, at the 6th Meeting of the SADC Working Group on Aquaculture and 2nd Meeting of the SADC-WorldFish Regional Platform for Genetics in Aquaculture. The main goal of this second meeting with the SADC representatives is start to design a roadmap towards the implementation of the Framework components at country and sub-regional level.

Once the Framework will be published, FAO expects that this guideline will have a wide range of beneficiaries such as fish farmers, hatchery people, fisher folk, AqGR managers, policy makers, decision makers, donors, consumers and academia.

In a broad view, the process towards the finalization of the Framework is part of the ongoing efforts of the Fisheries and Aquaculture Department in supporting countries to enhance knowledge on their AqGR for better conservation and management of key natural resources for sustainable production.



Broodstock of Nile tilapia (*Oreochromis niloticus*), China



SEE ALSO

www.fao.org/aquatic-genetic-resources/home

A User-Friendly Tool for Investment Decision Making in Aquaculture

The User-Friendly Tool for Investment Decision Making in Aquaculture (UTIDA) has been developed by the Aquaculture Branch of the FAO Fisheries and Aquaculture Department and the FAO Sub-regional Office for Eastern Africa. A beta version of UTIDA (see reference below), which is still undergoing final testing before its official release, has been made available online since October 2017.

The Tool is based on an interactive and user-friendly model, which allows rapid data entry by the users. UTIDA requires no advanced knowledge of economic concepts or advanced skills in the use of spreadsheets. The Tool is conceived to assist small- and medium-scale fish farmers in their decision whether or not to invest in aquaculture under specific assumptions. When used properly, UTIDA may provide valuable assistance to fish farmers for improving the financial management of their operations.

UTIDA consists of a series of linked workbook files within a folder. In each farming system, the first four spreadsheets ask the users to input data on production and economic characteristics



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Testing UTIDA during a training workshop in Zambia

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of the aquaculture operation, including fish species, size of the farm, number of ponds or cages, stocking densities, etc. Based on the performed data entry, the last six spreadsheets produce a summary of the information provided, a series of financial forms (average income statement, annual income statement, cash flow and balance sheet) and a summary of results. UTIDA also offers customized advices to the users based on the results of the analysis. In addition, it provides the financial analysis, the cost structure analysis and the sensitivity analysis.

The Tool only analyses two fish species, Nile tilapia (*Oreochromis niloticus*) and North African catfish (*Clarias gariepinus*). For each species, it focuses on two production phases: nursery and grow-out. At present the users can choose the monoculture pond based farming, but further farming systems are under development.

UTIDA has been tested during the training workshops on "Doing Aquaculture as a Business", which took place in several countries, including Ethiopia, Kenya, Rwanda, Uganda and Zambia. The participants included fish farmers, government officers with responsibilities in aquaculture development, members of academia and representatives from local NGOs. Overall, UTIDA was very well received in all

countries visited. Participants have rapidly learned how to use the Tool in an effective manner and realized the many ways it could help them to improve the management of the aquaculture operations. Participants provided useful comments and suggestions that have been used to improve the Tool. Based on interactions with users, the beta version of UTIDA was produced, in both English and French.

E-mail for inquiries:

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Acknowledgement

We acknowledge Nathanael Hishamunda, FAO Representative in Haiti, whose vision and assiduous efforts led to the design and development of UTIDA.



SEE ALSO

UTIDA (English version)
www.fao.org/fishery/topic/166347/en

UTIDA (French version)
www.fao.org/fishery/topic/166347/fr

FAO. 2017. *Doing aquaculture as a business for small- and medium-scale farmers. Practical training manual. Module 1: The technical dimension of commercial aquaculture*, by Menezes, A., Hishamunda, N., Lovshin, L. and Martone, E. Addis Ababa, Ethiopia; Rome, Italy.
www.fao.org/3/a-i7461e.pdf

Hishamunda, N., Martone, E. & Menezes, A. 2017. *Practical Training Manual on Commercial Aquaculture for Small- and Medium-scale Farmers. Module 2: The Economic Dimension of Commercial Aquaculture*. Addis Ababa; Rome, FAO.
www.fao.org/3/a-i7798e.pdf

NEW STAFF PROFILES



Vera Agostini

Deputy-Director of Fisheries and Aquaculture Division

A national of the USA, Dr Agostini is a fisheries scientist by training, who has held positions across three sectors (non-governmental, government, and academia/educational) providing technical and strategic leadership across a range of multi-disciplinary efforts around the globe. Her experience ranges from comprehensive ecosystem research to broad policy and planning.

Areas of focus include ecosystem based climate adaptation and disaster risk management, social resilience, small scale fisheries, ecosystem services in pelagic environments, ecosystem approaches to fisheries, marine spatial planning and protected area network design.

From 2007-2017, Vera was with The Nature Conservancy (TNC), initially as Senior Scientist with the Global Oceans Team, and most recently as Director of Conservation and Director of Climate Adaptation. Prior to TNC, Vera was with the University of Washington and the University of Miami (Pew Institute for Ocean Science); her research focused on Fisheries Resource Assessment, Ecosystem Approach to Fisheries, and Climate forcing of fish populations.

