CATCH THE LATEST IN FISHERIES

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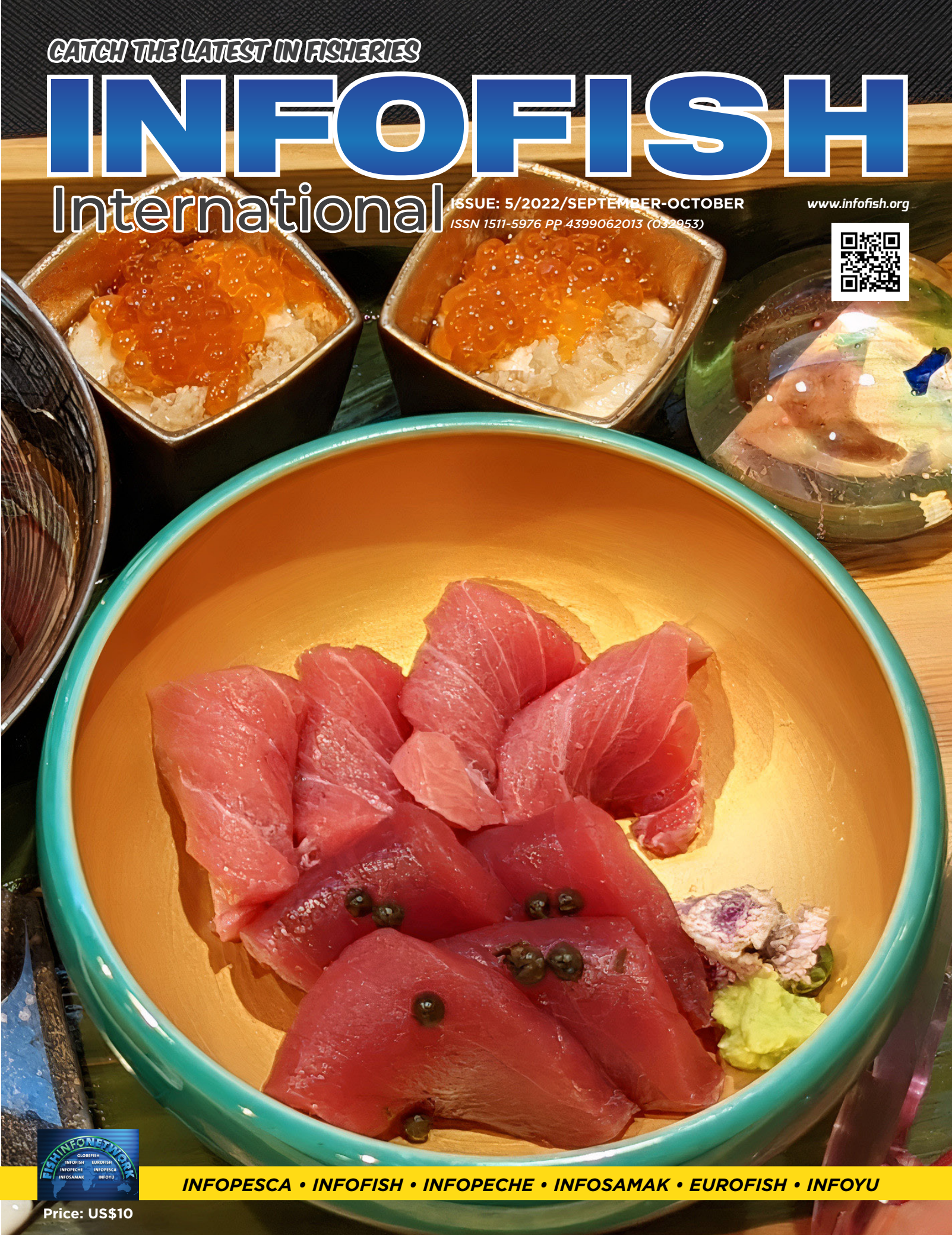

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AQUACULTURE//

By Ben Belton

The findings of telephone surveys conducted by WorldFish in six Asian and African countries show that COVID-19 induced micro- small- and medium-scale enterprises in aquaculture value chains to adopt a wide variety of coping strategies and exacerbated pre-existing inequalities. However, proactive adaptations allowed some businesses to seize emerging opportunities. Examples include the rapid uptake of digital technology, the restructuring of value chains by larger business, and the introduction of new institutional innovations. Recovery in many countries has been quite swift, underlining the resilience of aquatic food supply chains, but businesses now face a new array of emerging economic and climate challenges.

FISHING//

By Kanthana Sangsingkeo

Women's empowerment is a critical aspect of achieving gender equality, which is one of the fundamental guiding principles in internationally adopted blueprints such as the 2030 Agenda for Sustainable Development. In this interesting case study in Pathum Thani province, Thailand, a Community Enterprise (working together with a business consultancy) has shown significant growth since its establishment a few years ago. In addition to selling fresh whole catfish, members of the Enterprise have developed processed products which are well-received in the market, particularly the "crispy fish chips" snack. More products are under development for sale later this year. The core team of women have won awards and are widely recognized as "Smart Farmers" whose role now includes conducting training for others.

MARKETING//

By Steven Adolf

Those involved in the global tuna fisheries and trade will have noticed that something is shifting in the sustainable management policies of our tuna resources. Increasingly, the mid- and end-market segment of the supply chain – major brands, wholesalers, traders, and retailers – are expressing their growing dissatisfaction with the implementation of the policies to guarantee a sustainable sourcing of tuna. The explicit way they express this is not only new, it also might well add to a change in basic assumptions in the institutions where decision-making on global tuna management has traditionally been dominated by the interests of the industrial fishery fleets.

By Amod Ashok Salgaonkar

Alternative seafoods have begun to make a presence in Asian markets but not much is known about their current market share, the increasing involvement of big businesses and governments, and the long-term prospects for growth in the region. Based on his exhaustive research, the author presents reasons why Asia, already leading the world in traditional seafood trade, is expected to gain global dominance in the alternative seafood segment. Highlighting the production initiatives and multi-million dollar investments that are already taking place in several Asian countries such as Singapore, Japan, Thailand and Hong Kong, he opines that continued innovations as well as price parity with traditional seafoods, will be the main drivers in this process.

By European Market Observatory for Fisheries and Aquaculture Products

In this study of the impact of COVID-19 on the global caviar industry, there were lower exports and imports overall during 2020 but by the first quarter of 2021, sales were estimated to have exceeded pre-pandemic levels. The pandemic also gave a big boost to online marketing strategies such as in China where Kaluga Queen (the world's largest producer of caviar) launched a livestream campaign on the Chinese online shopping platform Taobao. Some major producers and retailers chose to create new packaging (e.g. value meals); others targetted special occasions such as Valentine's Day or created "Click and Collect" solutions as a new direct marketing channel to consumers.

INDUSTRY PROFILE//

Coordinator for CAFI-SSF Network - Global Network for capacity building to increase access of small-scale fisheries to financial services

EVENTS//

FISHBYTES//

OTHER SECTIONS//

Cover image : Sashimi-grade fresh tuna has been a part of Japanese cuisine for centuries
Credit : Nadeshiko Sushi, Japan

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EDITORIAL OFFICE:
INFOFISH
1st Floor, Wisma LKIM
Jalan Desaria
Pulau Meranti
47120 Puchong, Selangor DE
Malaysia
Tel: (603)80668112 (603)80603734 • 80603738
Fax: (603)80603697
E-mail: info@infofish.org
Website: www.infofish.org

REGIONAL OFFICES:
Latin America, Caribbean
INFOPESCA, Casilla de Correo 7086,
Julio Herrea y Obes 1296, 11200 Montevideo, Uruguay
Tel: (598) 2 9028701/29028702 • Fax: (598) 2 9030501
E-mail: infopesca@infopesca.org
Website: www.infopesca.org

Africa
INFOPECHE, BP 1747 Abidjan 01, Côte d'Ivoire,
Tél (225) 20 21 31 98/ 20 .21 .57.75
Fax (+225) 20 21 80.54
Email: infopeche@aviso.ci / infopech@gmail.com
Website: www.infopeche.ci

Arab Countries
INFOSAMAK, 71, Boulevard Rahal, El Meskini
Casablanca 20 000, Morocco.
Tel: (212)522540856 • Fax: (212)522540855.
E-mail: info@infosamak.org / infosamak@infosamak.org
Website: www.infosamak.org

Eastern Europe
Eurofish International Organization,
H.C. Andersens Boulevard 44-46,
1553 Copenhagen V , Denmark
Tel: (+45) 33377755 • Fax: (+45) 33377756
E-mail: info@eurofish.dk
Website: www.eurofish.dk

China
INFOYU, Room 901, No 18, Maizidian street,
Chaoyang District, Beijing 100125, China.
Tel (86) 01059195186 • fax: (86) 01059195186.
E-mail: infoyu@agri.gov.cn.
Website: www.infoyu.net.

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As we rapidly approach the 17th INFOFISH World Tuna Trade Conference and Exhibition, convening this year in the 'global tuna capital', Bangkok – now is an ideal time to reflect on both the challenges and opportunities of another eventful year for our industry.

Characterised by the ongoing impacts of COVID-19, alongside market disruption and inflationary pressures, the past 12 months have of course been a particularly difficult time for the sector. However, the response to these challenges from tuna producers and suppliers alike, has also defined 2021/22 as a period of resilience, innovation, and progress, which is taking our industry from strength to strength.

Despite the continued emergence of supply chain issues and risks, tuna players have adapted to meet them – adopting new technologies, forging effective collaborations, and launching creative initiatives to support the long-term, sustainable growth of the industry. This has all been made possible by seafood workers around the world, who I'd like to commend for their hard work and dedication throughout the pandemic, to drive operations forward within a constantly changing environment.

For all industries, including the global tuna sector, recovery in the wake of COVID-19 represents an opportunity to 'build back better', with sustainability at the core of our business approach. Recognising the important role that our industry plays in feeding the world while positively impacting both people and planet, we have seen a heightened momentum towards sustainable fishing practices – to protect the oceans around us and ensure seafood supplies for future generations.

Significant progress has been made in advancing tuna sustainability, with an increasing number of global fisheries achieving sustainable certification standards, and many Fishery Improvement Projects (FIPs) now maturing – cementing a crucial commitment to effectively manage fishing activity by maintaining productive and healthy fish stocks, minimising environmental impact and complying with all relevant laws and regulations. It is also encouraging to see the increased awareness of sustainable practices among consumers, who are using their purchasing power to bring about positive change across the industry and actively seeking out sustainable seafood options.

Notably, the issues of plastic pollution, discarded fishing gear and bycatch remain high on the agenda for the whole value chain – from fleets to consumers – with important work underway in packaging innovation to reduce waste and promote the ongoing transition towards a circular economy, and enhanced accountability to manage and retrieve anything placed onto the ocean surface.

The uptake of smart technologies such as satellite tracking and blockchain, is also enabling an industry-wide shift to greater transparency which is transforming the future of fishing. Catch-to-plate traceability tools are perhaps the most defining at present, reassuring consumers that their tuna has been sourced ethically and sustainably – with respect for marine ecosystems, as well as workers' rights.

I am confident that as one industry, united in our goal to safeguard the future of tuna and the livelihoods of people who depend on fishing, we will continue to advocate government and Regional Fisheries Management Organisation (RFMO) action, and drive change to manage tuna stocks effectively.

We will address all of these topics and more during the 17th INFOFISH World Tuna Trade Conference and Exhibition in October. The event will bring together the industry's boldest and brightest in Bangkok this year to explore 'Strengthening Resilience, Adaptability and Sustainable Growth in the Global Tuna Industry', discussing lessons learnt and practical approaches to navigating the challenges being faced today.

We hope you can join us in person at the prestigious Shangri-La Hotel, to exchange insights and ideas that will further the progress of our industry. We look forward to welcoming you.

Neil Bohannon
Group Director Seafood at Princes Limited

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Resúmenes de los principales artículos

Aquellos involucrados en la pesca y el comercio mundial de atún habrán notado que algo está cambiando en las políticas de gestión sostenible de los recursos atuneros. Cada vez más, el segmento de mercado intermedio y final de la cadena de suministro, es decir, las principales marcas, mayoristas, comerciantes y minoristas, expresan su creciente descontento con la implementación de las políticas para garantizar un abastecimiento sostenible del atún. La forma explícita en que expresan esto no solo es nueva, sino que también podría contribuir a un cambio en los supuestos básicos de las instituciones donde la toma de decisiones sobre la ordenación del atún ha estado tradicionalmente dominada por los intereses de las flotas pesqueras industriales.

El empoderamiento de las mujeres es un aspecto crítico para lograr la igualdad de género, que es uno de los principios rectores fundamentales en proyectos adoptados internacionalmente, como la Agenda 2030 para el Desarrollo Sostenible. En este interesante estudio de caso en la provincia de Pathum Thani, Tailandia, una empresa comunitaria (que trabaja junto con una empresa consultora) mostró un crecimiento significativo desde su establecimiento hace unos años. Además de vender bagre entero fresco, los miembros de la empresa han desarrollado productos procesados que son bien aceptados en el mercado, en particular los chips de pescado crujientes. Además, se están desarrollando más productos para vender a finales de este año. El equipo central de trabajo ha ganado premios y es ampliamente reconocido como "Smart Farmers" (acuicultoras inteligentes), cuyo papel ahora incluye realizar capacitaciones a terceros.

Los resultados de las encuestas telefónicas realizadas por WorldFish en seis países asiáticos y africanos muestran que el COVID-19 indujo a las micro, pequeñas y medianas empresas de las cadenas de valor de la acuicultura a adoptar una amplia variedad de estrategias de afrontamiento y exacerbó las desigualdades preexistentes. Sin embargo, las adaptaciones proactivas permitieron que algunas empresas aprovecharan las oportunidades emergentes. Los ejemplos incluyen la rápida adopción de la tecnología digital, la reestructuración de las cadenas de valor por parte de empresas más grandes y la introducción de innovaciones institucionales. La recuperación ha sido bastante rápida en muchos países, y demuestra la resiliencia de las cadenas de suministro de alimentos acuáticos, pero las empresas ahora enfrentan desafíos económicos y climáticos emergentes.

Los productos pesqueros alternativos han comenzado a tener presencia en los mercados asiáticos, pero no se sabe mucho sobre su cuota de mercado actual, la creciente participación de las grandes empresas y los gobiernos, y las perspectivas de crecimiento a largo plazo en la región. Sobre la base de su exhaustiva investigación, el autor presenta las razones por las que se espera que Asia, que ya es líder mundial en el comercio tradicional de productos pesqueros, tenga el dominio mundial en el segmento de productos alternativos. Destacando las iniciativas de producción y las inversiones multimillonarias que se están llevando a cabo en varios países asiáticos como Singapur, Japón, Tailandia y Hong Kong, el autor opina que las innovaciones continuas, así como la paridad de precios con los productos tradicionales, serán los principales impulsores en este proceso.

Según este estudio del impacto del COVID-19 en la industria mundial del caviar, hubo menores exportaciones e importaciones totales durante 2020, pero se estimó que para el primer trimestre de 2021 las ventas superaron los niveles previos a la pandemia. La pandemia también dio un gran impulso a las estrategias de marketing, como en China, donde Kaluga Queen (el mayor productor de caviar del mundo) lanzó una campaña de transmisión en vivo en la plataforma china de comercio electrónico Taobao. Algunos productores y minoristas importantes optaron por crear nuevos envases (por ejemplo, comidas económicas); otros se enfocaron en fechas especiales como el Día de San Valentín o crearon soluciones de "compra en línea y recogida en tienda" como un nuevo canal de marketing directo para los consumidores.

Rodrigo Misa

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Résumés des articles de fond

Les acteurs de la pêche et du commerce mondiaux du thon auront remarqué que quelque chose est en train de changer dans les politiques de gestion durable de nos ressources thonières. De plus en plus, les segments du marché intermédiaire et final de la chaîne d'approvisionnement, c'est-à-dire les grandes marques, les grossistes, les négociants et les détaillants, expriment leur mécontentement croissant face à la mise en œuvre des politiques visant à garantir un approvisionnement durable en thon. La façon explicite dont ils expriment cela n'est pas seulement nouvelle, elle pourrait aussi bien contribuer à un changement des hypothèses de base dans les institutions où la prise de décision sur la gestion mondiale du thon a traditionnellement été dominée par les intérêts des flottes de pêche industrielle.

L'autonomisation des femmes est un aspect essentiel de la réalisation de l'égalité des sexes, qui est l'un des principes directeurs fondamentaux des plans adoptés au niveau international tels que l'Agenda 2030 pour le Développement Durable. Dans cette étude pertinente de cas dans la province de Pathum Thani, en Thaïlande, une entreprise communautaire (travaillant en collaboration avec un cabinet de conseil aux entreprises) a connu une croissance significative depuis sa création il y a quelques années. En plus de vendre du poisson-chat entier frais, les membres de l'Entreprise ont développé des produits transformés qui sont bien accueillis sur le marché, en particulier le snack "chips de poisson croustillant". Plus de produits sont en cours de développement pour la prochaine vente de cette année. Le noyau de l'équipe, composée de femmes, a remporté des prix et est largement reconnu comme "fermière intelligente" dont le rôle comprend désormais la formation d'autres personnes.

Des enquêtes menées par WorldFish dans six pays d'Asie et d'Afrique montrent que la COVID-19 a incité les micro- petites et moyennes entreprises des chaînes de valeur de l'aquaculture à adopter une grande variété de stratégies d'adaptation et a exacerbé les inégalités préexistantes. Cependant, des adaptations proactives ont permis à certaines entreprises de saisir les opportunités émergentes. Les exemples incluent l'adoption rapide de la technologie numérique, la restructuration des chaînes de valeur par les grandes entreprises et l'introduction de nouvelles innovations institutionnelles. La reprise de la dynamique des activités dans de nombreux pays a été assez rapide, ce qui souligne la résilience des chaînes d'approvisionnement alimentaires aquatiques, mais les entreprises sont désormais confrontées à un nouvel éventail de défis émergents au plan économique et climatique.

Les fruits de mer alternatifs ont commencé à être présents sur les marchés asiatiques, mais on ne sait pas grand-chose de leur part de marché actuelle, de l'implication croissante des grandes entreprises et des gouvernements, et des perspectives de croissance à long terme dans la région. Sur la base de ses recherches exhaustives, l'auteur présente les raisons pour lesquelles l'Asie, déjà leader mondial du commerce traditionnel des fruits de mer, devrait acquérir une domination mondiale dans le segment des fruits de mer alternatifs. Soulignant les initiatives de production et les investissements de plusieurs millions de dollars déjà en cours dans plusieurs pays asiatiques tels que Singapour, le Japon, la Thaïlande et Hong Kong, il estime que la poursuite des innovations ainsi que la parité des prix avec les fruits de mer traditionnels seront les principaux moteurs de ce processus.