Earlier in her career, she worked from 1996-1999 in FAO as a Visiting Scientist/Consultant, mainly focusing on work in the Mediterranean Sea, as well as time at sea teaching oceanography. Vera has a B.Sc. in Zoology from Ohio University (USA), a Masters of Environmental Sciences from the State University of New York (USA), and a Ph.D. in Fisheries from the University of Washington in Seattle (USA).

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Collection of eggs from the mouth-brooding Nile tilapia (*Oreochromis niloticus*)



Matthias Halwart

Aquaculture Branch Head (ad interim)

Following the retirement of previous Acting Aquaculture Branch Head Malcolm Beveridge, Matthias was appointed in December 2017 *ad interim* Branch Head of the Aquaculture Team to coordinate the Aquaculture Branch's work programme.

For the previous two years, Matthias was seconded to FAO's Sustainable Agriculture, Forestry and Fisheries Programme where he was responsible for the coordination of cross-cutting activities with decentralized offices, in particular Asia and Africa, and several divisions in FAO. During his term with the Strategic Programme, Matthias also served as Delivery Manager of FAO's Major Area of Work on Efficient Resource Use.

During his professional career, Matthias has covered a broad range of fisheries and aquaculture related subjects mainly in the fields of aquatic biodiversity and integrated agriculture-aquaculture where he also obtained his Ph.D. Matthias joined the FAO's Fisheries Department in 1995 as Associate Professional Officer (Farming Systems), and has taken on increasing duties and responsibilities within the Organization starting as Aquaculture Officer in 1999 and later on as Senior Aquaculture Officer as of 2010.

He strongly contributed to two landmark conferences on *Aquaculture in the Third Millennium* in 2000 and *Farming the Waters for People and Food* in 2010, and he led the preparation of global studies such as on cage culture ten years ago and on the first ever *State of the World on Aquatic Genetic Resources for Food and Agriculture*, to be published later this year. For his dedication and commitment to non-formal education, such as in the Farmer Field Schools approach, and South-South cooperation as important instruments to promote aquaculture development, in 2015 Matthias has been awarded the Gold Medal of the Asian Fisheries Society.

Current responsibilities include serving as Technical Secretary of the Committee on Fisheries (COFI) Sub-Committee on Aquaculture, Secretary of the Intergovernmental Technical Working Group on Aquatic Genetic Resources of the Commission on Genetic Resources for Food and Agriculture (CGRFA), and Secretary of the COFI Advisory Working Group on Aquatic Genetic Resources and Technologies.

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Xinhua Yuan

Senior Aquaculture Officer (Aquaculture specialist)

A national of China, Dr Yuan holds a B.Sc. and M.Sc. in Aquaculture from the Huazhong Agricultural University of China, a Ph.D. in Agro-Economics and Management with Aquaculture Development policy and International Trade from the Nanjing Agricultural University, China. He has over 20 years of professional experience in Best Aquaculture Practices Development and Extension, especially within the South-South Cooperation developing countries.

He provided leadership and coordinated the aquaculture development and capacity-building programme in assisting FAO Member Countries to develop sound policies, GAP, intensification and sustainable aquaculture models through promoting aquaculture production and value chain, empowering the farmers and farmer's organization, as well as Public Private Partnership models.

Prior to FAO, he held the position of Deputy Director-General of the Freshwater Fisheries Research Center of the Chinese Academy of Fishery Sciences, also known as the FAO reference center for aquaculture and inland fishery research and training. He also acted as the Deputy Dean of Wuxi Fisheries College of Nanjing Agricultural University. He was a member of the Technical Advisory Committee of the Network of Aquaculture Centers in Asia-Pacific (NACA).

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Xinhua.Yuan@fao.org



Juvenile of sturgeon (*Acipenser baerii*)

1 www.fao.org/fishery/docs/news/2015/AsianFisheriesSocietyGoldMedal.gif



Rodrigo Roubach

*Senior Aquaculture Officer
(Aquatic animal nutrition)*

A national of Brazil, Dr Roubach is a fisheries biologist specialized in aquaculture who has worked on animal aquaculture feed issues and general sector development. He holds a B.Sc. in general biology, a M.Sc. in freshwater fisheries and fish nutrition from the National Institute of Amazonian Research (INPA)/Federal University of Amazonas (UFAM, Brazil). He also has a specialization in fish feed technology and nutrition from the University of Washington (USA), a specialization in public administration from the National School of Public Administration (ENAP, Brazil) and a

Ph.D. in fish nutrition and aquaculture from Auburn University (USA). Rodrigo provided training to students in his quality of feed and nutrition adviser at INPA/UFAM, University of Brasilia and other universities in Brazil.

He acted as General Coordinator for aquaculture during the former Brazilian Ministry of Fisheries and Aquaculture where he developed national policies for the sector and promoted aquaculture in the Brazilian federal waters through the ecosystem approach to aquaculture. Prior to joining FAO, he worked as Senior Researcher at the Ministry of Science, Technology, Innovation and Communication where he acted as adviser to the Brazilian Ministry on international policies in the area of aquaculture and fisheries.

He also covered the following roles: Head of the Aquaculture Department at the National Institute of Amazonian Research (INPA). Served as treasurer and president of the Latin American and Caribbean Chapter of the World Aquaculture Society (LACC/WAS). He was also a member of the Brazilian Technical National Biosafety Committee (CTNBio), a member of Brazil's National Commission on Biotechnology and of Brazil's National Water Resources Council (CNRH).

Rodrigo can be reached at:
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Graham Mair

*Senior Aquaculture Officer
(Environment, climate change,
and genetics)*

Graham is an internationally recognised science leader in the seafood industry and joins the Aquaculture Branch from Flinders University in South Australia. Graham spent the early part of his professional career working in aquaculture development leading a range of R&D projects focused on the application of genetics in the development of improved strains for aquaculture.

He spent nine years in the Philippines working mostly on the development of sustainable methods for sex control in tilapia. He followed this with another six years at the Asian Institute of Technology in Thailand working on aquaculture genetics projects, focused on carps and tilapias, in India, Bangladesh, Viet Nam and South Africa.

Graham moved to South Australia in 2004 to take up an aquaculture faculty position at Flinders University but quickly found himself seconded to the newly created Australian Seafood

Cooperative Research Centre (2007-2015) as Program Manager for Seafood Production Innovation, working across all major commercial aquaculture and wild catch fishery industry sectors in Australia. Graham is most comfortable when operating at the interface between the end user and the research provider and focuses on the delivery of tangible outputs and real developmental and commercial outcomes.

He obtained his doctoral degree from the University of Wales and more recently an MBA from the University of South Australia. Graham has been very active with the World Aquaculture Society and has served on its Board and as its President.

Graham can be reached at:
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Chiara Sirani

Intern, Aquaculture Branch

Chiara, an Italian National, has recently joined the Aquaculture Branch of the Fisheries and Aquaculture Department in Rome for a 6-month internship.

Chiara holds a BSc in International Economics and Management from Bocconi University, Milan. She



Delphine Bureau

*Office Assistant, Aquaculture
Branch*

Delphine is a French national who has joined the Aquaculture Branch of the FAO Fisheries and Aquaculture Department in October 2017 as Office Assistant. She is currently covering the Front-Office of the Branch.

She started in 1998, at the French Permanent Representation to FAO. She entered the UN Rome-based agencies in 2005, at the International Fund for Agricultural Development (IFAD), working as assistant at the Office of Evaluation and at the South and Eastern Africa Division. From 2011, at the World Food Programme (WFP), she has worked in the Government Partnerships Division (until 2013), and has been the assistant of the Director for Partnerships and Advocacy Coordination Division between 2014-2016.

In 2013, she served as administrative assistant in the office of Prof. Romano Prodi during his mandate as United Nations Secretary General's Special Envoy for the Sahel, in Rome. Delphine has studied Languages and International Commerce in France.

Delphine can be reached at:
Delphine.bureau@fao.org



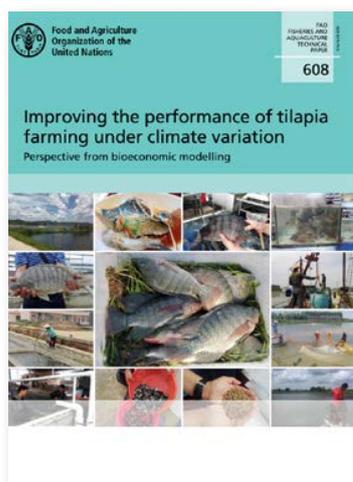
is interested in natural resource management and climate change economics, and during her studies has analyzed climate change impacts in a variety of sectors, concentrating on the implications to freshwater scarcity and food security in Sub-Saharan Africa. Chiara would like to improve her knowledge on the increasing role of aquaculture in global fish production, and on the implications of alterations of aquatic ecosystems for aquatic biodiversity. During her term at FAO, Chiara will contribute to the finalization of the first Global Report of *The State of the World's Aquatic Genetic Resources for Food and Agriculture* and to ongoing work of the Branch in relation to the impacts of greenhouse gas emissions to aquaculture and aquatic genetic resources.

Chiara can be reached at:
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NEW PUBLICATIONS

NEW PUBLICATIONS • NEW PUBLICATIONS • NEW PUBLICATIONS • NEW PUBLICATIONS • NEW PUBLICATIONS

TECHNICAL PAPERS



FAO. 2018

Improving the performance of tilapia farming under climate variation: perspective from bioeconomic modelling.

Cai, J.N., Leung, P.S., Luo, Y.J., Yuan, X.H. & Yuan, Y.M. 2018. FAO Fisheries and Aquaculture Technical Paper No. 608. Rome, FAO.

Tilapia is the world's most popular aquaculture species, farmed mostly in earthen ponds. Experience in China, the largest tilapia farming country, is used to develop and calibrate a bioeconomic model of intensive tilapia pond culture. The model is used to simulate the impacts of climate, technical and/or economic factors on farming performance and examines the performance of various farming arrangements under different conditions.