Dans cette étude de l'impact de la COVID-19 sur l'industrie mondiale du caviar, les exportations et les importations ont globalement diminué en 2020, mais au premier trimestre 2021, on estime que les ventes ont dépassé les niveaux d'avant la pandémie. Elle a également insufflé une dynamique aux stratégies de marketing en ligne comme en Chine où Kaluga Queen (le plus grand producteur mondial de caviar) a lancé une campagne de diffusion en direct sur la plateforme chinoise d'achat en ligne Taobao. Certains grands producteurs et détaillants ont choisi de créer de nouveaux emballages (par exemple, des repas de valeur) ; d'autres ciblaient des occasions spéciales telles que la Saint-Valentin ou créaient des solutions "Click and Collect" comme nouveau canal de marketing direct auprès des consommateurs.

DIGRÉ Arriko Calice

Pour plus amples informations et pour la traduction des articles contenus dans cette revue, veuillez vous addresses à INFOPÊCHE , BP 1747 Abidjan 01, Côte d'Ivoire
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文 章 摘 要

那些参与全球金枪鱼渔业和贸易的人会注意到，我们金枪鱼资源的可持续管理政策正在发生变化。越来越多的供应链中端市场部分，即主要品牌、批发商、贸易商和零售商，表达了他们对保证金枪鱼可持续采购政策执行的日益不满。他们明确表达的方式这不仅是新的，而且很可能会改变机构中的基本假设，在这些机构中，全球金枪鱼管理的决策传统上被工业化渔业船队的利益所主导。

妇女权力是实现性别平等的重要方面，性别平等是国际社会通过的2030年可持续发展议程等蓝图的基本指导原则之一。在泰国Pathum Thani省的这个有趣的案例研究中，一家社区企业（与一家商业咨询公司合作）自几年前成立以来，已经有了显著的增长。除了销售新鲜的整条鲶鱼外，企业成员还开发了在市场上广受欢迎的加工产品，特别是"脆皮炸鱼片"小吃。更多未开发的产品将在今年晚些时候出售。这个由女性组成的核心团队赢得了奖项，并被广泛认为是"聪明的农民"，她们现在的角色包括为其他人提供培训。

WorldFish在6个亚非国家进行的电话调查结果显示，新冠肺炎疫情导致水产养殖价值链中的中小微企业采取各种应对策略，加剧了原有的不平等。然而，积极主动的适应使一些企业抓住了新出现的机会。例子包括数字技术的快速应用，大型企业对价值链的重组，以及新体制创新的引入。许多国家的复苏相当迅速，凸显了水产食品供应链的韧性，但企业现在面临着一系列新出现的经济和气候挑战。

替代性海产品已经开始在亚洲市场上出现，但人们对它们目前的市场份额、大企业和政府越来越多的参与以及该地区的长期增长前景知之甚少。 基于他详尽的研究，作者提出了为什么亚洲，在传统海产品贸易方面已经领先世界，预计在替代海产品部分也将获得全球主导地位的原因。重点介绍了在新加坡、日本、泰国、香港等几个亚洲国家已经进行的生产计划和数百万美元的投资，他认为，持续的创新以及与传统海产品的价格平价，将是这一进程的主要推动力。

在一项关于新冠肺炎疫情对全球鱼子酱行业影响的研究中，2020年鱼子酱出口量和进口量都有所下降，但到2021年第一季度，鱼子酱的销售量估计已经超过了疫情爆发前的水平。疫情也极大地推动了在线营销策略，比如在中国，卡卢加女王（世界上最大的鱼子酱生产商）在中国网购平台淘宝上发起了一场直播活动。一些主要的生产商和零售商选择创造新的包装（如超值套餐）；其他针对特殊场合，如情人节或创建"点击并收集"解决方案，作为新的直接营销渠道面向消费者。

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SOURCING SEAFOOD RESPONSIBLY: WHAT TRADE AND RETAIL WANT

By Steven Adolf

Those involved in the global tuna fisheries and trade will have noticed that something is shifting in the sustainable management policies of our tuna resources. Increasingly, the mid- and end-market segment of the supply chain – major brands, wholesalers, traders, and retailers – are expressing their growing dissatisfaction with the implementation of the policies to guarantee a sustainable sourcing of tuna. The explicit way they express this is not only new, it also might well add to a change in basic assumptions in the institutions where decision-making on the global tuna management has traditionally been dominated by the interests of the industrial fishery fleets.


Credit:Steven Adolf

Tuna is probably the most consumed free school-caught fish on earth. Hundreds of millions of people are fed with the healthy marine proteins of at least one of the forty tuna and tuna-like species. According to a report by the Pew Charitable Trusts[1], the seven commercially most important tuna species are among the most economically valuable fishes on the planet. With the European Union and the United States as its biggest single markets, the end-value in the global consumer market for these species was an estimated USD 41 billion for a total catch of 5.5 million metric tonnes in 2018.

How sustainable are the global tuna fisheries? According to the latest report from the International Seafood Sustainability Foundation (ISSF)[2], 80.5 percent of the total catch comes from healthy stocks in terms of abundance; this is mainly because skipjack stocks contribute more than one half of the global catch of tunas, and most skipjack stocks are in a healthy situation. But a closer look shows that only six out of 23 major commercial tuna stocks worldwide recognized for stock assessment are avoiding overfishing and maintaining target stock biomass when measured against the Marine Stewardship Council (MSC) Fisheries Standard.

These figures point to a more uncomfortable truth. Without effective management, the levels of unsustainable tuna fisheries will increase rapidly due to the globally fast-expanding fishery capacity, illegal fisheries, and lack of catch data, amongst other things. Furthermore, although the effective, up-to-date management of the stocks by using so-called harvest strategies is taking shape, it is not taking place fast enough on an international level. Harvest strategies are based on a set of predetermined management objectives for the tuna fisheries in the areas under the purview of the Regional Fisheries Organizations (RFMOs). The operational component of the harvest strategy[3] is known as a harvest control rule, that automatically sets fishing opportunities such as catch limits, based on population status. Once the harvest strategies are installed, the RFMOs have set the rules for the game. And the yearly time-consuming and ineffective decision-making on an international level, is replaced by an automated system based on the status of the tuna stocks.

A powerful fisheries lobby

A sustainable tuna product must guarantee consumption for future generations while respecting the ocean environment and other species. It should be well-managed, create safe and sound working conditions and ensure that it meets an increasing list of other sustainability targets that have become

[1] *The Pew Charitable Trusts, Netting Billions 2020: a global tuna valuation, Oct 2020, Washington.*

[2] *ISSF. 2022. Status of the world fisheries for tuna. Mar. 2022. ISSF Technical Report 2022-04. International Seafood Sustainability Foundation, Washington, D.C., USA*

[3] *www.harveststrategies.org*

an indispensable part of tuna marketing in most developed markets over the last decade. Remarkably enough, despite the huge commercial interest in marketing a sustainable sourced tuna supply, until quite recently the voices of the middle and downstream supply chain – brands, trade, and most of all retail – were hardly heard when it came to the actual management of sustainable fisheries. Policymakers and politicians of the countries involved – the tuna consuming countries on one side, and the production countries that have the large stocks swimming their waters on the other – were basically steered by the interests of powerful distant-water fishing fleets when it came to managing tuna stocks.

There is growing awareness that this curious imbalance in the representation of the different stakeholders is not a transparent and responsible way to model modern global governance of tuna stocks. Consumers, who vote commercially through the products they buy, notice how their governments have engaged with SDG14, the biodiversity targets of the high seas and climate change actions as policy priorities on their agenda. Tuna retail, brands, and trade companies do realize that this will translate into a growing demand for transparent decision-making based on sustainable policies. Yet, the vast blue economy interests that they represent are constantly passed over by the interests of the fisheries industry and their well-organized lobbies.

Turning the tide: example of the Bolton Food Group

The tide is turning. Take the case of the Italian-based Bolton Food Group. Outside the world of tuna, Bolton might be an unknown entity but for the industry, the company hardly needs any introduction. Bolton is undoubtedly one of the main tuna market stakeholders, if not the biggest in terms of turnover of the EU market and one of the largest on a global scale. Bolton Food Group was established in 1978 in Amsterdam by Joseph Nissim (1919-2019), a Greek immigrant who escaped the Nazi invaders of his country to Italy and then fought with the British Army in the African desert. Currently, his daughter Marina Nissim is at the helm of the Italian-based company as its executive Chairperson. Privately owned, the Bolton Group is a global conglomerate strong in seafood, which generated a revenue of €2.8 billion in 2021, half of which was in Europe. Tuna is its core business. Bolton controls the leading Italian canned tuna brand Rio Mare, the French Saupiquet, the Spanish brands Isabel and Cuca, and has a stake in the Spanish Grupo Calvo. In 2019 it bought Tri Marine, that, together with the Japanese Itochu and Korean FCF, form the global triumvirate of the three biggest tuna traders that supply tuna and processed tuna products worldwide. This makes Bolton one of the biggest vertically-integrated conglomerates in the global tuna market.

Having become aware of its role in the sustainability issue several years ago, Bolton has set up special programmes and is now guided by the vision to become "the most sustainable tuna company in the world". It has set targets for sourcing from more selective fishing methods with a lower level of by-catch and environmental impact, better FAD management and sourcing from MSC-certified fisheries or from "credible" and "robust" fishery improvement projects (FIPs).

After announcing the ambition to put market-based tools in place to improve sustainable sourcing of tuna, Bolton has now taken a new step on its course for sustainability. In May of this year, Bolton Food Group's Sustainable Development Manager, Héctor Fernández, participated in a webinar on the issue co-hosted by The Pew Charitable Trusts, the Global Tuna Alliance (GTA), the Tuna Protection Alliance (TUPA) and HarvestStrategies.org. Fernández wrote in the Spanish paper El País[4] a strong plea for putting in place harvest strategies for all global tuna fisheries, starting this year with Atlantic bluefin tuna at the annual meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) which will be held in November.

If ICCAT agrees, it would in fact be the "pearl in the crown" in the success story of "the concerted effort of the fishing industry, science, NGOs, and policy makers" in which internationally-agreed catch reductions have enabled the dramatic recovery of the bluefin tuna population in the Eastern Atlantic and Mediterranean. Once established, the system of harvest strategies would effectively guarantee the management and sustainable sourcing of the species in the future to come.

As argued, the case of harvest strategies for bluefin tuna has a meaning that goes far beyond only this species. It provides a strong argument to bring all international tuna management efforts to a more modern and efficient level. Many international fisheries under the authority of the RFMOs still make effective application of harvest strategies difficult; and many times, it is not a priority in the political agendas of our governments. According to Bolton, that is a luxury that we can no longer afford. Exponential expansion of fleet capacity, increasingly efficient fishing techniques, and illegal, unreported, and unrecorded catches are rapidly endangering an increasing number of tuna stocks in the world. Bolton underlines the urgency of putting harvest strategies in place and holds governments responsible for establishing them within the RFMOs. Bolton repeated its plea recently on the eve of the meeting of the Inter-American Tropical Tuna Commission (IATTC).

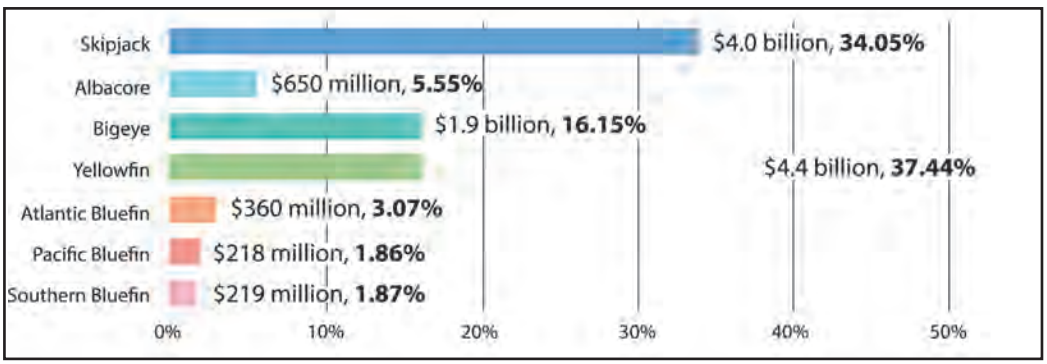
[4] *https://elpais.com/clima-y-medio-ambiente/2022-05-18/la-hora-de-una-gestion-sostenible-de-nuestro-atun.html)*

Market voices gather strength

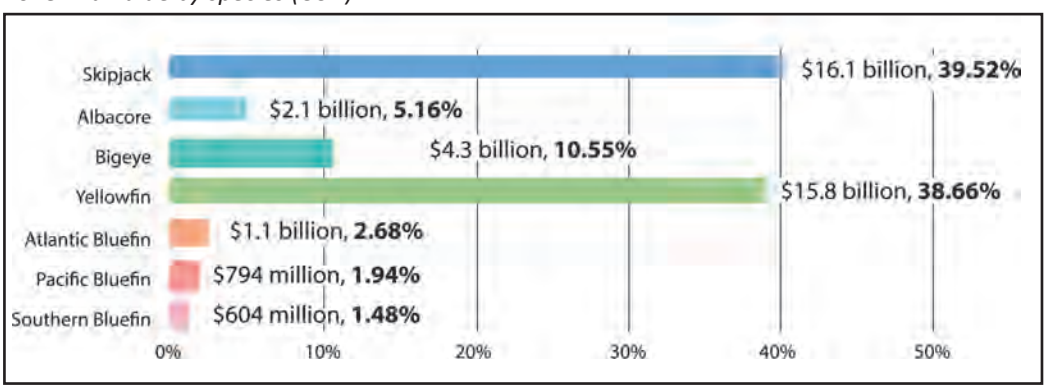
Bolton's explicit market engagement with the issue of sustainable governance at the level of tuna RFMOs fits a trend that currently is taking shape. In July, in an opinion article in the Seattle Times[5], Ray Clarke (Bumble Bee Seafoods' Vice President, fisheries management and government affairs), urged the United States to take leadership in the IATTC and the Western and Central Pacific Fisheries Commission (WCPFC) to work together with Japan and Canada to set harvest strategies for North Pacific albacore tuna.

Figure 1: Tuna Values Vary by Species and Volume

2018 Dock Value by species (USD)



2018 End Value by species (USD)



Note: With less than a third of the total landings, yellowfin's dock value roughly equaled skipjack's, while the bluefin species were the most valuable per metric ton.
Source: Poseidon Aquatic Resource Management Ltd., 2019

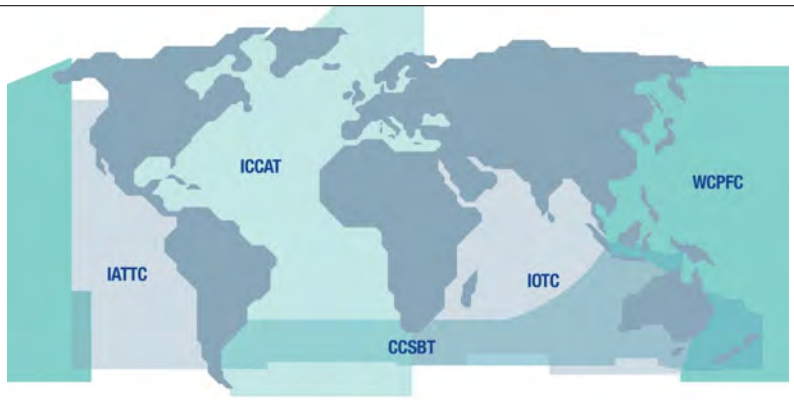
Further, last year the Global Tuna Alliance (GTA), representing 49 retailers, suppliers, wholesalers, and brands that collectively bought 1.6 metric tonnes of tuna worth USD 2.3 billion (dock price), urged the European Commissioner for Fisheries, Virginijus Sinkevičius, in an open letter to seriously consider the voice and interest of market stakeholders in the international tuna management organizations of which the EU is an important and often decisive member. "We are (...) calling for accelerated action on comprehensive harvest strategies to be implemented simultaneously with the development of precautionary reference points and harvest control rules", GTA Executive Director Tom Pickerell wrote. "Despite the huge commercial importance of the marketplace, we feel that our voice is not being heard in the development of EU tuna positions". The European Commission should take up its role as a champion in the development and adoption of harvest strategies if it took seriously its own commitments with the Sustainable Development Goal 14 (Life below Water), he argued.

Meanwhile, in the Indian Ocean Tuna Commission (IOTC), the market voices of alarm were already heard in 2020 due to the critical state of the stock of yellowfin tuna in the area, which according to the most recent stock assessment, is overfished. The Liverpool-based UK tuna brand Princes[6] announced it would cut its sourcing of yellowfin from the Indian Ocean by half compared with 2017 levels in order to put pressure on the IOTC Member States to introduce cuts to the catches and work out a credible recovery plan for the species. Princes' announcement came just a few months after the UK leading retailer Tesco announced[7] that it would stop sourcing tuna and billfish from the Indian Ocean for their own-label products, if the IOTC failed to implement a recovery plan. "Declining tuna populations threaten to impact the entire marine ecosystem", the retailer argued. Tesco was quickly followed by the British retailer-group Co-op that reaffirmed its pledge of not selling any canned yellowfin from the Indian Ocean in its stores, maintaining its stance held for the last seven years.

[5] *https://www.seattletimes.com/opinion/keeping-this-fish-on-the-regions-plate-requires-u-s-leadership/)*

[6] *https://www.pewtrusts.org/en/research-and-analysis/video/2021/prince-highlights-the-economic-importance-of-harvest-strategies-to-seafood-processors)*

[7] *https://www.pewtrusts.org/en/research-and-analysis/video/2021/supermarket-chains-explains-how-harvest-strategies-bring-stability-to-the-seafood-supply-chain*



There are five RFMOs worldwide that oversee tuna fisheries management in their respective ocean regions.

CCSBT – Commission for the Conservation of Southern Bluefin Tuna

IATTC – Inter-American Tropical Tuna Commission

ICCAT – International Commission for the Conservation of Atlantic Tunas

IOTC – Indian Ocean Tuna Commission

WCPFC – Western and Central Pacific Fisheries Commission

Credit: ISSF

The common denominator of all these pledges is clear: the voice of a market that no longer accepts its role as a passive bystander in the international governance of sustainable tuna management. It underlines the urgency to consider the crucial importance of sustainable sourcing to supply the markets.

RFMOs must address longstanding issues

The increased awareness of the market stakeholders of safeguarding a sustainable sourcing of tuna focusses on the issues around state governance in the Regional Fisheries Management Organizations or RFMOs: its serious problems with transparency, effectiveness, and structural imbalance of decision-making.

Though quite unknown to the general public and even many politicians and policymakers, RFMOs play a crucial role in fisheries management policies on an international level. Most of the organizations are closely related to the United Nations Law of the Sea (UNCLOS). The Member States are countries with fisheries interests in ocean areas with migratory species like tuna. RFMOs have the authority to establish fisheries conservation and management measures on the high seas outside the exclusive economic zones (EEZs) of individual nations. That concerns issues such as effort controls, quota allocation, closures at sea and other requirements like rulings for the use of fish aggregating devices (FADs) and (electronic) monitoring. These are tools that are key in fighting the major problems of fisheries on the high seas like overexploitation, bycatch of other species, damage to the environment, transhipment and illegal, unreported, and unregulated (IUU) fishing.

RFMOs essentially bring together the two sides of fisheries: on the one hand, the coastal states in the region where the fishery takes place and on the other, the distant-water fishing nations which harbour the large industrial fleets that harvest the fish in the global oceans. There are in total 17 RFMOs that manage fisheries in the global oceans, five of which are dedicated to the different tuna stocks: the WCPFC (2004) and the IATTC (1949) in the western and eastern Pacific, respectively; the IOTC (1996) in the Indian Ocean; the ICCAT (1966) in the Atlantic; and the Commission for the Conservation of Southern Bluefin Tuna (CCSBT, 1994) in the southern hemisphere of the oceans. These RFMOs, which function in a way that you could consider as a kind of United Nations for tuna management, have their regular yearly agenda to decide on management policies in meetings attended by hundreds of national delegates, lobby groups and observers of NGOs.

Most tuna RFMOs were established in the second half of the last century, and as a result they bear all the characteristics of organizations focussed mostly on fisheries and less on measures related to managing sustainable sourcing. They were not organized around the increasing range of different sustainability goals of the 21st century, a context which affects a much broader group of stakeholders, including markets and consumers. Adding to the current problems, most RFMOs' decision-making is consensus-based, which often makes it difficult to get a clear picture how policies have been decided upon and what interests they reflect. Many times, science-based proposals are blocked by a few Member States and

effective solutions fail to get approved within the needed time schedule. Furthermore, lack of transparency of fisheries data adds to the failing effectiveness of the policy measures.
For the market stakeholders like trade and retail, the problems in the RFMOs represent a fundamental issue. They need a product that meets the increasing sustainability requirements they are held responsible for by consumer markets. That translates into a direct commercial interest. They entirely rely on effective RFMO management of the tuna fisheries, but until recently were practically ignored as stakeholders whose direct interests are actually part of the RFMO negotiating table. This can take extreme forms. For example, the European Union is represented in the WCPFC, thanks to the limited presence of the Spanish distant-water fleet in the area. However the Western and Central Pacific represents the most important sourcing area for skipjack tuna in the European Union, globally the largest single consumer market for tuna. And while the influence of the strong and well-organized large-scale fisheries is visible during most of the RFMO meetings, the European market voice is hardly heard.

Market-driven push for harvest strategies

The most up-to-date management tool in the RFMOs that can guarantee sustainable supply are harvest strategies. This is the position held by Tom Pickerell of the GTA, who believes that harvest strategies will continue to be a central issue in the next years when it comes to the interests the Alliance defends. The fact that many of the tuna stocks in the RFMOs are still in the green according to the ISSF report (no overfishing or being overfished) is no argument to not put the harvest strategies in place, he argues – certainly not under the current circumstances of rapidly increasing capacity of the fleets and the problems of IUU fishing. "All RFMOs have a mandate and a time schedule to deliver the harvest strategies. But according to the analysis of the ISSF, the tuna RFMOs are not delivering", he said.

Most of the supply chain companies are looking beyond the actual state of the stocks, Pickerell argues. "What if the management in place is lacking? It is like having a house without a roof. When it starts to rain, you want to have the protection of the roof in place." Héctor Fernández of Bolton states a similar point: "You need harvest strategies instead of a reactive response. No management can be based on a reactive approach, it must be anticipated. You cannot wait for disaster to trigger the decision-making in the RFMOs."

At the end of the day, the argument of the market boils down to a simple message: if there is no proper management in place, there will be no sustainable tuna; and brands, traders, and retailers cannot sell it. And as British retailers made clear, the market has the most powerful tool to enforce change: refusal to buy from unsustainable sources. That might be easier said than done, but at least the die is cast. Pickerell: "In order to change the current dynamic in the RFMOs, we are using commercial power."

Credit: Steven Adolf

Steven Adolf *(1959) is a writer, researcher, and consultant for sustainable governance of tuna fisheries. His latest book Tuna Wars (Springer, 2019) tells the history of the power struggles emerging around tuna and the present-day issue of the governance of sustainable fisheries in the global markets for the most-consumed fish in the world. He lives between Amsterdam in The Netherlands and Barbate in the south of Spain, port of the ancient, traditional Almadraba fisheries on bluefin tuna.*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Market Trends

SHRIMP

Global: Overall, shrimp producers are currently facing oversupply following strong production and less supplies purchased by US importers. The US has been importing larger quantities during the previous months from countries like India, Indonesia and Ecuador, resulting in higher levels of inventories.

India: Supply is picking up as production increases. Sales have been good for packers who are now confident to increase asking prices. Shrimp landings on the west and east coasts of India have been steady, and are meeting with continuous strong demand from the US, EU and UK markets.

Vietnam: The usual peak harvesting season has been much slower, amidst improved supplies of raw frozen shrimp. China and the EU remain Vietnam's prominent markets for its shrimp supplies. Supplies to the Russian and Ukraine markets have however, been halted by some companies as the war continues. Rising labour and fuel costs continue to be a challenge.

Thailand: According to Jim Gulkin, CEO of Siam Canadian, as he told Undercurrent News, shrimp has a higher cost of production in the country compared to other countries like India, Indonesia, Vietnam and Ecuador. As a result, the industry in Thailand intends to double down on the production of more processed forms, where the raw material price has less impact on the final profits.

Japan: The opening of the borders in June to foreign tourists had been welcomed, with anticipation of increased economic activities that should generally boost demand for seafood and push sales of shrimp in the foodservice sector as more restaurants open for business. However, the actual recovery of economic activities has been somewhat slower than expected. Instead, the ongoing global inflationary pressures as well as the threat of emerging COVID-19 variants, continue to be concerns regarding the demand for shrimp across all product types as costs and customer behaviour are impacted. This is despite the fact that the sector is expecting a strong season of shrimp consumption across all product types.

USA: Market trends have indicated that consumer demand for shrimp in retail and foodservice has remained constant. Despite the overwhelming negative trends in the US economy, analysts highlight that US wholesale shrimp prices have stayed relatively stable at present. The current price stability has resulted in continued strong demand in the US shrimp market from consumers in both the retail and foodservice sectors.

Inflation has continued to rise, impacting costs and consumer behaviour, but this has not stopped the shrimp industry from recording higher sales as prices are still considered lower compared to other proteins, including salmon. After increasing to 5.3% in April 2022, overall US restaurant sales increased by 4.9% in May with almost all segments posting positive sales growth except for the fast food segment.

Imports on the other hand, when compared to May 2021, have decreased by 6.3% following high inventory accumulated for the past four months. Consequently, delays in big purchases are anticipated until Thanksgiving. However, if the US strong import trend continues amidst declining demand, a downward pressure on US wholesale prices could be observed in the near term. Among the main suppliers, imports from India and Indonesia recorded decreases while Ecuador, Vietnam and Thailand increased compared to the same month last year.

The overall outlook of the seafood industry, particularly for shrimp, remains uncertain as concerns on rising costs, logistics and warehouse issues are still on-going. It is however, anticipated that with the moderate prices for shrimp and the easing of the COVID-19 restrictions, consumers will continue to dine outside homes, offsetting some of the uncertainty risks. According to the seafood consulting firm Urner Barry, long-term positive shrimp demand will be expected due to their overall price stability. The lower prices compared to other proteins including salmon, when adjusted for inflation, will continue to attract strong demand for shrimp.

Europe: The increased imports in the first months of 2022 signify the much-anticipated growth in overall demand for raw and processed shrimp in the region following the return of regular business hours and dine-in in hotels, restaurants and the catering services (HORECA). Supplies are more than enough, particularly from Ecuador, and with the good inventories, prices are being pushed downwards.

Ecuador: According to the head of CNA as reported by Undercurrent News, a US team who toured *Omarsa* and *Grupo Almar's* farms on 12-13 July showed interest in increasing their demand for value-added, headless, peeled and deveined shrimp, and other shrimp products.

TUNA

Thailand/Western Pacific: Weakened demand for canned tuna has slowed purchases by canneries for raw material; and hence the landed raw material price for skipjack tuna in Thailand has dropped lower, to USD 1 425 – 1 450/MT FOB from USD 1 550/MT FOB in early June. Similarly, supplies of raw material are expected to be lower due to the three-month FAD closure which started in July in the Western and Central Pacific Ocean.

Japan: The current total landings at the Toyosu daily auction market have decreased in both the fresh and frozen tuna categories, particularly for bluefin, due to poor fishing conditions and high temperatures during the summer season. Prices remain unchanged (steady) since the last reporting. On the other hand, favourable weather conditions in the Southern hemisphere are seeing excellent quality landings

of Southern bluefin tuna coming in from New Zealand and Australia, which are fetching higher prices.

Landings of frozen tuna for raw materials specific for canning and other uses at Yaizu Port, have maintained a steady increase in volume for all major species (yellowfin, albacore and skipjack) over the May and June 2022 periods. Similarly, average prices have also maintained a steady increase for all species.

With the rise in the cost of goods and the rapid spread of the COVID-19 BA.5 variant in Japan, there is a greater concern that this turn of events may dampen general demand for seafood. In addition, despite, the recent opening of Japan's borders to accept foreign tourists, increased economic activities have yet to pick up.

USA: The total imports of fresh/chilled tuna in the USA during the January – April 2022 period compared to 2021 have increased by 11% (9 289 MT). This increase is also the highest recorded, the last time being during the same period of 2020.

Total imports of non-canned frozen tuna fillets during the January – May 2022 period increased by 41.9% in quantity (21 281 MT) and 80.7% in value (USD 293 million) from the previous year of the same period. Supplies from the top ten suppliers increased for all except for Canada (-11.6%).

CANNED TUNA

USA: Total US imports of canned and processed tuna for the January – May 2022 period increased in both volume at 100 106 MT (7%) and value of about USD 511 million (9.4%) compared to the same period in 2021. Thailand continues to maintain its market dominance with 43.8% market share despite a 6.1% (43 874 MT) decrease in exports compared to the same period in 2021 (46 722 MT). According to market analysts, canned tuna is the third most consumed seafood product in the US (1.18 kg/ca) behind salmon (1.3 kg/ca) and shrimp at the top (2.3 kg/ca).

Philippines: Total exports of canned tuna from the Philippines for the first quarter of 2022 (16 303 MT) compared to the same period in 2021 (23 339 MT), recorded a decrease in both volume (-30.2%) and value (-26.4%). By market share, Germany (18.1%), Japan (14.6%), United Kingdom (12.7%), Spain (11.8%) and the Netherlands (11.6%) were the Philippines' top five market destinations during the first quarter of 2022.

Thailand: Total imports of cooked tuna loins for canning reached 28 976 MT for the January - May 2022 period, compared to the previous year at 15 997 MT. This represented increases of 81.1% in volume and USD 99 million (79.3%) in value from the same period in the previous year. Among Thailand's top three suppliers, China (+138.1%) and Indonesia (+42.8%) both recorded increased supplies during this period whilst Vietnam recorded a decrease of 26.3%.

With regard to total exports, canned and processed tuna from the world's largest producer (Thailand) increased by 8.1% in quantity (212 379 MT) and 13.2% in value (USD 887 million) during the January - May period of 2022 compared to the same period in 2021. Among Thailand's top ten export destinations, exports increased to all except Japan (-1.8%), Canada (-14.1%), Saudi Arabia (-26.8%) and Chile (-0.6%).

FROZEN AND FRESH FISH

Tilapia

Cambodia: Tilapia export plans to Japan for early this year were pushed back until the end of July due to logistical issues, according to *Cambodia Fresh Farms.* In addition, exporting frozen unprocessed tilapia would not be that profitable at the moment following higher shipping costs due to cold-storage facilities' shortage, they added. The company is now considering drying, smoking or canning the tilapia to cut costs and keep the fish from spoiling while being transported in standard shipping containers; or alternatively, steaming the cichlids in banana leaves in a local process known as "amok". According to the CEO, potential Japanese buyers have already been inquiring for the product, and orders are set to pick up next month from shops, Cambodian associations and others based in the East Asian country. He said frozen unprocessed tilapia exports would be reconsidered depending on the success of these initial shipments.

China: As the country is focusing on its domestic market, frozen tilapia exports have declined. During January – March 2022, there has been a decrease by 5.2% at 78 282 MT from 82 608 MT in the same period of 2022. The first-quarter decline in exports is an indicator of negative growth this year comparing to last year's annual exports which increased by 10% against 2020. Breaded fillets, which comprised 77% of the total frozen tilapia exports, declined by 4.6% compared to the same period the previous year. Among the main markets for this specific product were the US (+29%), Mexico (-24%), Israel (+99%) and Cote d'Ivoire (-49.8%).

Pangasius

Vietnam/UK: During the first half of this year, frozen pangasius exports increased by 83.2% at an estimated USD 1.43 billion, the highest growth rate among fishery products, accounting for 25% of the total seafood export value. According to the Vietnam Association of Seafood Exporters and Producers (VASEP), seafood exports from Vietnam were expected to rise to nearly USD 5.8 billion in the first six months, up almost 40% year-on-year.

Exports to the UK increased six-fold in the first half of 2022 compared to the same period last year. VASEP said that the Russia-Ukraine conflict has pushed up the prices of seafood, forcing UK importers to find alternative products, which is a good opportunity for pangasius exporters. In addition, there is now much greater opportunity after the UK-Vietnam Free Trade Agreement officially came into force on 1 May 2021.

Salmon

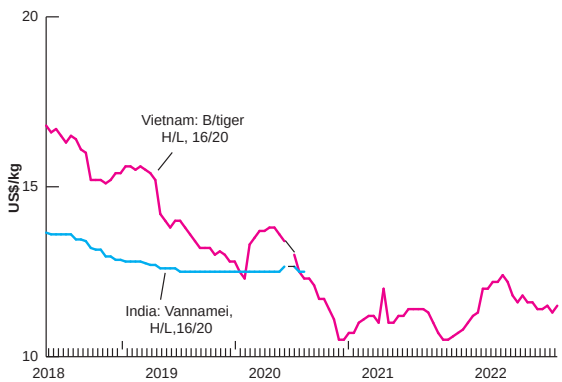
Norway: During the first half of 2022, fresh salmon exports decreased in volume by 5% at 534 500 MT, whilst exports increased in value by 37% at USD 1.3 billion compared to the same period last year. Salmon continued to have the largest share of the country's export value, following lower production volume and increasing demand which resulted in high prices. The fresh salmon price averaged USD 8.66/kg against USD 5.77/kg a year ago. Major markets for Norwegian salmon included Poland, France and the US with exports to France and Italy recording the highest growth in value.

China: During January – May 2022, exports of fresh Norwegian Atlantic salmon increased in value by 67% while exports decreased in volume by 11% compared to the same period in 2021. The rise in value was the result of a global surge in fresh salmon prices following the market's recovery from the easing of COVID-19-related restrictions in dining and public gatherings. In recent years, as Chinese consumers' living standards have risen rapidly, salmon has become increasingly popular. Consumption data from a supermarket in Beijing showed that it currently has a group of regular consumers who come to buy salmon two to three times a week. Most of them are young and middle-aged white-collar workers.

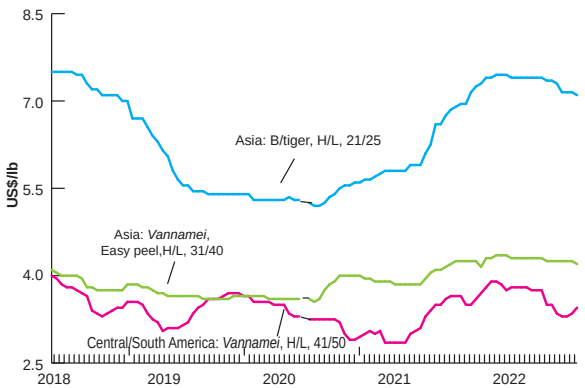
However, with the increased inflation, Chinese consumer demand for salmon is now weakening following higher prices. According to an analyst, the soaring prices for imported salmon may not be good for long-term market growth as the higher salmon prices in China will "destroy" healthy market demand for salmon and consumers might shift to other species.

Price Trends

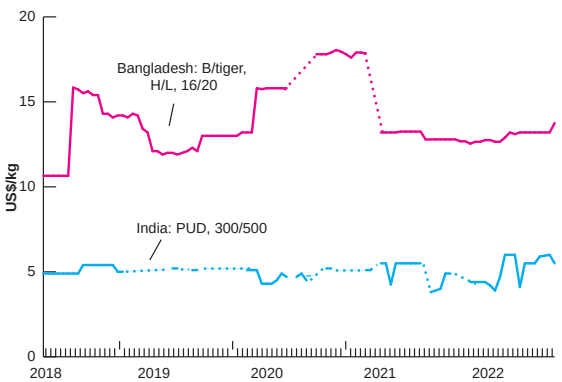
FROZEN SHRIMP, C&F JAPAN (US$/Kg)



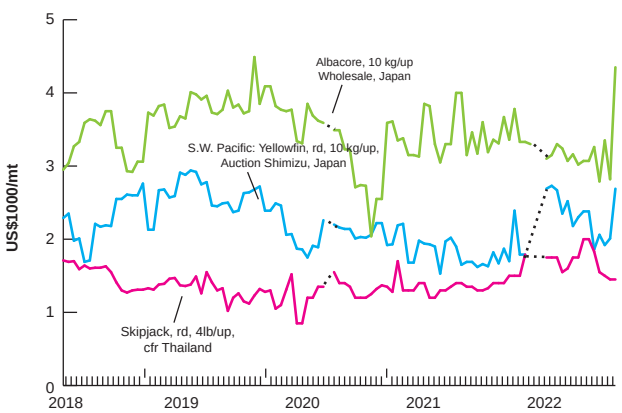
FROZEN SHRIMP, USA (ex-warehouse NY, US$/lb)



FROZEN SHRIMP, EUROPE (CFR, US$/kg)

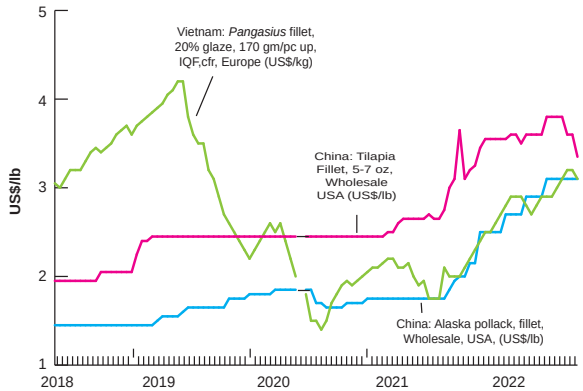


FROZEN TUNA (US$/MT)