The simulation results indicate that: (i) an increase in feed price, an increase in mortality, or a decrease in fish price significantly reduces profitability, whereas an increase in the cost of seed, labour, rent, electricity or water management has smaller impacts on profitability; (ii) considering the impact of water temperature on fish growth, the profitability of a production cycle starting at the optimum timing may be twice as high as one starting at the worst possible time; (iii) farming arrangements that maximize the profit of individual fish crops may not maximize overall profitability because of path dependency of farming performance; (iv) optimal farming arrangements that maximize overall profitability can significantly improve economic performance; (v) given no price discrepancy against small-size fish, harvesting at about 300 g in two-year-five-crop arrangements could increase overall enterprise profitability by up to 50 percent compared with harvesting at > 500 g in one-year-two-crop arrangements; and (vi) a two-tier farming system that separates nursing and outgrowing ponds could allow one-year-three-crop arrangements that enhance profitability by up to nearly 90 percent compared with the one-year-two-crop arrangements. With more refined information on fish growth under different farming conditions, the model could become a decision-making tool to help farmers design optimal farming arrangements.

The PDF version of this publication can be downloaded at the following web link:

www.fao.org/3/i8442en/I8442EN.pdf

For further information, please contact: Junning.Cai@fao.org



FAO. 2017
Report of the sixteenth session of the Sub-Committee on Fish Trade of the Committee on Fisheries. Busan, Republic of Korea, 4–8 September 2017
 Fisheries and Aquaculture Report No. 1216. Rome, Italy (trilingual).

The Committee on Fisheries established the Sub-Committee on Fish Trade to serve as a multilateral framework for consultations on international trade in fishery products. The sixteenth session of the Sub-Committee was held in Busan, Republic of Korea, from 4 to 8 September 2017. The Sub-Committee took note of recent developments concerning international trade in fishery products. It also considered specific issues related to international trade and sustainable fisheries development, including:

- (i) reduction of fish food loss and waste; (ii) Voluntary Guidelines for Catch Documentation Schemes (CDS); (iii) update on activities related to food quality, safety and market access; (iv) fish trade and the Convention on international trade in endangered species of wild fauna and flora (CITES); and (v) monitoring the implementation of article 11 of the Code of Conduct for Responsible Fisheries (CCRF). The Sub-Committee for the first time also addressed the following topics: (i) social sustainability in fisheries value chains and the link to trade; (ii) the impact of Marine Protected Areas (MPAs) on livelihoods, trade, food fish supply and consumption; and (iii) the impact of climate change on future fish supply, trade and consumption.

The PDF version of this publication can be downloaded at the following web link:

www.fao.org/3/i8157t/i8157T.pdf

*For further information, please contact: **Audun.Lem@fao.org***



FAO. 2017
Report of the Ninth Session of the Regional Commission for Fisheries (RECOFI), Kuwait, State of Kuwait, 9-11 May 2017
 FAO Fisheries and Aquaculture Report No. 1208. Rome, Italy.
 (Bilingual English/Arabic)

This document contains the report of the Ninth session of the Regional Commission for Fisheries (RECOFI) held in Kuwait, State of Kuwait, from 9-11 May 2017. The session was attended by 20 delegates from five members of the Commission, namely State of Iraq, State of Kuwait, Sultanate of Oman, State of Qatar and Kingdom of Saudi Arabia, and six invited organizations. RECOFI acknowledged the convenience of the MoU with Regional Organization for Protection of the Marine Environment (ROPME) and expressed its willingness to receive the legally cleared MoU for its consideration. It was agreed that the enforcement process of the MoU following this Session will be led by the Commission Chairperson in close collaboration with the Secretariat.

The Commission reviewed the major activities carried out during the intersessional period. The Commission agreed on the inclusion of the main decisions and recommendations of FAO Committee on Fisheries (COFI) and Regional Conference for the Near East (NERC) to the regular meetings of its working groups. The Commission endorsed the WGFN proposal to add two mullet species to the priority list, namely Klunzinger's mullet (*Liza klunzingeri*) and Greenback mullet (*Liza subviridis*). It was agreed that the catch and effort data submitted by Members will be harmonized and integrated in an Excel format.

The Commission agreed to proceed with the standard FAO aquaculture data questionnaires (AQNS1 and FishStat-AQ forms) for use at national and regional levels. It was decided to hold the regular meetings of its subsidiary bodies every two years starting from 2017. The Commission enforced a two-year programme of work for 2017-18 intersessional period.

The PDF version of this publication can be downloaded at the following web link:

www.fao.org/3/a-i7803b.pdf

*For further information, please contact: **Haydar.Fersoy@fao.org***



FAO. 2018

Report on the 17th session of the Committee for Inland Fisheries and Aquaculture of Africa. Banjul, Gambia, 9–11 May 2017

FAO Fisheries and Aquaculture Report No. R1223.