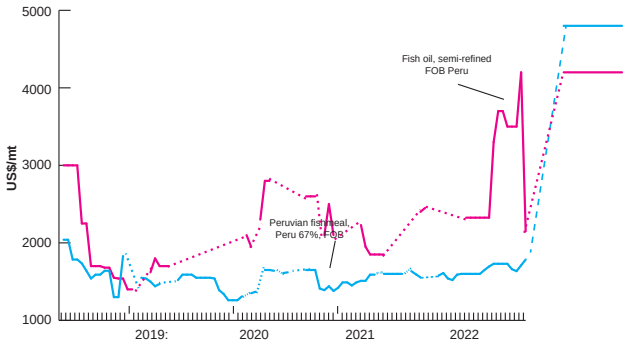


Price Trends • Cold storage holdings • import trends

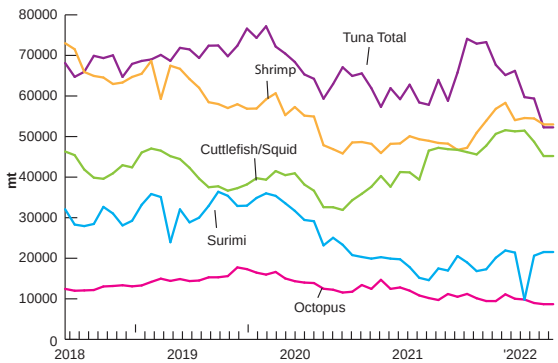
FROZEN WHITEFISH



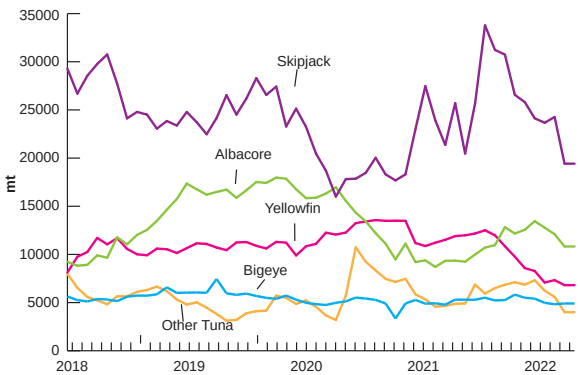
FISHMEAL/FISHOIL (US$/MT)



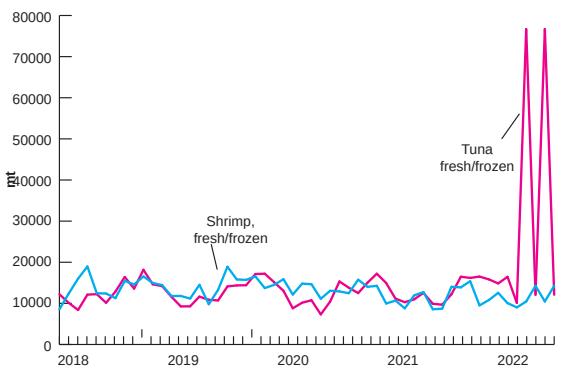
JAPAN COLD STORAGE HOLDING: SELECTED PRODUCTS (MT)



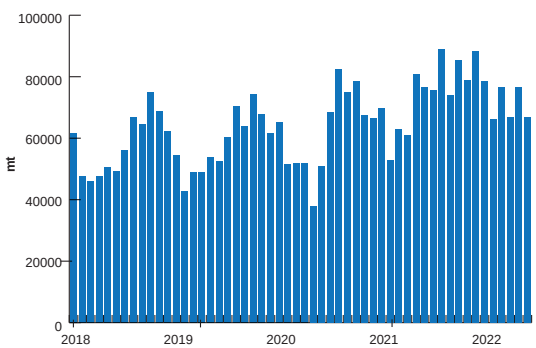
JAPAN COLD STORAGE HOLDINGS TUNAS (MT)



JAPAN: MONTHLY IMPORTS OF SHRIMP & TUNA (MT)



USA: Monthly SHRIMP Imports



TUNA

The global tuna trade in 2021 has been characterized by improved demand for non-canned tuna, falling retail demand for canned tuna and improved sales opportunities in the hotel, restaurant and catering (HORECA) sector, particularly in the western markets. On the supply side, tuna catches were low worldwide during the third quarter of 2021, balancing slow demand for frozen raw material from tuna canners. But prices are under pressure due to lack of demand for end products.

Supply

The fish aggregating device (FAD) closure in the Western and Central Pacific (WCP) ended on 30 September 2021. However, tuna landings in the area continued to be poor during the last quarter of 2021, affected by the bad weather.

In the Eastern Pacific Ocean, tuna catches were moderate during the last quarter of 2021 and the second 72-day IATTC 'veda' fishing closure was in place from 9 November 2021 to 19 January 2022 when 51 percent of the EPO's tuna fishing fleet stayed in the port.

Fishing in the Indian Ocean remained moderate during the review period and fluctuated in the Atlantic Ocean.

Raw material imports

During January-September 2021, total imports of frozen raw material into Thailand were the same as in 2020. Although skipjack imports increased by 10 percent, yellowfin and albacore imports declined by 17 percent and 35 percent respectively; imports of cooked loins (generally used for processing of high value products) were also 10 percent less than a year ago as demand for processed tuna remained weak in 2021.

In the Philippines, there was a 16 percent rise in raw material imports (mostly skipjack); part of these was processed for the large domestic market.

In Ecuador, frozen raw material imports increased by 48 percent to 55 570 tonnes (mostly skipjack and yellowfin) for processing of cooked loins and canned products.

Spain, the largest tuna canning base in Europe, reported 10 percent lower raw tuna imports, and 4 percent lower cooked loins imports during the review period. However, cooked loin imports increased in Italy and Portugal by 5 and 22 percent respectively.

Fresh and frozen tuna markets (non-canned)

With the re-opening of the food service sector in major markets, trading of non-canned tuna (sashimi and non-sashimi grade) improved in 2021 in comparison with 2020. Tuna sales in the world's largest sashimi market, Japan, recovered during the second half of 2021. Demand also remained good in the second largest market, the United States of America, throughout the year. In Europe and other emerging markets, imports of frozen tuna loins in particular, increased during the first nine months of 2021.

Japan: Sashimi tuna trade recovered moderately during July – December 2021 but with a strong preference for frozen tuna fillets and shrinking demand for fresh tuna. Better sales opportunities during the July – August 2021 holiday season and increased demand during the year-end/New Year celebrations reduced inventories at the wholesale level.

Cumulative imports of fresh and frozen tuna (whole, dressed and loins) into Japan during January – September 2021 were 5 percent lower than during the same period of 2020, at 152 000 tonnes; 70 percent of these imports consisted of sashimi-grade tuna. Imports of fresh tuna declined again to 5 790 tonnes during this period, which is 50 percent less than during the corresponding period in 2017.

Frozen tuna (whole and dressed) imports also declined (-12 percent at 99 315 tonnes) during the review period. However, there was stable demand for ultra-frozen tuna loins (frozen at -60 degrees Celsius) at the catering and retail trade. Imports increased by 28 percent at 46 750 tonnes during January – September 2021. China emerged as the top exporter of this commodity to Japan; supplies also increased from Malta, Turkey, Spain, Morocco and Croatia.

United States of America: Contrary to the weaker market trend for canned and processed tuna, demand for non-canned tuna including high quality sashimi-grade fish was good in the US market throughout 2021. During January – September 2021, cumulative imports of non-canned tuna, fresh and frozen, increased by 18 percent at 46 585 tonnes; the lion's share consisted of frozen fillets at 26 755 tonnes (+6 percent). Imports of fresh air-flown tuna also increased by 33 percent as compared to over a year ago with higher supplies of bluefin and southern bluefin tuna for sashimi and sushi usage. Fresh bigeye imports also increased substantially (+ 53 percent at 2 170 tonnes) during this period.

Ultra-frozen tuna fillets and steaks, popular in the retail and catering trade, had a 57 percent share in non-canned tuna imports and supplies increased by 6 percent to 27 000 tonnes. Indonesia and Viet Nam were the top two exporters of this product with 38 and 33 percent market shares respectively.

Other markets : Frozen tuna fillets dominate the non-canned tuna imports into the European Union Common Market. Among the top five markets (Spain, France, Italy, the Netherlands, and Germany) imports increased in Spain and Italy following strong revival of the tourism industry in the summer of 2021 but declined marginally in the other markets during January – September 2021. In Portugal, Poland, and Romania, imports of frozen tuna fillets increased by 80 to 110 percent, ranging from 1 500 to 2 000 tonnes.

Outside the European Union, strong demand for frozen tuna fillets persisted in the Russian Federation and in the United Kingdom of Great Britain and Northern Ireland. Imports in these two markets increased by 63 percent and 70 percent respectively during the first nine months against the same period in 2020.

Non-canned tuna imports also increased in the Republic of Korea, Australia, Taiwan, Singapore, and Hong Kong during January – September 2021. Imports also went up in the Near East, namely in Saudi Arabia, the United Arab Emirates and Qatar during this period.

Canned tuna trade

The demand pattern for canned/processed tuna changed in 2021 compared with 2020, particularly in the North American and European markets where imports of large catering packs increased but declined for retail cans. This trend impacted supplies of canned tuna from Thailand, Spain, and Indonesia. On the other hand, exports from the Philippines to North America and Japan increased.

Exports

Total exports of canned/processed tuna from Thailand declined significantly during the 2021 review period because of sluggish demand in the large markets of the Americas (United States of America, Canada, Peru, Chile, Argentina) and also in the Middle East

and North Africa (MENA). Among the top ten markets in the MENA region, exports dropped to all but Egypt, United Arab Emirates, and Yemen. Exports also declined to Japan, Australia, New Zealand, Malaysia, and Singapore.

The positive export trend of processed tuna from Ecuador could be attributed to increased supplies to the European Union, particularly cooked loins (+8 percent at 39 000 tonnes). The European Union held a 64 percent share in total processed tuna exports from Ecuador. Canned tuna exports from Ecuador to Argentina, Peru, Brazil, and Venezuela also rose, but they declined to the top two markets, Colombia and Chile.

Nearly 50 percent of Chinese processed tuna exports consisted of cooked frozen loins during the reporting period, mostly sent to the European Union (63 percent) and Thailand (17 percent).

Low demand from households in the European Union impacted exports of processed tuna to the Community market. However, there was a huge rise in export to the United Kingdom of Great Britain and Northern Ireland (+144 percent at 3 665 tonnes). Exports also increased to Morocco and some small markets outside the European Union.

European Union imports of prepared and preserved tuna January–September, 2019–2021 (1 000 tonnes)

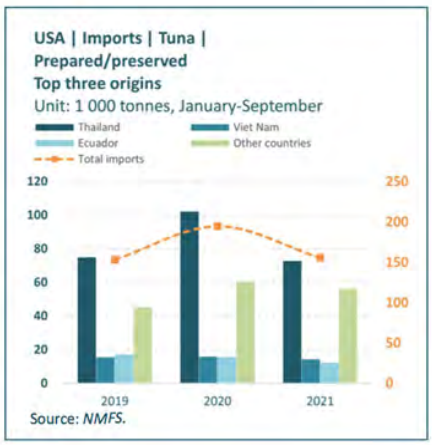
	2019	2020	2021
Canned/preserved tuna			
Ecuador	110.06	108.67	100.11
Spain	74.94	88.32	78.98
Netherlands	24.38	38.19	39.87
Other countries	290.50	321.16	298.90
Total imports	499.87	556.34	517.87

Source: *TDM.*

Thailand exports of prepared and preserved tuna January–September, 2019–2021 (1 000 tonnes)

	2019	2020	2021
Prepared/preserved tuna			
United States of America	75.09	110.31	69.40
Egypt	30.76	38.79	49.21
Japan	26.41	30.14	29.45
Other countries	260.99	270.81	195.12
Total imports	393.24	450.05	343.18

Source: *TDM.*



Exports from the Philippines to its top market, the European Union, remained stable at 37 255 tonnes and consisted of cooked loins and canned tuna. There were increased exports of catering packs to the United States of America and Canada. However, overall exports declined due to reduced demand from the United Kingdom of Great Britain and Northern Ireland and the Middle East markets.

Imports

Demand for canned tuna remained soft in the global market during 2021 in comparison with 2020. Retail trade acquired less products as household demand for ready-to-eat tuna products reduced in 2021, resulting in lower imports during January – September 2021. However, imports of large institutional cans used in the catering and restaurant trade increased both in the United States of America and Canada during this period. This demand pattern shows the importance and dominance of households in the overall canned tuna trade.

Low demand for ready-to-eat tuna and semi-processed raw materials persisted in Europe throughout 2021, despite improved business in the HORECA (hotel, restaurant and catering) sector. High inventories led to lower imports as consumer demand moved to other seafood (fresh tuna, shrimp, cephalopods) in outdoor dining.

Total imports of canned and processed tuna into the European Union were 7 percent lower during January – September 2021 compared with the same period of one year earlier. Supplies from non-EU sources declined by 6 percent but with stable supplies from the top sources such as Ecuador, Papua New Guinea, and the Seychelles.

The negative import trend also continued in the United Kingdom of Great Britain and Northern Ireland (-4 percent at 72 000 tonnes) but there was an increase in imports from Ecuador (+66 percent at 27 185 tonnes).

Imports in Switzerland and the Russian Federation also declined by 16 percent and 13 percent respectively against the same period in 2020.

In the MENA market, canned tuna imports declined in Egypt (-35 percent) and Saudi Arabia (-30 percent); this trend was similar in the other medium and small markets. Canned tuna imports also declined in most of the markets in East Asia and the Pacific. Japan, Australia, Malaysia, and Singapore imported less in the January – September 2021 period than a year earlier.

Frozen tuna prices worldwide shot up between November 2021 and January 2022, then went down in February 2022. The long waiting periods for carriers of frozen cargo in Bangkok port reduced raw material landings in Thailand, pushing prices up for skipjack, in particular. The frozen skipjack price increased from USD 1 300 per tonne in October 2021 to USD 1 750 per tonne in January 2022 for delivery to Thailand. This price was USD 100 –150 higher per tonne than the ex-vessel price at Manta in Ecuador. This price gap has not been seen for at least three years, making frozen fish suppliers reluctant to conclude any deals. In fact, in February 2022, prices went down in Bangkok but recovered in Manta.

Outlook

The volcanic eruption in the South Pacific (Tonga) during mid-January 2022 made the WCPO catch situation unpredictable. High raw material prices will also influence canners' decision in procuring raw materials during the first quarter of 2022.

In the marketplace, household demand for canned tuna may improve in North America and in Europe during the winter months while most markets are holding sufficient stocks. However, demand for non-canned tuna will be low until the Easter/Lent season in March/April.

Canned tuna imports in the Middle East and East Asia will be slow during the first quarter of 2022. In Japan, home demand for pre-packed sashimi tuna will stay moderate during the winter months in favour of the catering trade which will require more frozen tuna fillets. The next high consumption season for fresh and frozen sashimi tuna will take place during the Spring festival season in April/May.

Source: FAO - Globefish

EMPOWERING WOMEN IN SMALL-SCALE AQUACULTURE: THE WOMEN'S COOPERATIVE IN THAILAND

By Kanthana Sangsingkeo

Women's empowerment is a critical aspect of achieving gender equality, which is one of the fundamental guiding principles in internationally adopted blueprints such as the 2030 Agenda for Sustainable Development. In this interesting case study in Pathum Thani province, Thailand, a Community Enterprise (working together with a business consultancy) has shown significant growth since its establishment a few years ago. In addition to selling fresh whole catfish, members of the Enterprise have developed processed products which are well-received in the market, particularly the "crispy fish chips" snack. More products are under development for sale later this year. The core team of women have won awards and are widely recognized as "Smart Farmers" whose role now includes conducting training for others.

Gender equity and equality are fundamental guiding principles in internationally accepted frameworks such as the FAO's Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines), and the 2030 Agenda for Sustainable Development. They recognize that to achieve gender equality, focus must be placed on empowerment of women which is the process of enhancing women's ability to determine their own choices, and their right and ability to organize, influence, and participate in change through decision-making for themselves and others. Strategic partnerships with national authorities, retailers, development and business agencies, and researchers are a useful tool in this process.

The Lam Sai Pattana Community Enterprise

Situated only 55.6 kilometres from the heart of Thailand's capital city of Bangkok is an area known as Lam Sai (Pathum Thani province), where women are leading the way in small-scale production, processing and marketing of aquaculture products. Lum Sai is characterized by abundant land and populated by people who have inherited knowledge of aquaculture from one generation to the next, along with privileged know-how on breeding of land fish, most commonly catfish. The most well-known area for catfish farming in the province is located next to a natural brook called Klong Sib

Song (12) whose waters run for only a few kilometres before entering the eastern part of Bangkok.

At one time, the small-scale aquaculture sector in Lum Sai was struggling economically but a group of local catfish breeders decided to expand their activities to include processing. From the very start, the traditional farming wisdom of the villagers was adopted and their cooperation sought in gathering together to produce and sell processed catfish. The focus was on developing diverse products, and creating jobs for members of low-income communities. Subsequently, the "Lam Sai Pattana Community Enterprise" was registered on 22 May 2017 at the Provincial Agriculture Office, Department of Agricultural Promotion, bearing the registration code no. 1-13-06-06/1-0015, and having its address listed as: 9 Moo 13, Lam Sai Subdistrict, Lam Luk Ka District, Pathum Thani Province. The production, processing, marketing and production standards were adopted based on Good Manufacturing Practices issued by the Department of Fisheries.

Initially, private funds were sourced to enable work to begin on product development, find market channels and enhance community self-reliance. Working capital for fish food procurement was supplied by members who had fish ponds; then came the product development stage which was participated in by various government agencies. By 2019, the increasing cost of fish food was the main cause of rising catfish prices which led the management of the group to try to increase its bargaining strength with feed suppliers.

Originally there were only seven members of the Community Enterprise, each of whom put in 500 Thai baht per share; by 2020 the biggest shares were worth 350 000 Thai baht per share. Members resolved to loan working capital from the Bank for Agriculture and Agricultural Cooperatives, to be used for fish farming and processing activities from 2020 onwards. Currently there are 18 directors, of whom 10 are men and eight are women. Persons involved in the operation of the Lam Sai Pattana Community Enterprises are divided into two main groups: farmers (34 in total, consisting of 24 men and 10 women); and processing workers (18), consisting of 10 men and 8 women. The latter group of eight women have won awards ranging from provincial to regional levels, and are widely recognized as "Smart Farmers" who have not only gathered experience on craftsmanship and sales, they are also trainers at all seminars, communities and schools.

In general, the men undertake the outdoor work such as rearing and harvesting whilst the women cook, pack and suggest the best in-house flavours or recipes for products. The Community members are agreed upon four main objectives:

- Comprehensive management of activities from end-to-end;
- Harvesting is dependent on the size of the fish and the prices for the product in processed form;
- Harvested fish that are below 350 grams or above the standard of more than 1 200 grams are used as raw material for processing;
- Farmers benefit from higher prices

Business activities from farming to marketing

Comprehensive management activities are categorized according to three major stages:

Upstream: catfish farming and catching

Foraging for fish feed to distribute to members;

- Each person is entitled to a loan of 300 000 baht from agricultural or cooperative banks to buy fish feed;
- In a year there are 2 – 3 crops; the time of harvest will depend on the sizes of the fish and the prices they can fetch;
- Fish that are caught below 350 grams or above the standard of more than 1 200 grams are used for processing as part of the business activities of the Community Enterprise;
- Higher prices are paid to the farmers: the Community Enterprise's cold storage pays about 50 baht per kg (the standard fish price is about 40 baht per kg); and
- Upon reaching the processing plant, the fish are washed and packaged according to size, and frozen for export.

Midstream: processing & packaging

Workers at the plant prepare the catfish for processing into several products:

- Ready-to-cook: Semi-dried aged catfish plus the belly of the fish is used to make a traditional fermented product known locally as *pla som*;
- Ready-to-eat: Fried catfish strips (original), fried catfish strips (sweet), crispy fried skins cooked in tasty paprika, and crispy fish chips;
- The belly is sold to cooking oil producers; and
- Bones and heads are bio-fermented into an organic insecticide product for use in rice fields at an affordable price of only 5 baht per kilogram. Fresh parts left over from the above activities are used as feed in culture ponds, or sold downstream.

Downstream: marketing

- Efforts are focused on finding markets and prices, with consensus between all 18 directors of the Community Enterprise;
- Large-scale members are helped to find markets for the fish from their ponds; and
- Outlets are found for the processed products.

Fermented rice fish (pla som)

Crispy fried fish skin

Crispy fried skins. The original packaging by Community Enterprise was navy blue (below); this was subsequently changed to orange (left)

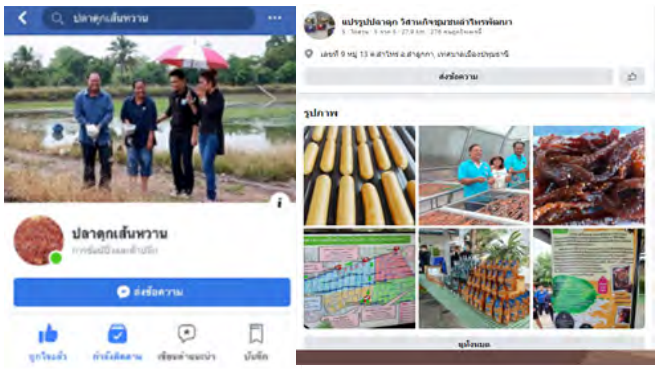
Type	Current products	Pack size in grams	Retail price per pack (Thai baht)*
Ready-to-cook	Semi-dried aged catfish	500	120
Ready-to-eat	Crispy fish chips	30	40
Ready-to-eat	Fried catfish strips (sweet)	200	120
Ready-to-eat	Fried catfish strips (original)	150	120
Ready-to-cook	Fermented rice fish: *pla som*	500	80
Ready-to-eat	Crispy fried skins	30	35

**All prices as presented in the first quarter of 2022.*

Fried catfish strips (sweet and original flavours)

Semi-dried aged catfish

Community Enterprise products are currently sold on Facebook and Shopee while the Line App is used for pre-orders of all products. There remains a significant opportunity to grow the business further through social media platforms. In addition, products are available for purchase in a minimart at Bangkhen.



In the first two years, members of the Enterprise received a fluctuating level of income from (i) fresh fish trading; (ii) difference from the amount received from sales of fresh fish and the cost of feeds; and (iii) the profit obtained from the sales of processed foods produced by the Enterprise's factory.

However in the second half of 2022, more deals have been sealed with much larger retailers and there is a plan to launch the products nationwide. In 2023, this segment is expected to grow further.

Partners in the process

Food innovation and product development

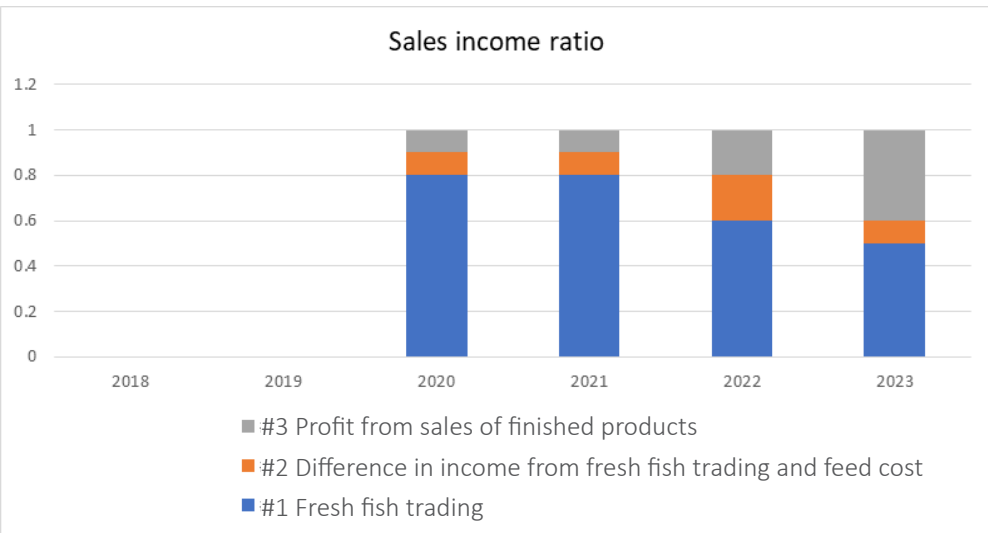
The Department of Fisheries was a source of tremendous support in raising awareness on Good Aquaculture Practices (GAP); helping to develop a variety of processed products; as well as both offline and online marketing.

Verification by Thai FDA

Crispy Fish Plates were developed at the end of 2019 and into 2020. The Provincial Agriculture Office in Pathum Thani liaised with the Food and Drug Administration in Thailand.

Product packaging designs

The Raja Mangala University of Technology Thanyaburi, Khlong 6 provided support in developing products from 2021 until 2022. A new product called Crispy Fish Chips was designated an Award Winning Product.



Social services and environment protection

In terms of public interest, as Buddhism is the main religion in this "Land of Smiles", the Community Enterprise supported activities such as funeral aid, giving merits at two temples, and setting up a food canteen twice a year. Members and their families also supported activities such as children's day in communities. Care is also taken with regard to the environment, with fish being sold whole or fully processed. No wastewater is released into natural water sources; thus the environmental impact is zero. Furthermore, fish farming and processing of catfish products by the Lam Sai Pattana Community Enterprise is conducted in accordance with the Boston Consulting Group (BCG) growth-share matrix.

More products being developed

Crispy catfish will continue to be developed according to different flavours, sizes and price levels; and more distributors will be sought. There are several products in the pipeline which are undergoing research to ensure product freshness and most tasteful flavours for the Thai consumer at large. The pack size in grams, the cost per pack, and the suggested retail price per pack have not been confirmed at this point in time.

Type	New products under development in 2022	Actions needed
Ready-to-cook	Chinese fish sausage	To obtain certification for GAP
Ready-to-cook	Northern SaiAua sausage	To be certified by the Thai FDA
Ready-to-cook	Smoked fish sausage	Control chilled room to be set up
Ready-to-cook	Spicy fish cake	Finetuning required for taste/recipes, and ensure no storage problems

Various types of catfish sausages and cakes will be added to the range of products

Kanthana Sangsingkeo *is a Business Consultant in Thailand. She works closely with the Lam Sai Pattana Community Enterprise, mainly with regard to finding retail markets for the products.* *She acknowledges Ms Namaoi Somprasong, President of the Community Enterprise, for sharing the information required for this article.*

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SUCHITRA UPARE

Coordinator for CAFI-SSF Network - Global Network for capacity building to increase access of small-scale fisheries to financial services

Based on the premise that access to financial services for coastal and inland small-scale fisheries communities will remain a serious challenge for coastal and inland small-scale fisheries communities within the next five years, could you briefly describe what the FAO-initiated and -supported CAFI-SSF Network is, and what it aims to achieve by 2025?

SU Access to financial services for coastal and inland small-scale fisheries communities is a major challenge for small scale fisheries development. Therefore, FAO has taken an initiative to establish the Global Network for capacity building to increase access of small-scale fisheries to financial services, also called CAFI-SSF Network, during the Expert Workshop on "*Guidelines for Micro-finance, Credit, and Insurance for Small-Scale Fisheries in Asia*" (Bangkok, Thailand, May 2019)[1], organized by FAO and the Asia-Pacific Rural and Agricultural Credit Association (APRACA).

During the workshop, representatives from the financial sector, government agencies, fisherfolk organizations and civil society involved in financing to the small-scale fisheries (SSF) sector in Asia-Pacific, welcomed and endorsed the initiative and proposed the Network establishment strategy. In 2020, FAO and APRACA jointly developed a Network Concept Note and conducted regional virtual meetings with key stakeholders from the Asia-Pacific, Latin American, the Caribbean, and African (West and East) regions. In these meetings, nearly 80 stakeholders associated with fisheries and aquaculture discussed the Network's scope of work, strategy and governance. To ensure wider outreach across regions with financial service providers (FSPs), CAFI-SSF has partnered with APRACA and the African Rural and Agricultural Credit Association (AFRACA), and is currently engaging with more organizations interested to become Network partners.

What the CAFI-SSF (the Network) aims to achieve by 2025/2030 is to enhance resilience of small-scale fisheries development. The Network will focus on increasing the availability of and access to credit, microfinance and insurance services for SSF. The Network has four specific objectives:

- increase advocacy and awareness;
- enable capacity building and knowledge sharing;
- support innovative and suitable programmes particularly to meet the microfinance, credit, and insurance needs of SSF; and
- promote and increase collaborative action among members to strengthen existing and build new partnerships.

The Network aims to increase the capacity of policy makers, financial service providers, fishers' and fish farmers' organizations to promote, design and implement appropriate financial services in support of small-scale fisheries and aquaculture. The following are few initiatives taken by the Network to strengthen some of its partner organizations:

- Foremost is to increase global attention and awareness. The Network organizes knowledge-sharing sessions through a Webinar Talk Series. In 2021 and 2022, eight knowledge-sharing sessions have been organised. Information on these webinars can be accessed here: https://www.rfilc.org/event_organizer/cafissf-network/
- It has supported a baseline study to assess current situation of financial and insurance services provision for the small-scale fishers in Africa and developed case studies on financial institutions servicing SSF in the United Republic of Tanzania and Zambia.
- Support a study on "*Issues, Practices & Opportunities in Application of Insurance as a tool for Marine Fisheries Management and to Build Resilience in the Sector in South Asia*".

Further, the Network will contribute to achieving the 2030 Agenda for Sustainable Development Goals, particularly SDG 14, target 14.b: *"provide access for small-scale artisanal fisheries to marine resources and markets".*

[1] https://www.fao.org/documents/card/en/c/ca6482en/

Self-help group meeting in Odissa State, India

Considering that most women are to be found in the processing and marketing sectors and to an extent in fish farming activities, what special provisions should be included within savings, credit, and insurance schemes so that they would have equitable access to financial services and insurance protection?

Women play a central role in whole value chain activities, aquaculture, mariculture, post-harvest processing, fish marketing, distribution, and retail. As confirmed by the recent Illuminating Hidden Harvests (IHH) study, 45 million women participate in SSF; this includes for subsistence[2]. Hence it is important to ensure that women are provided access to financial services. In Asia, particularly in Bangladesh, India, the Philippines, and Viet Nam, women are provided loans through Self-help Groups (SHGs) for marketing of fish and fishery products for retail purpose. Taking into consideration their major role within the fish marketing sector, they should be provided cash credit to purchase fish for local sale, provision for purchase of ice-making unit, iceboxes or solar dryer units, weighing machines, and fishbone cutting machines; fish packaging materials for retail sale; fish stall with refrigerated storage facility; improved technology machines for fish brining or smoking; and purchase of fish transport vehicles such as bicycles, scooters, rickshaws and trucks (with appropriate refrigeration and packaging facilities).

Women are an equally active workforce in aquaculture-related activities; here, I would like to give an example of a successful initiative on how women have been provided equitable access to financial services (which includes savings and credit schemes). The State Government of Odisha in India has a policy initiative under the aegis of "Mission Shakti Programme" to give priority to women self-help groups (SHGs) for leasing village ponds (community tanks). The duration of lease is on long-term basis, usually for three to five years. The Programme, in association with the Directorate of Fisheries (DOF), has received technical support and around 6 343 women SHGs have participated in fish culture, covering 8 076 village community tanks, with a turnover of INR 145.05 crores (USD 18.22 million) and income-generation of USD 9.1 million (INR 72.5 crores)[3] (1USD approximately equals to INR 79.62).

Worldwide, fish processing facilities employ a workforce predominantly consisting of women, mainly working on output-based contract basis with minimal insurance and social security benefits. The severe occupational hazards faced in post- harvest processing units are cuts and scrapes,

[2] https://www.fao.org/voluntary-guidelines-small-scale-fisheries/resources/detail/en/c/1539334/

[3] https://missionshakti.odisha.gov.in/convergence/directorate-fisheries

stings leading to tetanus infections and whitlow, or in some species, the release of poison in body (ciguatera poisoning, scombroid poisoning etc.) This is further coupled with the health and biological risks they face within the processing sector. This can potentially be addressed with the following approaches:

- It should be made mandatory for micro-, small- and medium-processors to take a gender-neutral policy cover for the workers employed within the units;
- The insurers need to provide an "all-risk" cover, instead of "named perils" to ensure cover for all occupational risks and hazards;
- Emphasis on introducing financial literacy programmes to increase the financial capability of women;
- Use of mobile phones for loan disbursement, repayment, and insurance premium payment; and
- It is essential for insurance companies to increase efforts and engage with financial institutions (this includes banks, credit unions, microfinance institutions) to design products in which insurance is bundled with a credit and savings component.

These steps are beneficial in the provision of credit, savings, and insurance services and create a win-win situation to increase incomes and provide inclusive financial services for women workers within the SSF sector.

Are there any small-scale credit and insurance schemes managed at the grassroots level in Asia that have been successful? What are the lessons learnt which make it possible for their success to be replicated in other countries in Asia and the Pacific?

SU According to (FAO 2022), the primary sector of capture fisheries and aquaculture employs 58.5 million people, of whom 35 percent are engaged in aquaculture while the remaining 65 percent are involved in capture fisheries production. The Asian region constitutes around 50 million people employed in the sector, of whom 90 percent are linked to SSF. Hence it is important to serve the required needs and bridge the demand-supply gap particularly for credit, microfinance, and insurance services within the region. We would like to share information on a few successful schemes that may be replicated throughout the region.

Countries like India, Bangladesh and Viet Nam are the top three borrowers' markets in terms of microcredit needs. India has the largest and most cost-effective micro-credit scheme, the Self-Help Group (SHGs)-Bank Linkage Programme. The concept was pioneered by the National Bank for Agriculture and Rural Development (NABARD) and is successfully being implemented for the past three decades. The programme covers overall some 8 million SHGs and about 100 million poor households. This credit scheme has been popular amongst the 28 million fisherfolk, with active participation from women engaged in the sector.

A successful model for provision of micro-credit to SSF is implemented in southern India by the SIFFS (South Indian Federation of Fishermen Societies):

- They offer customized loan products to suit productive purposes and household consumption needs of fisher communities;
- The client beneficiaries include owners of motorized and non-motorized small-scale fishing vessels and crew members on-board;
- The loan product is designed to have a flexible repayment structure and low interest spread. In case of larger loan amounts, SIFFS offers a longer repayment term duration than the formal financial service providers (FSP);
- Seasonal loans are offered with flexibility to repay at the end of fishing season; and
- Fisherwomen are provided working capital loans for fish vending and petty trade activities and consumption loans are available to address lifecycle needs of fisher households.

Bangladesh, along with India, supports another micro-credit innovation, "Joint Liability or Solidarity Group Lending", that focuses on livelihood and income-generating activities and promotes groups acting as guarantors of loans. Each group consists of either three, five or seven members who collectively guarantee each others' loans mainly for small and microenterprises in need of short-term working capital. Initial training is provided to group members, focusing on joint liability responsibility. Microfinance institutions (MFIs) approve loans based on the groups' creditworthiness. This scheme can easily be implemented by MFIs and banks too can adopt this scheme to finance groups of fishermen and fish farmers for undertaking small investments in Asia-Pacific.

Countries like, Japan, the Philippines, Thailand, Indonesia, China, India, and Viet Nam have introduced regulatory frameworks for provision of insurance schemes to SSF communities. I would like to share some examples that have the potential to be replicated within the region, for providing support to SSF communities that often experience damage or loss of their fishing vessel(s), catch, equipment and gears,

partial or total loss during aquaculture operations because of natural disasters or accidents. The insurance system guarantees the SSF communities' continuation of their operations.

Japan has the largest insurance market in Asia. The national insurance policies are an integral part of the country's disaster counter-measures policies (under the Fishery Accident Compensation Act). The coverage for all type of operations like capture fishing, aquaculture, hatchery, breeding units or any other fishery-related facilities, is offered only through a fishery mutual insurance scheme (FMIS). They are mandatory for all fishers and fish farmers and these schemes are implemented and managed through a three-tier system such as: (i) at the village level these schemes are operated through fisheries cooperative associations (FCAs); (ii) at the Prefecture level[4] the fisheries mutual insurance associations (FMIAs) manage the mutual insurance programmes; and (iii) at the national level the central government supports the system through subsidies and a provision for special funds is available for rehabilitation from disasters.

Indonesia has a law on insurance to "protect and empower" fishers and fish farmers. The government operates a subsidy programme to cover insurance premiums both at central and local levels. It has initiated partnerships to implement this programme with twelve insurance companies.

In Thailand, shrimp farmers are mostly small-scale with an average farm area of less than one hectare, but they mainly practice intensive farming techniques (high stocking density). To combat disease outbreaks and to provide a safety-net and risk-mitigation mechanism, the Thai National Farmers Council, in collaboration with the Thai Chamber of Commerce, developed an innovative approach through a collective action model linking shrimp farmer cooperatives (clusters) with other stakeholders – seed and feed producers, buyers, processors, exporters, credit institutions, government regulatory and technical agencies, and insurers. The shrimp farmers adopt and implement good aquaculture management practices and comply with buyers' product quality standards. This insurance scheme clearly reflects SSFs insurance-worthiness.

How can governments and other stakeholders encourage more small-scale fishers to insure their vessels and equipment? Conversely, how can insurance providers be encouraged to package their services so that they are accessible and attractive to the sector?

International Maritime Organizations (IMO) conventions include compulsory insurance requirements for large vessels, and they do not distinguish between a merchant marine or a fishing vessel. Similarly, decision-makers may integrate insurance within legislative and policy frameworks, as efforts are needed to extend and make compulsory insurance for small-scale fishing boat owners, to register them, and/or to obtain/renew fishing licenses or authorizations.

Fishing is one amongst the most dangerous occupations in the world. There is a growing concern regarding safety at sea, with increasing numbers of fishing vessel loss or damage, or even damage to third-party property or loss of life, as well as personal injury to crewmembers including third parties. Often when these losses are not compensated, it creates a financial and social hardship for SSF communities and limits them from reviving their operations. Governments and other stakeholders can intervene to introduce stringent and compulsory safety risk covers like third-party liability insurance in fisheries, which is of utmost importance. This type of insurance covers a wide variety of claims, including claims for loss of life or personal injury, as well as claims relating to loss or damage caused by a fishing vessel to another vessel or other property. This cover can be provided by protection and indemnity clubs (P&I) or private insurers.