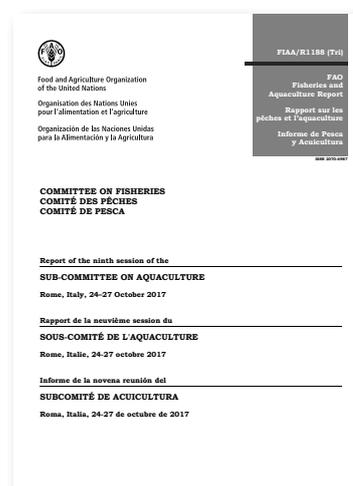
(Bilingual English/French)

This document is the report of the 17th session of the Committee for Inland Fisheries and Aquaculture of Africa (CIFAA), which was held in Banjul, the Gambia, from 9 to 11 May 2017. A total of 28 delegates from 10 member countries and 3 observers attended the 17th ordinary session. The session covered the following main topics: follow up of intersessional activities and way forward; outcomes of the sixth annual meeting of the Aquaculture Network for Africa (ANAF) and the Status of Inland fisheries; and proposals for the main topics to be presented at the eighteenth ordinary session of the CIFAA.

The PDF version of this publication can be downloaded at the following web link:

www.fao.org/3/I8573EN/i8573en.pdf

For further information, please contact: Ndiaga.Gueye@fao.org



FAO. 2018

Report of the ninth session of the Sub-Committee on Aquaculture of the FAO Committee on Fisheries. Rome, Italy, 24–27 October 2017

FAO Fisheries and Aquaculture Report No. 1188. Rome, Italy (trilingual)

The ninth session of the Sub-Committee on Aquaculture (SCA) of the FAO Committee on Fisheries (COFI) was held in Rome, Italy from 24 to 27 October 2017. The Sub-Committee underlined the important contribution of aquaculture to food security and nutrition as well as the importance of market access and post-harvest issues, and emphasized the need to support small-scale producers. The Sub-Committee recognized the growing global significance of sustainable aquaculture development and its potential contributions to both global food security and nutrition, as well as to the achievement of a wide range of SDG targets, while recognizing that there is a growing need for implementation of best practices in aquaculture in many countries and regions.

The Sub-Committee recommended that FAO should develop global guidelines for sustainable aquaculture development. The Sub-Committee welcomed the forthcoming report on the State of the World's Aquatic Genetic Resources for Food and Agriculture. The Sub-Committee recognized the importance of extension for sustainable aquaculture development, and requested that FAO provide guidance and facilitate experience-sharing among Members.

The Sub-Committee highlighted the importance of regional coordination within and among Small Island Developing States (SIDS) and recommended that FAO continue its work in aquaculture development in SIDS and provide support through capacity development and technical assistance. With regard to FAO Technical Guidelines on Aquaculture Certification, the Sub-Committee welcomed the work of FAO, noting the increasing role of certification in national and international markets, and highlighting the need to strengthen the capacity of small-scale producers to attain certification and eventually improve market access.

The PDF version of this publication can be downloaded at the following web link:

www.fao.org/3/i8886t/i8886t.pdf

For further information, please contact: Matthias.Halwart@fao.org



FAO. 2018

The FAO Blue Growth Initiative: Strategy for the Development of Fisheries and Aquaculture in Eastern Africa

By Ana Menezes, Devin Bartley, Rebecca Metzner and Yaw Ansah.

FAO Fisheries and Aquaculture Circular No. 1161, Rome, Italy.

As part of FAO's Blue Growth Initiative (BGI) the FAO Member Countries of the Eastern Africa Sub-Region agreed on a strategy for the Development of Fisheries and Aquaculture within the Blue Growth Initiative in Eastern Africa (BGI Strategy). The Strategy includes 11 over-arching development objectives that are common to fisheries and aquaculture in marine and freshwater environments. The Strategy contains specific objectives and actions to achieve them for inland fisheries, marine fisheries and aquaculture.

The actions were chosen to also address the four streams of the BGI: (i) capture fisheries; (ii) aquaculture; (iii) ecosystem services contributing to livelihoods; and (iv) trade, markets, postharvest and social support. The actions further embrace the principles of the Green Economy and will lead to Blue Production, Blue Communities and Blue Fora.

Implementing a BG Strategy in Eastern Africa will require partnerships, collaboration with a variety of organizations. No one group has the full suite of needed knowledge and expertise in fisheries, aquaculture, trade, community development and maintenance of biodiversity and ecosystem services to implement the BG Strategy alone. Partners will include fisherfolk, national development agencies, governing bodies, regional economic commissions, regional fishery bodies, regional trade portals, intergovernmental organizations, nongovernmental organizations and international development banks. Sub-regional coordination and communication in awareness raising, project development, outreach, extension, and engaging the private sector will be essential for the implementation of the BG Strategy. Policy and decision makers are encouraged to establish mechanisms to adapt the Blue Growth Strategy to the national priorities and opportunities.

The PDF version of this publication can be downloaded at the following web link:

www.fao.org/3/I8512EN/i8512en.pdf

For further information, please contact: Ana.Menezes@fao.org



FAO. 2018

Women's participation and leadership in fisherfolk organizations and collective action in fisheries: a review of evidence on enablers, drivers and barriers

By Alonso-Población, E. and Siar, Susana V. 2018. FAO Fisheries and Aquaculture Circular No. 1159. Rome, FAO.