Conversely, insurance providers need to identify key entry points to package insurance services and make it accessible to the SSF sector through various ways:

- collective approach – promote alliances with fisherfolk federations, boat owners' associations, cooperatives, producer organizations, and NGOs to deliver insurance services in a collective manner;
- establish linkages with other financial institutions – engage with specifically banks, credit unions, and microfinance institutions with a widespread outreach in rural areas, to design suitable insurance products that can be bundled with credit or savings components. In several countries, microfinance institutions have a good presence in remote areas; thus, insurance providers can leverage on these linkages to reduce high administrative costs and offer cost-effective options with a reduced premium rate and faster claim handling process;
- introduce innovative delivery models for distribution – tie-up with dealers of fishing boats and gears, farm machinery and equipment, suppliers of fish seed and feed could act as insurance agents. Also, weather-index based insurance is used in agriculture and livestock and is now being piloted in aquaculture. It uses the level of rainfall as a "payout trigger" to cover damage from natural disasters such as flood, excessive precipitation, and drought. In aquaculture, other parameters can be used. In China, for example, index-based insurance schemes use wind speed (for

[4] *first level of jurisdiction and administrative division (at present 47 prefectures in Japan)*

laver seaweed insurance) and temperature as a parameter (for crab, oyster, and sea cucumber); and

- simple policy documents with an effective mechanism in place to address fisher/fish farmer grievances with respect to damage assessment and the claim settlement process.

Lakshadweep Island (India), affected by cyclone Taukate

And in closing, could you recommend to readers some useful websites and/or publications that contain further details and information on insurance and financial services for the small-scale fisheries and aquaculture sector?

There are many publications on credit, microfinance, and insurance services for small –scale fisheries; however, I would like to suggest several relevant and useful publications as follows:

- World review of capture fisheries and aquaculture insurance – 2022.
- DOI: https://doi.org/10.4060/cb9491en
- IYAFA. 2022. Small in scale, big in value. International Year of Artisanal Fisheries and Aquaculture. [online] Food and Agriculture organization of the United Nations (FAO). Rome. www.fao.org/artisanal-fisheries-aquaculture-2022/home/en/
- Martinez, N.A. and Van Anrooy, R. 2021. Third-party liability insurance for fishing vessels. CC4Fish Policy Brief, October 2021, issue no. 4. Rome, FAO. https://doi.org/10.4060/cb6963en.
- Financing small-scale fisheries in the Philippines – A policy brief. Rome. https://doi.org/10.4060/cb8029en
- Guidelines for increasing access of small-scale fisheries to insurance services in Asia: A handbook for insurance and fisheries stakeholders. 2019. http://www.fao.org/3/ca5129en/ca5129en.pdf
- FAO. 2020a. FAO's Blue Growth Initiative. Blue finance guidance notes: Microfinance for small-scale fisheries. Rome. www.fao.org/3/ca8645en/ca8645en.pdf
- FAO. 2020b. FAO's Blue Growth Initiative. Blue finance guidance notes: Insurance for small-scale fisheries. www.fao.org/3/ca8646en/CA8646EN.pdf
- FAO.2020c. FAO's Blue Growth Initiative. Blue finance guidance notes: Aquaculture insurance for small-scale producers. 2020. Rome. http://www.fao.org/3/ca8663en/CA8663EN.pdf
- Martinez, N. A. & Van Anrooy, R. 2020. Compulsory insurance (third party liability) requirements for fishing vessels: a case for the introduction of compulsory fishing vessel insurance in the Caribbean. FAO Fisheries and Aquaculture Circular No. 1199. Rome, FAO. https://doi.org/10.4060/ca7732en
- Tietze, U. & Van Anrooy, R. 2018. Assessment of insurance needs and opportunities in the Caribbean fisheries sector. FAO Fisheries and Aquaculture Circular No. 1175. Rome, FAO. https://www.fao.org/3/ca2199en/CA2199EN.pdf
- FAO. 2015. Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) https://www.fao.org/documents/card/en/c/I4356EN
- Rural Finance and Investment Learning Centre https://www.rfilc.org/newsletters/
- Financing Fisheries in Africa. Case studies from the United Republic of Tanzania and Zambia https://afraca.org/wp-content/uploads/2022/01/Financing-Fisheries-in-Africa-case-studies-from-the-United-Republic-of-Tanzania-and-Zambia.pdf
- Financing Fisheries in Africa. Financial services provision to small-scale fisheries https://www.rfilc.org/wp-content/uploads/2022/03/Financial-services-provision-to-small-scale-fisheries.pdf

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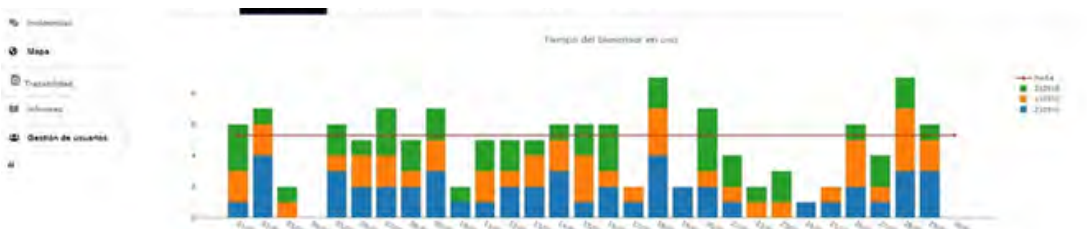

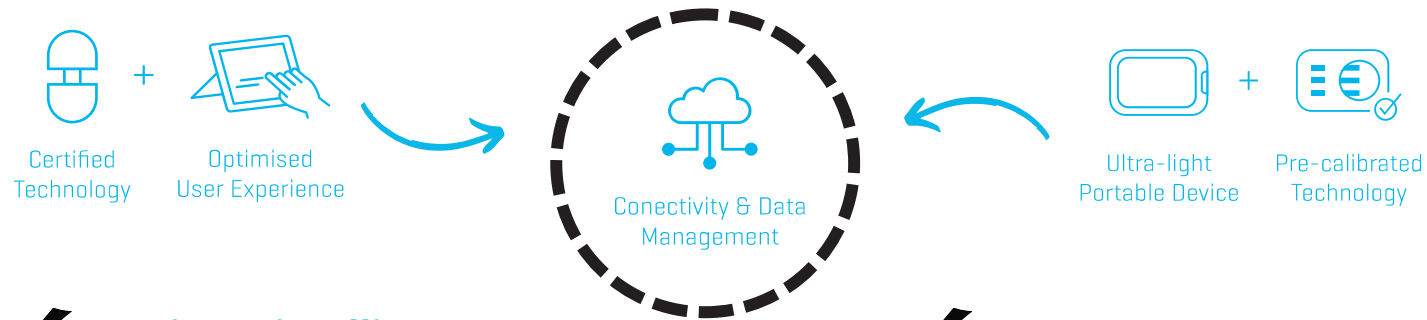

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Press Release August / September 2022

REGISTER NOW and JOIN US at this flagship 17th INFOFISH World Tuna Trade Conference and Exhibition (TUNA 2022) in Bangkok, Thailand from the 11th – 13th of October 2022. This is 'the' premier convening of the world's leading tuna players who will be speaking to the resilience, adaptability and sustainable growth of the Global Tuna Industry in a rapidly changing and disruptive environment.

Juan Corrales

CEO, Tri Marine International, USA

We are privileged to announce that Mr. Juan Corrales, CEO of Tri Marine International, USA, will be delivering the Keynote Address on the conference theme **"Strengthening Resilience, Adaptability and Sustainable Growth in the Global Tuna Industry"** at TUNA 2022. We are also further privileged to bring to you at the TUNA 2022, a remarkable line-up of many notable world tuna leaders, professionals and policy makers, as highlighted below:

From our exhibition site, forty booths featuring thirty-six (36) companies and organizations from across the globe will be promoting their products, equipment, machinery and services, all of which are relevant and unique to the tuna industry. Please do visit our conference website http://tuna.infofish.org for a more detailed listing of our TUNA 2022 exhibitors.

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17TH INFOFISH WORLD TUNA TRADE CONFERENCE & EXHIBITION

11 – 13th October 2022
Shangri-La Hotel, Bangkok, Thailand

'Strengthening Resilience, Adaptability and Sustainable Growth in the Global Tuna Industry'

Tentative Conference Programme

Chairperson : **Neil Bohannon** (Group Director Seafood, Princes Limited)
Co-Chairperson : **Dr Chanintr Chalisarapong** (President, Thai Tuna Industry Association, Thailand)

Monday, 10 October 2022

16.00 - 21.00 Pre-Registration

Day 1: Tuesday, 11 October 2022

07.30 – 09.00 Registration
09.00 – 10.00 Opening Ceremony
Welcome Address by **Shirlene Maria Anthonysamy, Director INFOFISH, Malaysia**
Special Address by Conference Chair (**Neil Bohannon,** Group Director Seafood, Princes Limited)
Special Address by **H E Andres Arens Hidalgo** (Vice Minister of Fisheries and Aquaculture, Ministry of Production, Foreign Trade, Investments and Fisheries, Government Financial Platform, Ecuador)
Official Opening by Hon. Minister of Agriculture and Cooperatives, Thailand (TBC)

10.00 – 10.30 Press Conference/Tour of Exhibition/Tea Break

10.30 – 11.00 Keynote Address: ***'Strengthening Resilience, Adaptability and Sustainable Growth in the Global Tuna Industry'*** **- Juan Corrales (CEO, Tri Marine International, USA)**

Session 1: Industry Updates: Adapting to the new global trade reality

11.00 – 11.20 Thai tuna industry update – **Narin Niruttinanon (Vice President of Thai Tuna Industry Association, Thailand)**

11.20 – 11.40 Latin America: Ecuador's tuna industry during this pandemic – **Monica Maldonado (Executive Director, Ecuador Association of Tuna Processors and Exporters (CEIPA), Ecuador)**

11.40 – 12.00 Europe: Industry updates and how the industry is adapting to the new global trade reality – **Roberto Alonso (Secretary General, ANFACO-CECOPESCA, Spain)**

12.00 – 12.20 Tuna fisheries in the Indian Ocean – **Erik Hempel (Director of Communications, The Nor-Fishing Foundation, Norway)**

12.20 – 12.40 Panel Discussions (20 mins)

12.40 – 13.40 Lunch (1 hour)

Session 2: Industry updates: Revisiting sustainability

13.40 – 14.00 Transparent accountability across tuna fisheries – **Susan Jackson (President, International Seafood Sustainability Foundation (ISSF), USA)**

14.00 – 14.20 Industry's role in sustainability from the Government's perspective: Ecuador – **H E Andres Arens Hidalgo (Vice Minister of Fisheries and Aquaculture, Ministry of Production, Foreign Trade, Investments and**

Fisheries, Government Financial Platform, Quito, Ecuador)

14.20 – 14.40 The tuna industry in the Pacific – Parties to the Nauru Agreement (PNA) - **Dr Sangaa Clark (CEO, Parties to the Nauru Agreement, PNA, Republic of the Marshall Islands)**

14.40 – 15.00 Industry's role in sustainability - **Neil Bohannon** (Group Director Seafood, Princes Limited)

15.00 – 15.20 Women in the Western and Central Pacific Ocean tuna fisheries - **Prof. Kate Barclay, (Marine Social Scientist, University of Technology Sydney, Australia)**

15.20 – 15.40 Panel Discussions (20 mins)

15.40 – 15.55 Tea Break (15 mins)

Session 3: Overview of global tuna resources and supply

15.55 - 16.15 Global production and trade trends – **FAO**

16.15 - 16.45 Tuna stock health and sustainability (challenges and issues) - **panel WCPFC / IOTC /BOBPIGO**

16.45 – 17.05 The Global Tuna Alliance: Supporting the delivery of SDG14 through supply chain advocacy and action via a 5-year strategy – **Dr Tom Pickerell (Executive Director, Global Tuna Alliance, UK)**

17.05 - 17.25 Panel Discussions (20 mins)

Day 2: Wednesday, 12 October 2022

Session 4: Tuna markets and marketing: Embracing changes

09.00 - 09.20 **Inaugural Address:** Impact of raw material prices on global tuna trade – **Dr Audun Lem (Deputy Director, Fisheries & Aquaculture Division, FAO, Italy)**

09.20 - 10.40 (i) **Canned /processed tuna:** Retail and catering trade

- » Trends in the US tuna retail market: Post-COVID **– Martin Thurley (Executive Director, Seafood Task Force)**
- » Europe: Changes in retail and institutional trade – **Henk Brus, (CEO, Pacifical B.V., Netherlands)**
- » Trends in the Middle East and North Africa (MENA) region – **Arnab Sengupta (Independent Consultant, India)**
- » Post-COVID-19 New Era in Latin America: The rise of tuna and the surprising case of Brazil – **Dario Chemerinski (Business Director, SSP-Selecting Strategic Partners, Brazil)**

10.40 – 10.55 Tea Break (15 mins)

10.55 – 12.15 (ii) **Changing landscapes**

- » WTO fish subsidies agreement, implementation and potential impacts for the tuna sector - **David Vivas Eugui (Head, Ocean Economy and Fisheries UNCTAD, Switzerland)**
- » Asia/Pacific: Growing demand for semi-processed raw material - **Fatima Ferdouse (International Consultant, Malaysia)**
- » Changing landscape in Vietnam on tuna markets and marketing – **Le Hang (Deputy Director, Vietnam Association of Seafood Exporters and Producers (VASEP), Vietnam)**
- » Market adaptability and innovation at the retail level in the EU market - **Adolfo Valsecchi (CEO, Generale Conserve S.p.A, Spain)**

12.15 – 12.35 Panel Discussions (20 mins)

12.35 – 13.35 Lunch (1 hour)

Session 5: Sustainable supply chain and logistics

13.35 – 13.55 Shipping tuna: Impacts of high freight costs on raw tuna /raw material and processed tuna trade - **Thue Barfod (Global Head of the Fish & Seafood Segment, Center Reefer Management, Maersk Hong Kong Limited, Hong Kong)**

13.55 – 14.15 How the pandemic is reshaping supply chains - **Luciano Pirovano (Global Sustainable Development Director, Bolton Food, UK)**

14.15 – 14.35 Effectiveness in maintaining European Union policy in fighting Illegal, Unreported and Unregulated fisheries (IUU): post-COVID-19, new challenges and future objectives – **Roberto Cesari (Head of Unit, DG MARE – B4, IUU Fisheries Policy Directorate for International Ocean Governance and Sustainable Fisheries, European Commission, Belgium)**

14.35 – 14.55 Panel Discussions (20 mins)

Session 6: Market adaptation and technological innovation

14.55 – 15.55 E-commerce innovation

- E-commerce and consumer trends; the impact of the pandemic in tuna supply chains and logistics – **Dr Radika Kumar, PhD (Adviser Infrastructure Policy – Digital, Trade, Oceans and Natural Resources Directorate, The Commonwealth Secretariat, UK)**
- ESG and sustainability in fisheries, a new vision in Latin America - **Antonio Guerra Autrey (CEO, GrupoMar, Mexico)**
- Transforming the way tuna is processed: Digitalization and automation journey - **Bergur Gudmundsson (Business Development Manager, Marel Fish, Spain)**

15.55 – 16.10 Tea break (15 mins)

16.10 – 16.50 Technological innovation

- Marine Instrument's innovative Tuna Drone - **Gabriel Gomez Celaya (General Manager, Marine Instruments, Spain)**
- How technology innovation is helping to monitor IUU and other illegal activities: A case in point in the Pacific Ocean - **Dr Moritz Lehmann (Senior Scientist, Xerra, New Zealand)**

16.50 – 17.10 Panel Discussion (20 mins)

Day 3: Thursday, 13 October 2022

Session 7: Technology and innovations for a safer, secure and sustainable tuna industry

09.00 - 09.20 **Inaugural Address:** Blue Food revolution: Balancing demand, supply and sustainable tuna stock – **Dr Transform Aqorau (CEO, iTuna Intel and Founding Director, Pacific Catalyst, Solomon Islands)**

(i) How smart technology is supporting sustainable fishing

09.20 – 09.40 Electronic monitoring technology for sustainable fishing: Edge-computing for automatic capture detection in real-time - **Faustino Velasco (President and CEO, SATLINK S.L, Spain**)

09.40 – 10.00 Food control digitalization - **Antonio Bustamante (Delegate to Asia, BIOLAN, Spain)**

10.00 – 10.20 Environmental DNA (eDNA) in canned tuna: How does it affect the industry? – **Christopher W. Lord**

(Independent Consultant on behalf of EUROFISH, Ecuador)

10.20 – 10.40 The path to sustainability for global tuna fishing through artificial intelligence and technology - **Angel Martinez (Commercial Director, *Zunibal*, Spain)**

10.40 – 10.55 Panel Discussions / Tea Break (15 mins)

10.55 – 11.15 Origin of the Smart Brine Viewer or "SBV": The salt content measurement for new market opportunities and quality in the fishing industry – **Gildas Bodilis (President, OLEN, France)**

11.15 – 11.35 Adding value to tuna Fishery Improvement Projects (FIPs) – **Iain Pollard (Senior Consultant, Key Traceability Ltd., UK**)

(i) What's next in social accountability and sustainability?

11.35 – 11.55 Fisheries and people in the context of social accountability and sustainability - **Francisco Blaha (Independent Consultant, New Zealand)**

11.55 – 12.15 How can tuna safeguard people, planet and prosperity? – **Martin Purves (Managing Director, International Pole & Line Foundation (IPNLF), UK)**

12.15 – 12.35 Growing concerns among banking and financial institutions' drive for greater due diligence and scrutiny of fishing investments – **Bubba Cook (Western and Central Pacific Tuna Programme Manager, WWF, New Zealand**)

12.35 – 12.50 Panel Discussions (15 mins)

12.50 – 13.40 Panel

- What's next in social accountability and sustainability at the Marine Stewardship Council (MSC) – **Bill Holden (Senior Tuna Fisheries Outreach Manager, MSC, Australia)**
- Satellite and CCTVs monitoring, augmented reality audits and marine biodiversity offsets: sustainable seafood certification according to Friend of the Sea– **Paolo Bray, (Founder and Director, Friend of the Sea (FOS), Italy)**
- Human rights in tuna fisheries: Group certification experience of PNG tuna fleet – **Marcelo Hidalgo (Sustainability and CSR Director, Fishing Industry Association, Papua New Guinea)**
- Social sustainability in fishing: why is it controversial? – **Dr Julio Moron (Managing Director, OPAGAC/ AGAC, Spain)**

13.40 – 14.00 Wrap up and closing remarks

14.00 – 15.00 Lunch (1 hour)

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info.ecuador@thsa.com
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企业简介
COMPANY INTRODUCTION

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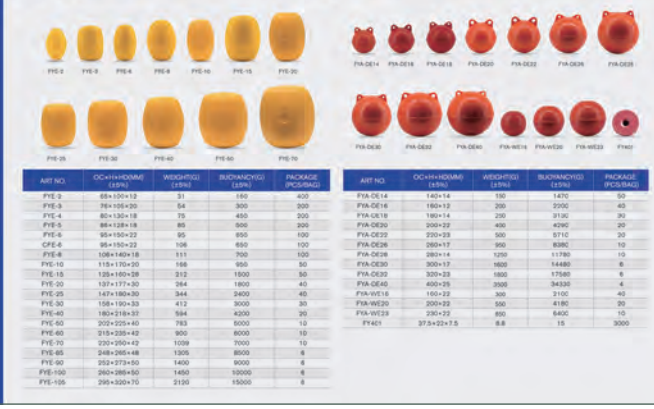

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FYE-5	86×128×18	85	500	200
FYE-6	95×150×22	95	650	100
CFE-6	95×150×22	106	650	100
FYE-8	108×140×18	111	700	100
FYE-10	115×170×20	166	950	50
FYE-15	125×160×28	212	1500	50
FYE-20	137×177×30	264	1800	40
FYE-25	147×180×30	344	2400	40
FYE-30	158×190×33	412	3000	30
FYE-40	180×218×37	594	4200	20
FYE-50	202×225×40	783	5000	10
FYE-60	215×235×42	900	6000	10
FYE-70	220×250×42	1039	7000	10
FYE-85	248×265×48	1305	8000	6
FYE-90	252×273×50	1400	9000	6
FYE-100	260×285×50	1450	10000	6
FYE-105	295×320×70	2120	15000	6

ART NO.	OC×H×HD(MM) (±5%)	WEIGHT(G) (±5%)	BUOYANCY(G) (±5%)	PACKAGE (PCS/BAG)
FYA-DE14	140×14	150	1470	50
FYA-DE16	160×12	200	2000	40
FYA-DE18	180×14	230	3130	30
FYA-DE20	200×22	400	4290	20
FYA-DE22	220×23	500	5710	20
FYA-DE26	260×17	950	8380	10
FYA-DE28	280×14	1250	11790	10
FYA-DE30	300×17	1600	14480	6
FYA-DE32	320×23	1800	17580	6
FYA-DE40	400×25	3500	34330	4
FYA-WE16	160×22	300	2100	40
FYA-WE20	200×22	550	4180	20
FYA-WE23	230×22	850	6400	10
FY401	37.5×22×7.5	8.8	15	3000

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Press Release, August 2022

The Pacific Tuna Forum will be back in September 2023

INFOFISH and its partners are very pleased to announce that the **8th Pacific Tuna Forum (PTF)** will be back in September 2023 and that this premier event on the global Tuna calendar will be held in *Amazing* Port Moresby, Papua New Guinea.

The event will provide industry players within the region and beyond with the timely opportunity to convene on the state of the play of the Tuna industry, including the significant potential for further business growth and investment in this exciting industry and region, the Western and Central Pacific.

The **8th Pacific Tuna Forum 2023** is supported by **FAO-GLOBEFISH** and jointly organized by **INFOFISH**, the **National Fisheries Authority (NFA)** of Papua New Guinea, and regional organizations in the Pacific.

Tuna industry players eyeing the Western and Central Pacific region are warmly invited to participate in this unique event.

The specific dates and meeting venue will be confirmed and provided well in advance of this convention of key industry players in **Port Moresby, Papua New Guinea**, in **September, 2023.**

Please bookmark this date and look out for more details which will be provided in the weeks and months ahead.

COVID-19 AND LESSONS LEARNT ON THE RESILIENCE OF AQUACULTURE VALUE CHAINS

By Ben Belton

The findings of telephone surveys conducted by WorldFish in six Asian and African countries show that COVID-19 induced micro- small- and medium-scale enterprises in aquaculture value chains to adopt a wide variety of coping strategies and exacerbated pre-existing inequalities. However, proactive adaptations allowed some businesses to seize emerging opportunities. Examples include the rapid uptake of digital technology, the restructuring of value chains by larger business, and the introduction of new institutional innovations. Recovery in many countries has been quite swift, underlining the resilience of aquatic food supply chains, but businesses now face a new array of emerging economic and climate challenges.

Credit: worldfishcenter.org

COVID-19 and the policies implemented to contain it caused an unprecedented systemic shock to global food systems. During the early stages of the pandemic, restrictions on transport, human mobility, and temporary closures of businesses and institutions impacted the flow of goods and services along global, regional, national, and sub-national supply chains, sharply reducing economic activity and impacting consumer demand for aquatic foods such as fish and shrimp. This scenario led to a wave of studies that aimed to track effects of the crisis on aquatic food systems and value chains in real time.

During 2020 and 2021, WorldFish implemented regular phone surveys in Asian and African countries including Bangladesh, Egypt, India, Kenya, Myanmar, and Nigeria, in partnership with institutions including the CGIAR, FAO, and numerous universities. These studies sought to evaluate the effects of the COVID-19 pandemic on the availability and price of aquatic foods, and the challenges faced by aquatic food producers and supply chain actors, including feed millers and dealers, and fish producers, wholesalers, and retailers. Most respondents were owner-operators of micro-, small- or medium enterprises (MSMEs).

As the pandemic progressed, study designs were adjusted to focus on the adaptations and pivoting strategies actors used to cope with shocks, and the effects of these strategies on the structure, conduct, and resilience of aquatic food supply chains.

Now, as the peak of the pandemic recedes, we can look back to the main identifying trends revealed by studies conducted during this period and take stock of resultant changes in aquatic food systems. This synthesis was first captured in a presentation given at the INFOFISH World Shrimp Trade Conference and Exhibition on June 9, 2022, which forms the basis for this article.

Initial disruptions to aquatic food value chains, and their impacts

During the first half of 2020, restrictions implemented to slow the transmission of COVID-19 severely disrupted value chains supplying aquatic foods. Transport restrictions that hampered logistics (e.g., movement of fish from farms to markets, or feed from mills to farms) were the main vector for disruption to value chains. Co-ordinated monthly phone surveys implemented simultaneously in Bangladesh, Egypt, India, Myanmar, and Nigeria[1] showed clearly that supply chain actors' ability to access production inputs and buyers closely matched their ability to access transport.

[1] *Belton, B. et al. 2021. COVID-19 impacts and adaptations in Asia and Africa's aquatic food value chains. Marine Policy. 104523: 1-13. https://doi.org/10.1016/j.marpol.2021.104523*

Figure 1. Respondents able to access transport & inputs, by month Feb-Nov 2020, Assam, India (%)

A particularly pronounced example of this trend is revealed in data from the state of Assam in India (Figure 1). However, also evident in Figure 1, the impacts of initial stringent lockdown policies on transport and mobility were mainly short-lived, as governments quickly made policy adjustments to allow the movement of "essential" goods and businesses made adaptations such as using new routes or opening outside of normal hours.

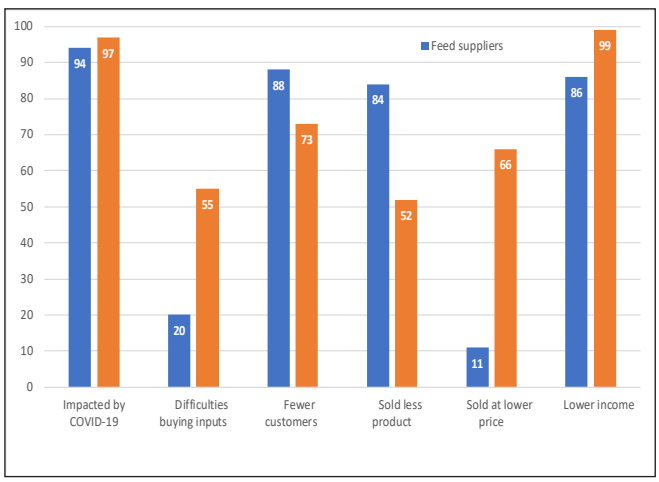
Lockdown and stay-at-home policies simultaneously disrupted the flow of aquatic foods along supply chains, and curtailed retail activities. Many businesses such as restaurants closed temporarily, markets closed or operated under reduced trading hours, and consumers stayed home to avoid infection, or because non-essential travel was prohibited. These trends resulted in an immediate reduction in volumes of aquatic foods traded. For instance, in China, wholesale markets experienced a precipitous drop in the volumes of all aquatic foods traded domestically between January and April 2020. Sales of lower-value species such as carps, which are mainly eaten at home, were quicker to recover than sales of more expensive marine capture fish species that are mainly eaten at restaurants.[2]

Our coordinated five-country phone survey revealed that farmed fish retail prices spiked during the lockdown months of March-May 2020, as compared to pre-pandemic February 2020, but subsequently declined to below February levels. This trend was likely due to restrictions on wet market and restaurant operation and reduced consumer mobility during stringent lockdowns, followed by declining demand for aquatic foods thereafter, as consumer spending power fell due to the slowdown in economic activity that reduced income-earning opportunities.

Farmgate prices were depressed from March to November in almost all countries, averaging 10% less than in February overall. Prices received by wholesalers followed a similar pattern. At the same time, input costs increased. The all-country average price of pelleted feed purchased by farms rose steadily to around 20% higher in September than in February. Increasing feed costs reflected rising costs of business operation, including transport and labour, and inflation, which was high in all surveyed countries during 2020. The dual trend of lower farmgate prices and rising input costs occurring in tandem implies that producer margins were increasingly squeezed during this period.

Businesses in most value chain segments experienced similar pressures. A representative survey of 329 fish traders and 79 feed supply businesses in Southwest Bangladesh in 2021 found that nearly all enterprises reported being impacted negatively by COVID-19. Commonly reported problems included difficulties buying inputs, fewer customers than normal, selling less product than usual, and selling products at lower prices than usual. As a result, 99% of fish traders and 86% of feed suppliers reported earning lower-than-usual incomes (Figure 2).

Figure 2. Feed supply and fish trading business in southwest Bangladesh reporting COVID-19 related challenges during 2021

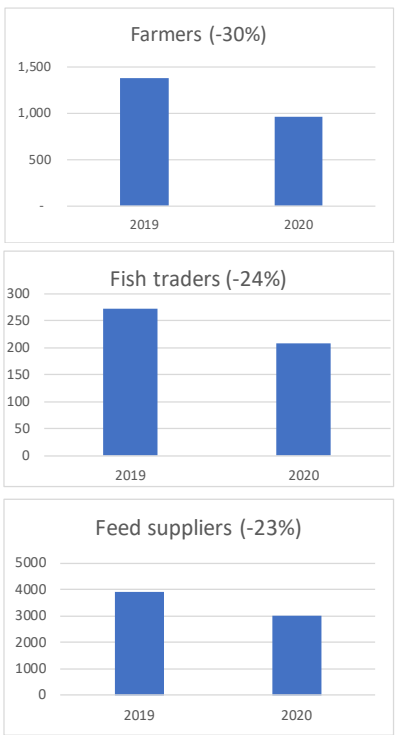


[2] *Love, D. et al. 2021. Emerging COVID-19 impacts, responses, and lessons for building resilience in the seafood system Global Food Security. 28: 100494 https://doi.org/10.1016/j.gfs.2021.100494*

The nature of challenges experienced by businesses evolved over time. Results from a monthly phone survey conducted in Nigeria during 2020 found that early in the pandemic, the main problems experienced related to accessing inputs, transport and markets, and low demand. Over time, these challenges declined in importance, and rising input costs and financial constraints (e.g., inability to access or recoup loans) became more significant issues.

These composite challenges caused the volume of aquatic foods produced and sold to decline significantly from 2019 to 2020. Our representative surveys in Southwest Bangladesh, including 721 farms producing a mix of fish for domestic markets and crustaceans for export, found that the sales reported by feed supply businesses, farms, and traders in 2020 were consistently about one-quarter lower than in 2019 (Figure 3).

Figure 3. Average annual sales made by feed suppliers, farms, and traders in southwest Bangladesh, 2019 and 2020



Some enterprises have been more resilient to the challenges faced than others. A second round of longitudinal phone surveys conducted in Nigeria in 2021 allowed us to track patterns of business closures beyond the initial lockdown period. Regression analysis showed that, controlling for other business characteristics, businesses owned by women were 11% more likely to close than those owned by men. Larger businesses were 13% less likely to close than small businesses, and businesses in the north of Nigeria were 7% more likely to fail than those in the more economically developed south (Table 1). Although these results are not generalizable to other locations, it is likely that similar patterns are evident in some settings, with some types of businesses being more vulnerable than others to shocks such as COVID-19. The negative impacts on businesses owned by women, smaller enterprises, and those in less developed regions suggests that the pandemic has deepened pre-existing inequalities.

Table 1. Correlates of aquaculture value chain enterprises going out of business between 2020 and 2021 due to factors related to COVID-19, Nigeria

	Probability of closing down
Variables	**Margins**
Female-owned enterprise (1/0)	0.111***
Rural (1/0)	0.021
Upstream (1/0)	0.021
Midstream (1/0)	-0.020
Lateral (1/0)	0.047
Large business (1/0)	-0.132***
North (1/0)	0.072**
Lockdown (1/0)	-0.043
N	415

Coping and pivoting adaptations

Accelerated uptake of digital technologies has been one of the most notable changes in behaviour arising from the pandemic. Although these technologies were already in use prior to the pandemic, restrictions on mobility and avoidance of physical contact accelerated and intensified their uptake. Use of digital technologies in making transactions, such as "mobile money" and searching for buyers or sellers (via phone, social media, and online marketplaces), was already common in Kenya prior to the crisis, but accelerated in its wake (Figure 4). Similar changes, though starting from a lower base, were also observed in Nigeria. In India, accepting digital payment via QR codes became very common, even for the smallest retail businesses (Figure 5).

Other common coping strategies or adaptations reported in numerous locations included temporary business closures, attempting to reduce costs (e.g., by laying off staff), switching to use of cheaper or locally available inputs, searching for new markets, establishing formal or informal contracts, introducing a new "just in case" strategy, and increasing payment of bribes to facilitate transportation or continued business operations.

Figure 4. Use of e-payments (top), and use of social media to search for customers (bottom), and change in use patterns due to the pandemic, by fish traders and processors, Kenya

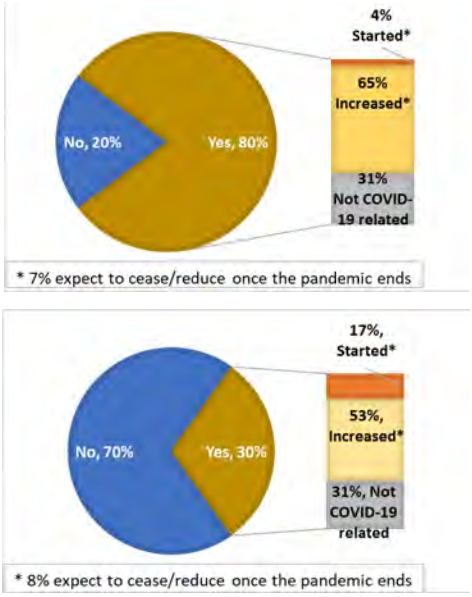


Figure 5. A simple roadside dried fish retail stall in Odisha accepting payment by QR Code

Many of the adaptations listed above can be considered reactive or passive. However, some businesses were able to identify significant new opportunities arising from the pandemic. In some cases, the resulting "pivots" in behaviour contributed to significant restructuring of business operations, and even reshaped supply chains. The "aquapreneur" from Assam in India pictured in Figure 6 provides one such example. Prior to the pandemic he had already operated a successful fish farming, fish seed trading and feed distribution business, and established an online store for purchasing inputs. The closure of wholesale auction markets during the peak of the pandemic forced him to begin delivering fish from his own farm directly to retailers. This experience provided him with the inspiration to try to establish seven live fish distribution centres in the State, with a plan to source fish from farmers in the State via his own e-commerce platform, and onward for sale to retailers through the distribution centres.

Figure 6. A young "aquapreneur" in Assam, India, restructured his business model in response to opportunities identified during the COVID-19 pandemic

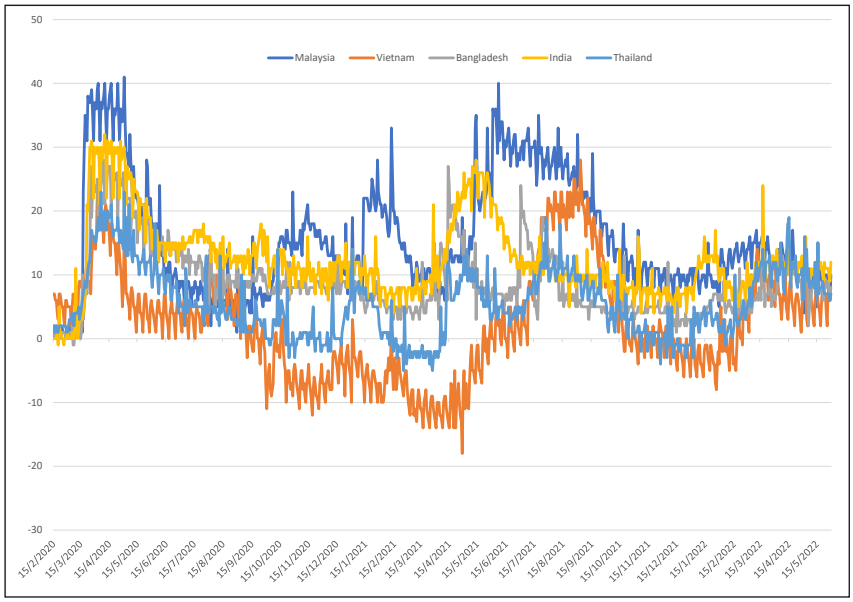
The aquatic food sector received very little targeted formal assistance to support COVID-19 recovery in any of the countries surveyed. General social protection programmes were limited in scope, and in some places (e.g., Nigeria), were almost non-existent. Perhaps partly as a result, businesses often reported receiving or providing informal support to their staff, other businesses, or neighbouring communities such as loans or donations. Drawing down savings to support business operating costs was also a common coping strategy.

Partial recovery in 2021 despite Delta variant

2021 saw signs of partial business recovery in most of the countries surveyed, despite the severity of the Delta variant "wave" of COVID-19 during the middle of the year, before widespread rollout of vaccines occurred. The Delta variant resulted in strict lockdowns and a high propensity to "stay home" in many countries, as illustrated in Figure 7 which shows daily percentage changes in the likelihood of staying home, as compared to a pre-February 2020 baseline in several Asian countries.

For example, in Egypt, the average number of days per month operated between March and May 2021 by feed mills was 77% higher than during the same period in 2020, and the share of fish farms that procured inputs was 22 percentage points higher on average during the same months in 2020. Similarly, whereas nearly all survey respondents in Egypt reported that the value of their sales in 2020 had been lower than in 2019 (with 10-24% lower, being the most common response), most of those who expressed an opinion on anticipated sales in 2021 expected them to be higher than in the previous year (with 10-24% higher being the most commonly reported option).

Figure 7. Google residential mobility index for selected Asian countries, Feb 2020 – May 2022



Preliminary data from the FAO Fish Price Index – an index which tracks trends in global fish prices – indicated fish prices fell by around 15% in 2020 compared to the long-term average but rebounded quickly during the first half of 2021, suggesting that demand began to recover quickly. This improving scenario is illustrated in Figure 8, which shows a popular seafood restaurant in Penang, Malaysia, that was forced to close for more than one year during the COVID-19 crisis due to lack of business, but recently reopened and was packed with customers again.