The increased recognition of the multiplicity of roles played by women in, and their crucial the fisheries sector exists in stark contrast with the low presence of women in fisherfolk organizations around the globe, and the lack of access to decision-making positions in many formal fisheries-related organizations. This paper summarizes analyses of a global literature review on women in fisherfolk organizations. The aim of the study was to identify positive examples and lessons learned by pointing to the drivers – as well as the enablers and entities identified in the literature – that have a key role in fostering increased women's participation and leadership in collective action in fisheries.

State institutions, social movements and civil society organizations, development and conservation projects, religious movements, academia, endogenous mobilization, charismatic individuals and coincidences have been identified as the key enablers of women's participation in collective action. Dwindling resources and the need to secure management roles, modernization, the allocation of fishing rights, economic changes, family welfare and women's rights, are the main drivers identified by the authors as catalysers of women's engagement in collective action. Finally, the paper identifies some of the barriers faced by women to gain equal access to organizations and decision-making. Although more research on the topic is required, there seems to be consensus on the positive effects for women arising from their engagement in modes of collective action.

The PDF version of this publication can be downloaded at the following web link:

www.fao.org/3/i8480en/i8480en.pdf

For further information, please contact: Susana.Siar@fao.org



New pen drive containing FAO aquaculture publications produced during the period 1999 to 2017

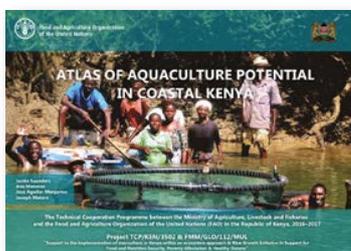
More than 1200 publications related to aquaculture, including technical papers, circulars, FAO reports, CD-ROMs, web-based products and newsletters, in both hard and electronic versions and in various FAO official languages have been published and distributed worldwide during 1999-2017 period, in both hard and electronic versions.

Publications have been assembled on this pen drive as Portable Document Format (PDF) files, in order to make them easily available, searchable and printable to all users especially those with limited access to the Internet. The application is readable in *Windows*, *Linux* and *Mac* environments. Users can easily search publications through the publication list or through a free text-based search engine which performs search on titles, abstracts, authors, keywords and year of publication.

The majority of FAO aquaculture publications are accessible at the following web link:

www.fao.org/fishery/aquaculture/information-products/en

For further information, please contact: Valerio.Crespi@fao.org



Atlas of Aquaculture Potential in Coastal Kenya FAO Project "Support to the implementation of mariculture in Kenya within an ecosystem approach & Blue Growth Initiative in Support for Food and Nutrition Security, Poverty Alleviation & Healthy Oceans" Saunders, J., Menezes, A., Aguilar-Manjarrez, J. & Matere, J. 2017. FAO and Kenyan Ministry of Agriculture, Livestock and Fisheries. Rome, Italy.

This aquaculture atlas for Kenya is the outcome of the application of spatial planning tools to support the development of environmentally sustainable and socio-economically responsible mariculture. The atlas provides invaluable information to help guide the Government of Kenya and others in formulating a systematic plan for the expansion of aquaculture by allocating zones for certain culture systems and species, and to facilitate decision-making for investors when selecting locations for their farms. Long-term sustainability of mariculture requires good spatial planning and management, starting with the appropriate zoning and selection of sites, followed by the adoption of good area management practices. The atlas can also help in the creation of integrated coastal zone development plans, and help anticipate and address the impact of sea level rise on the intertidal and supratidal locations required for marine aquaculture..

The majority of FAO aquaculture publications are accessible at the following web link:

www.fao.org/3/a-i8311e.pdf

For further information, please contact: Ana.Menezes@fao.org



The ecosystem approach to aquaculture 10 years on – a critical review and consideration of its future role in blue growth Brugère, C., Aguilar-Manjarrez, J., Beveridge, M. C. M. and Soto, D. (2018). Rev Aquacult. doi:10.1111/raq.12242

Over a decade ago, the ecosystem approach to aquaculture (EAA) emerged from discussions between the Food and Agriculture Organization (FAO) of the United Nations and international aquaculture experts on how to move aquaculture development towards greater sustainability. The purpose of this review is to critically examine the use and mainstreaming of the EAA in aquaculture development to date and consider its possible evolution in the next decade.

The PDF version of this publication can be downloaded at the following web link:

<http://onlinelibrary.wiley.com/doi/10.1111/raq.12242/full>

For further information, please contact: Jose.AguilarManjarrez@fao.org

CALENDAR OF EVENTS



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MARCH
2018

Regional Workshop on Building National Capacity for Cultured Animal Disease Diagnostic in Relation to Bio-Security

Cairo, Egypt, 6-8 March 2018

Information: Haydar.Fersoy@fao.org

Regional meeting to operationalize the strategy for the sustainable development of Mediterranean and Black Sea aquaculture and Technical meeting on an Aquaculture Demonstrative Centre in the Black Sea

Trabzon, Turkey, 13-15 March 2018 – www.fao.org/gfcm

Information: Fabio.massa@fao.org

APRIL
2018

Eight Meeting of RECOFI Working Group on Aquaculture (WGA)

Kuwait, State of Kuwait, 17-19 April 2018

Information: Haydar.Fersoy@fao.org

MAY
2018

The Seventh Regional Consultative Forum Meeting of Asia-Pacific Fishery Commission (APFIC)

Bohor, Philippines, 7-9 May 2018

Information: Weimin.Miao@fao.org

Thirty-fifth Session of Asia-Pacific Fishery Commission (APFIC)

Bohor, Philippines, 11-13 May 2018

Information: Weimin.Miao@fao.org

JUNE
2018

High-level Conference on Black Sea fisheries and aquaculture

Sofia, Bulgaria, 8-9 June 2018 – www.fao.org/gfcm

Information: GFCM-Secretariat@fao.org

JULY
2018

Thirty-second Session of the Committee on Fisheries (COFI)

FAO Headquarters, Rome, Italy, 11-15 July 2018 – www.fao.org/about/meetings/cofi

Information: Hiroto.Watanabe@fao.org

NON FAO EVENTS

MARCH
2018**Seafood Expo North America***"Fighting IUU fishing and seafood fraud: enhancing traceability and transparency through strengthened governance frameworks"**Boston, United States of America, 11-13 March 2018**Information: Marcio.CastroDeSouza@fao.org*APRIL
2018**Seafood Expo Global / Seafood Processing Global***Brussels, Belgium, 24-26 April 2018**Information: Globefish@fao.org*MAY
2018**The Eighth Offshore Mariculture Conference Asia***Held in association with the U.S. Soybean Export Council. Singapore, 15-17 May 2018 –**www.offshoremарiculture.com/asia**Information: Conferences@offshoremарiculture.com*AUGUST
2018**AQUA 2018 - The Joint EAS-WAS Conference***Montpellier, France, 25-29 August 2018 –**www.was.org/meetings/default.aspx?code=Aqua18**Information: Lionel.Dabbadie@cirad.fr*

Harvesting sabaki tilapia (*Oreochromis spilurus*) in an experimental tank where biofloc culture is tested. Jeddah Fisheries Research Center, Saudi Arabia

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The FAO Committee on Fisheries (COFI), presently constitutes *the only global inter-governmental forum where major international fisheries and aquaculture problems and issues are examined* and recommendations addressed to governments, regional fishery bodies, NGOs, fishery and aquaculture workers, FAO and international community, periodically on a world-wide basis. COFI has also been used as a forum in which global agreements and non-binding instruments were negotiated.

The two main functions of COFI are to review the programmes of work of FAO in the field of fisheries and aquaculture and their implementation, and to conduct periodic general reviews of fishery and aquaculture problems of an international character and appraise such problems and their possible solutions with a view to concerted action by nations, by FAO, inter-governmental bodies and the civil society. COFI membership is open to any FAO Member and non-Member eligible to be an observer of the Organization. Representatives of the United Nations (UN), UN bodies and specialized agencies, regional fishery bodies, international and international non-governmental organizations participate in the debate, but without the right to vote.

The Committee has held 32 sessions. The First Session in 1966, and thereafter annually till 1975. Since 1977 the sessions have been held biennially.

The Thirty-third Session runs from 9-13 July 2018 and will take place at FAO, Rome.

Delegations from FAO Member States, UN Specialized Agencies and Related Organizations, and Intergovernmental organizations/Non-governmental organizations, have been invited to attend this session of COFI.

The week dedicated to COFI envisions a full agenda of discussions and decisions on various topics of interest, including:

- State of world fisheries and aquaculture¹.
- Progress in the implementation of the Code of Conduct for Responsible Fisheries (the Code) and related instruments.
- Decisions and recommendations of the Sixteenth Session of the *COFI Sub-Committee on Fish Trade*, Busan, the Republic of Korea, 4-8 September 2017.
- Decisions and recommendations of the Ninth Session of the *COFI Sub-Committee on Aquaculture*, Rome, 24-27 October 2017.

¹ The State of World Fisheries and Aquaculture (SOFIA) 2018 will be presented as a scene-setting information.



From left to right: José Graziano da Silva, FAO Director-General; Johán H. Williams, former COFI Chairman; Arni Mathiesen, Assistant Director-General, FAO Fisheries and Aquaculture Department

- Fisheries and ocean governance that includes (i) Combating illegal, unreported and unregulated (IUU) fishing; (ii) Small scale and artisanal fisheries governance; and (iii) Global and regional ocean process.
- Agenda 2030 for Sustainable Development.
- Climate change and environmental matters.
- FAO's Programme of Work in fisheries and aquaculture.
- Multi-year programme of work (MYPow) of the Committee.

If you're not with us in Rome for COFI 33 this year, follow our wrap-ups in our Blue Growth blog posts (www.fao.org/blogs/blue-growth-blog), or follow our live tweeting from @FAOfish or through the hashtag #COFI33.

For further information, please contact COFI Secretariat: FAO-COFI@fao.org



FAO Atrium during the 32nd COFI Session 2016



SEE ALSO

COFI website: www.fao.org/about/meetings/cofi

COFI Sub-Committee on Fish Trade website:

www.fao.org/about/meetings/cofi-sub-committee-on-fish-trade

COFI Sub-Committee on Aquaculture website:

www.fao.org/cofi/aq

National Aquaculture Sector Overview Collection

The Fisheries and Aquaculture Department following recommendations from its Member countries at the Second Session of the COFI Sub-Committee on Aquaculture, held in Trondheim, Norway in 2003, started the preparation of the National Aquaculture Sector Overview (NASO). NASO collection consists of

concise and comprehensive products, providing a general overview of the aquaculture and culture based fisheries aspects at the national level. Since this activity started, NASOs for more than 100 FAO Member countries around the globe have been prepared and updated/revised over the years, following a standard template. The

NASOs contain detailed information on the history of aquaculture; human resources involved in the sector; farming systems distribution and characteristics; main cultured species contributing to national production; production statistics; governing regulations; applied research education and training, etc.

Search page of NASO collection*

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National Aquaculture Sector Overview

Japan

Replaces: Arabic version (2006), Spanish version (2006), French version (2006), Chinese version (2006)

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Characteristics, structure and resources of the sector

Summary

Commercial aquaculture production in Japan has developed dramatically since the end of the 2nd World War and today occupies an important place in the fisheries sector. Total aquaculture production in 2015 was estimated at 1 103 235 tonnes, worth US\$ 4 376 million (FAO 2015), which corresponds to 24 percent of total national fisheries production and 36 percent of the total value produced in Japan (MAFF 2015). Marine aquaculture accounts for 97 percent of total aquaculture production and 78 percent of the total value produced (MAFF 2015).

More than 60 species are included in the aquaculture section of the annual fisheries statistics. Of these, the main species are Noni (27 percent of total aquaculture production, and 15 percent of the value produced), yesso scallop (23 and 11 percent), oyster (15 and 7 percent), Japanese amberjack (value produced), red sea bream (8 and 8 percent), and sea mussel (5 and 1 percent) (MAFF 2015).

Aquaculture has contributed to bringing previously high-priced species within reach of the average consumer and has helped to create a more varied dietary culture. It has also contributed to the economy of remote areas by providing local employment. However, in recent years, overcrowded fish farms and excessive feeding have led to environmental deterioration of coastal areas, thought to be a major cause of eutrophication, red tides and fish diseases. To better manage these issues, additional technological development and institutional efforts are underway.

History and general overview

It is thought that around 100 B.C., irrigation ponds and ditches were used for raising freshwater fish in Japan. An ancient document records that fish were stocked and raised for palatine cuisine in palace ponds at the end of the 8th century. The first shellfish aquaculture recorded was seabed-sown cultivation of oysters in the Seto Inland Sea in the middle of the 16th century. Japanese amberjack cultivation of red sea bream began at the start of the 17th century. Noni (loose) cultivation with a supporting system was started by fishermen living in Edo (Tokyo) at the end of the 17th century. In the middle of the 19th century, semi-intensive carp culture in rice paddy fields started, as well as eel farming in ponds.

The first intensive aquaculture of marine fish, Japanese amberjack, mackerel and seabream, was carried out in enclosures in 1930. Cage culture was then developed in the 1950s, leading to major gains in productivity. Until the mid-1960s, Japanese amberjack was the most commonly cultured marine fish, but red sea bream increased its share, and today several dozen species are currently cultured all over Japan. Commercial aquaculture of oysters was first developed using a support system, which was superseded by its resistance to high waves, predominant, mainly in the northern region of Japan. This technique was also utilized for the cultivation of larger seaweeds such as Japanese kelp (kombu). Pearl culture first succeeded in 1893. After 1910, the production of full-orbed pearls was made possible due to technical developments which have since been adopted by pearl farms worldwide (Onizawa 1994).

According to the Ministry of Agriculture, Forestry and Fisheries (MAFF), total aquaculture production in 2015 was estimated at 1 103 235 tonnes, worth US\$ 4 376 million, corresponding to 24 percent of total national fish production and 36 percent of the total value of fish production. More than 60 species are included in the aquaculture section of annual fisheries statistics. 97 percent of total aquaculture production, as well as 78 percent of the total value produced by aquaculture, is marine aquaculture (Statistics Department, MAFF 2015).

Human resources

In 2013, there were 14 944 enterprises engaged in marine aquaculture, employing 43 495 workers in the high season, of whom more than 5 093 were women. Some 3 129 enterprises were engaged in freshwater aquaculture, employing 10 548 individuals, 3 028 of whom were women. Therefore, in freshwater aquaculture, the aquaculture sector in Japan supported 54 048 jobs in 2013. However, the number of enterprises and workers has been continuously declining in recent years (Statistics Department, MAFF 2013b).

Farming systems distribution and characteristics

Marine and freshwater aquaculture is conducted in all 47 Japanese prefectures.

FARMS BY ADMINISTRATIVE UNITS

View in a larger map | View in Google Earth | GIS

Map: Satellite

Map showing the distribution of farms by administrative units in Japan, with labels for North Korea, South Korea, and various Japanese prefectures.

Cultured species

We invite our readers to consult the current 107 online NASOs available at:
www.fao.org/fishery/naso/search

* Note that not all NASOs are updated.

FAN

FAO Aquaculture Newsletter

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