Figure 8. On the road to recovery

Lessons learnt on the resilience of aquaculture value chains

Synthesizing the trends presented above, we find that aquatic food value chains have proven quite resilient to the shock of the pandemic overall, despite severe challenges. The impact of initial containment policies on the movement of commodities along supply chains was severe but short-lived as workarounds and policy adjustments were quickly introduced. Demand for aquatic foods was longer-lasting than the initial disruptions to mobility and business operations due to the economic downturn that these produced, but partially recovered during 2021. Despite greater severity in terms of numbers of cases, the Delta variant wave of COVID-19 in 2021 posed far fewer logistical problems than the first wave due to business and policy adaptations implemented in the intervening months.

Two broad sets of business adaptations can be observed from our surveys: (i) Short-term reactive coping strategies such as pausing business activities, reducing operating costs, drawing down savings, or borrowing; (ii) Longer-term more proactive pivots such as the diffusion of digital technologies, increasing contractualization, operational diversification, and institutional innovations.

Reactive coping strategies facilitated immediate survival for many businesses, but depleted their resources. We find evidence that smaller businesses and those operated by women may have been more negatively impacted than larger and male-operated business in Nigeria, though these results may not be generalizable. Larger enterprises tended to display more adaptive capacity, including the ability to seize emerging opportunities to restructure and grow businesses. Our findings underline the centrality of logistics in value chain functioning, and the need to introduce more comprehensive systems of social protection in low- and middle-income countries. Finally, although the global aquaculture sector is on the path to recovery from the impacts of COVID-19, it now confronts an emerging set of challenges and crises linked to conflict, weather extremes, and economic shocks that are pushing up feed and fuel prices, which will further test its resilience.

Dr Ben Belton *is Global Lead for Social and Economic Inclusion at WorldFish, Penang, Malaysia. He shares a joint appointment with Michigan State University, East Lansing, USA, as Associate Professor of International Development. His work focusses on the links between value chains and food systems, rural development and agrarian change, food and nutrition security, social well-being, and the environment.*

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AQUACULTURE

Mitsubishi – Maruha collaboration on Atlantic salmon

Japan – On 30 June, Mitsubishi Corporation (MC) and Maruha Nichiro Corporation (Maruha Nichiro) announced an agreement to establish a new joint venture company, ATLAND Corporation (ATLAND), that will specialize in the land-based production of Atlantic salmon. Mitsubishi will own 51% and Maruha Nichiro 49%.

Following the establishment of the company, a land-based Recirculating Aquaculture System facility with a capacity of 2 500 tons (live weight equivalent) will be constructed in Nyuzen (Toyama prefecture) this October, with the aim of starting operations in 2025 and completing the first delivery in 2027. The salmon produced will be distributed within the country to meet increasing domestic demand.

This project will be run in a sustainable manner, involving advanced water-treatment technologies and digitalization (AI and IoT). It is also expected to produce fewer greenhouse gas emissions compared to the practice of importing fresh salmon into Japan by air from salmon-farming countries.

Another Atlantic salmon collaboration (Marubeni – Proximar)

Japan – Marubeni Corporation and Norwegian firm Proximar Seafood AS signed an agreement in April 2022 for Proximar to build Japan's biggest RAS

facility for Atlantic salmon. To date, construction has already begun on the facility in Shizuoka Prefecture. It is envisaged to be ready to supply fish to the domestic market from mid-2024, and Marubeni will be the exclusive distributor in Japan for all the fish.

In its press release dated 20 April 2022, Marubeni estimates that the annual demand for Atlantic salmon in Japan is approximately 60 000 tonnes, and that in 2024, the expected harvested volume from the RAS facility will be around 2 500 tonnes (head-on gutted weight), increasing to targeted 5 300 tonnes (head on gutted weight) when operating at full capacity in 2027.

In April 2020, Marubeni, through its subsidiary company Benirei Corporation, had invested in Denmark's Danish Salmon A/S which is one of the world's largest RAS-based Atlantic salmon producers. With this new collaboration with Proximar, Marubeni is setting itself up to be one of the top distributors of Atlantic salmon in Japan.

Abalone ranching success

Australia – An ocean ranch for greenlip abalone is now formally recognised as a Wild Enhanced Fishery, meeting the Marine Stewardship Council (MSC) standard. The company, Rare Foods Australia, says it has developed a model to combine sustainability with the market appeal and premium pricing of wild-catch fisheries.


Credit: Rare Foods Australia

The abalone is farmed in a 413 hectare ocean area in Flinders Bay using purpose-built artificial abalone structures (ABITATs™) and they grow naturally without the use of feed and power inputs.

Additional investment in aquaculture

Brunei/Oman – Resulting from the Oman-Brunei Darussalam Cooperation Dialogue held at Universiti Brunei Darussalam in early July, the Oman Brunei Investment Company (OBIC) will continue to explore more opportunities in aquaculture, in particular, a state-of-the-art salmon farming facility in the Sultanate, said Minister at the Prime Minister's Office and Minister of Finance and Economy II Dato Seri Setia Dr Awang Haji Mohd Amin Liew bin Abdullah. A private equity fund, OBIC was jointly established by Oman Investment Authority and Brunei Investment Agency in 2009 with the aim of encouraging more investment between the two countries.

OBIC already owns a 50 percent stake in Golden Corporation, a local shrimp exporter. The Minister added that despite COVID-19 related challenges, Golden Corporation has been able to expand production by another 135 ponds, harvest over 4 000 tonnes of shrimp, and improve production capacity, cold storage facility as well as manufacturing and transport related logistics.

Breakthrough in squid culture

Japan – On 2 August 2022, the Okinawa Institute of Science and Technology (OIST) announced that researchers from the Physics and Biology Unit, led by Prof. Jonathan Miller, have developed the first squid aquaculture system that has the potential to be commercialized. The research species is the oval squid, stocks of which have been declining in Okinawa waters since the 1980s. Successfully rearing squid in a way that is compatible with aquaculture has never before been achieved due to several of the animal's traits such as their aggressive behaviour, sensitivity to water flow, food preferences, and complex lifecycle. Dr. Zdenek Lajbner, who is responsible for squid culturing within the OIST Unit, said that the system specifically focuses on providing good conditions for spawning and hatching.

FISHING

IATTC announces agreements on transhipment and compliance

Global – At the 5 August meeting of the Inter-American Tropical Tuna Commission (IATTC), members agreed on agreements on transshipment and compliance, and a commitment to adopt a harvest strategy

for north Pacific albacore at next year's meeting. The IATTC is thus following the lead of the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Indian Ocean Tuna Commission (IOTC) by adopting stronger oversight for transshipment at sea.

The IATTC also agreed to establish a working group on electronic monitoring (EM), intended to lead to improvements in data collection and oversight of fishing vessels.

It is likely that the Western and Central Pacific Fisheries Commission (WCPFC), which gets its data from the same international scientific committee, and cooperates with ICCAT to manage Pacific tuna stocks, will follow suit given the close relationship between the two regional fishery management organizations.

Supply chain company set up

Marshall Islands – The Nature Conservancy (TNC) has set up a vertically integrated, sustainable end-to-end tuna supply chain company called Pacific Island Tuna in the Republic of the Marshall Islands. The goal of this initiative is to reduce bycatch of baby tunas and at-risk species and to create a sustainable funding source for community-based conservation projects in the region. As a Republic of Marshall Islands-based company, Pacific Island Tuna will ensure that Pacific Island countries have direct ownership of their tuna catch from the dock to retailers and that a portion of net income flows to community-based conservation projects.

The project will partner directly with local government and communities, embed rules into vessel contracts to drive sustainable fishing practices and provide retailers with unparalleled levels of visibility in exchange for long-term, mutually beneficial, supply contracts. Its multi-faceted approach will help stabilize regional ecosystems, protect the world's tuna supply and preserve local cultural traditions.

Yellowfin tuna FIP launched

Malaysia – A yellowfin tuna fishery improvement project was launched in July off the coast of Semporna, Sabah. It is located within the "Coral Triangle", which includes the waters of Indonesia, Malaysia, the Philippines, Papua New Guinea, Timor-Leste and the Solomon Islands. This district produces more than 40 percent of the total yellowfin landings in the area, with a significant number of fishermen from nearby Mabul Island

catching the tuna using fishing rods (one-by-one). The Semporna project is governed by 10 stakeholder groups comprising government agencies, research institutes, non-governmental organizations and Mabul communities.

Apart from WWF-Malaysia, the project also receives funding from Yayasan Hasanah for activities involving improving the quality of yellowfin tuna, such as the adaptation of freezing processes and innovations for onboard fish storage systems.

MSC certification for AGAC vessels in all oceans

Spain – In a 6 July press release, the Marine Stewardship Council (MSC) announced that the Association of Large Freezer Tuna Vessels (Asociación de Grandes Atuneros Congeladores, AGAC) has obtained MSC certification for its skipjack tuna fishery in the Indian Ocean. Subsequently on 20 July, it was reported that Spanish ministers, fishing industry representatives and marine scientists gathered in Madrid to recognise the simultaneous MSC certification of six separate tuna stocks fished by AGAC. The certification applies to yellowfin tuna in the Eastern and Western Pacific and in the Atlantic; skipjack tuna in the Western Pacific and Indian Oceans; and bigeye tuna also in the Western Pacific. It is the first time that a fishing operation has achieved certification for operations in all four oceans. It is also the first purse seine fishery including both free school and Fish Aggregating Device (FAD) sets to achieve certification in the Atlantic Ocean.

This achievement is the result of more than 10 years' work to improve the sustainably of the fishery, including a Fisheries Improvement Project (FIP) started in 2016 and completed in 2020. In 2012 AGAC, which includes OPAGAC, the Organization of Associated Producers of Large Tuna Freezers, introduced a Code of Good Practice (CGP) to address impacts on non-target species, including the adoption of non-entangling and biodegradable FADs. Compliance with the CGP is verified annually by the independent scientific organization AZTI. Onboard and electronic observation is in place for all fishing trips. In addition, the MSC notes that AGAC has made great strides in reducing the impact of FADs on vulnerable habitats and the ecosystem by launching the first multi-stakeholder FAD-recovery project in the world in the Seychelles.

Purse seine tuna vessels operated by AGAC have received MSC certification

MARKETING

Pangasius export forecast of USD 2.6 billion

Vietnam – The Vietnam Association of Seafood Producers and Exporters (VASEP) reports that in the first five months of this year, the total export value of pangasius reached USD 1.21 billion, an increase of nearly 90% compared to the same period last year. The forecast for the whole year is USD 2.6 billion.

Major increases were seen for China (USD 317 million; +124%) and the US (USD 310 million; +131%), as well as for the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) countries (USD 146 million; +64%). In this latter grouping, exports to Mexico reached USD 51.8 million (+71%); Canada USD 27.5 million (86%); Australia USD 16.5 million (+29%); and Japan USD 14.6 million (+64%). It is forecasted that in the second quarter of 2022, frozen pangasius exports to the CPTPP will increase by more than 35% compared to the previous quarter, reaching about USD 110 million.

Credit: VASEP

Seafood outlook 2022-2031

China – Quoting from the recently-released China Aquatic Products Outlook Report (2022-2031), with the further improvement and implementation of the fishing moratorium and the control of fishing intensity, the fishing output in 2022 will continue to drop slightly to 12.96 million tonnes, a decrease of 0.7% from the previous year. The total output of aquatic products will reach 67.64 million tonnes, an increase of 1.1% over the previous year. It is expected that the consumption of aquatic products will reach 69.69 million tonnes in 2022, an increase of 1.2% over the previous year.

In 2022, the import of aquatic products will increase slightly, reaching 5.95 million tonnes, an increase of 3.5% over the previous year; meanwhile the annual export of aquatic products will increase to 3.9 million tonnes, 2.6% more than the previous year.

In the outlook for the next ten years, steady growth in output is expected, with equal emphasis placed on quantity and quality while continuously enhancing

competitiveness. It is estimated that the output of aquatic products will reach 71.27 million tonnes in 2031, an increase of 8.4% over the base period; and in the next 10 years, the output of aquatic products will increase by 0.8% annually. The output from aquaculture is expected to rise to 58.6 million tonnes by 2031, an increase of 12.0% over the base period. Second, consumption will continue to grow, with preference being on high-protein and low-fat aquatic products. By 2031 the consumption is expected to rise to 74.16 million tonnes. Third, imports will grow faster than exports. It is estimated that China's aquatic product imports will be 6.9 million tonnes in 2026.

Atlantic salmon market in Japan

Japan /Norway – In July, the Norwegian Seafood Council (NSC) announced that Norway's fish exports in the first half of 2022 reached NOK 70.1 billion (USD 6.84 billion), the highest first-half-year value on record. But exports to Japan, which also include shipments of mackerel, had decreased by 20 percent, largely because chilled air-freighted Atlantic salmon had to be rerouted (mainly to Dubai and Doha) due to the closure of Russian airspace in response to Japan's condemnation of its invasion of Ukraine.

Nevertheless, Norway continues to be the main supplier of Atlantic salmon to Japan, contributing about 90% of the fresh fish sold in the country. According to customs data from Japan's Ministry of Finance, imports of Norwegian salmon in 2021 amounted to 13.3 million kilograms, valued at USD 123 million. Because of their perceived higher quality, imported farmed Atlantic salmon goes towards sashimi and sushi dishes while Japan's domestic output of coho, which is mostly sold frozen, is used in cooked dishes, often replacing salmon.

Meanwhile, Norway-based Mowi, the world's biggest Atlantic salmon farming company, reported that to save weight on shipping, most of its exports to Japan are in the form of pinbone-in fillets, which weigh 25 percent less than the head-on

gutted (HOG) form. The ratio of fillets to HOG has been increasing annually, and fillets now represent around 70 percent of Mowi Japan's total sales by volume, with HOG sales accounting for much of the remaining sales. Besides saving on shipping costs, the fillets, which are deboned in Norway, keep quality better than HOG.

TRACEABILITY & SUSTAINABILITY

Making transparency accessible

The World Wildlife Fund (WWF) recently announced the launch of transparenC, the first open-source, free, traceability software for commodity supply chains. This cloud-based smartphone app and desktop web portal can be used anywhere by farmers, buyers, retailers, and everyone in between without paying licensing fees that can be a barrier for disaggregated supply chains, especially in developing countries.

transparenC

Created through a collaboration between WWF and Republic Systems, the app has already been tested with seafood supply chains in Vietnam, Thailand and India and palm oil producers in Honduras. The WWF's global network lead for aquaculture, Aaron McNevin told Forbes the genesis for the app was the issues faced by shrimp farmers in Thailand, who could not get the source of the fish meal they were using to meet certification requirements.

Retailers can promote sustainability and still profit

Financial thinktank Planet Tracker has issued a report entitled "How retailers can be sustainable and profitable in seafood." The report reveals how retailers can assess the sustainability of their seafood products using Planet Tracker's Seafood Sustainability Protocol and establishes the link between sustainability and profitability. In other words, seafood retailers could have a huge positive impact on ocean ecosystems and improve their bottom line by sourcing more sustainable seafood, and being more transparent about their efforts to do so. Findings are based on a case study of Carrefour, one of the ten largest food retailers in the world, with analysis of over four million non-publicly available datapoints on seafood purchases from its largest market, France.

The report calls on seafood retailers to:

- Determine what stage they are at in the seafood sustainability journey;
- Implement sustainable strategies to make progress on necessary areas;
- Improve the transparency of their seafood supply chains, including setting a time-bound target on full seafood traceability; and
- Track and report progress over time.

Investors and lenders should:

- Engage with the companies they fund on ways to align revenue, profit and cash flow growth strategies with ocean sustainability, including demanding:
  - ♦ Greater seafood supply chain disclosure;
  - ♦ A change in seafood sourcing towards more sustainable choice;
  - ♦ Time-bound targets on seafood traceability;
- Discuss, design and structure financial tools that aim at improving ocean sustainability; and
- Support initiatives aimed at providing financial incentives to suppliers that implement traceability solutions.

Companies interested in assessing the sustainability of the seafood they buy and sell can do so via Planet Tracker's interactive Seafood Sustainability Protocol.

New certification system for eels from 2025

Japan – Most of the eels consumed in Japan were caught as juveniles (glass eels) from rivers and coastal waters and transported to grow-out farms until they reach marketable size. The fish is particularly popular in Japan where it is usually consumed skewered, grilled or basted in soy sauce and mirin rice wine.

Over the past 40 years, over-fishing and pollution have resulted in dwindling stocks and in 2014, the Japanese eel *(Anguilla japonica)* was added to the International Union for Conservation of Nature's Red List of Threatened Species. Their greatly reduced stocks in the wild have led to increasing incidences of smuggling and illegal harvesting. An estimated 40% of the glass eels traded in Japan are obtained from unknown

sources. During the 2020 fishing season, 11 tonnes of glass eels were caught in 24 prefectures according to government data, but 17 tonnes of domestically caught young eels were put into aquaculture ponds in Japan. In other words, six tonnes were from unknown sources.

Top: glass eels (between 5 and 7 cm in length); Bottom: Skewered and grilled adult eels

As part of counter-measures against poaching and illegal trading, the Fisheries Agency in Japan plans to include glass eel in a certification system from December 2025. Most eel restaurant owners are said to be in favour of the proposed system but fishermen and eel traders are concerned that it will bring an increased administrative burden. The Agency says that catch numbers will not be assigned for each eel but they will indicate production area and trading day. Under the system, fishermen will have to notify the agency of their catch, and when trading, distributors and eel farmers will be required to keep records, including a 16-digit catch number. Retailers and restaurants will not need to record the catch numbers when purchasing adult eels.

WORLD

Production of fishery products at all-time high in 2020

Significant growth in aquaculture has driven global fisheries and aquaculture production to a record high as aquatic foods make an increasingly critical contribution to food security and nutrition in the 21st century, according to a report from the UN Food and Agriculture Organisation (FAO) released on 29 June.

The 2022 edition of "The State of World Fisheries and Aquaculture (SOFIA)" says the growth of aquaculture, particularly in Asia, lifted total production of fisheries and aquaculture to an all-time high of 214 million tonnes in 2020, comprising 178 million tonnes of aquatic animals and 36 million tonnes of algae. Production of aquatic animals in 2020 was 30 percent higher than the average in the 2000s and more than 60 percent above the average in the 1990s. Record aquaculture output of 87.5 million tonnes of aquatic animals largely drove these outcomes.

The report also states that the sustainability of marine fishery resources remains of significant concern, with the percentage of sustainably fished stocks falling to 64.6 percent in 2019, a 1.2 percent decline from 2017. However, there are encouraging signs as

sustainably fished stocks provided 82.5 percent of the total volume of 2019 landings a 3.8 percent increase since 2017. This seems to indicate that larger stocks are being managed more effectively.

(Editor's note: Please see the FishBytes pages in this issue for more details.)

New standard covering aquaculture, agriculture and fisheries

Global Reporting Initiative (GRI), which encourages businesses and other organizations to take responsibility for their impacts, has introduced a new standard covering aquaculture, agriculture and fisheries, in order to keep track of – and ultimately reduce – the industries' impacts.

"While the essential role of the agriculture, aquaculture and fishing sectors in feeding the world is clear to see, clarity on their impacts is not. Use of lands and seas face ever-competing demands, while biodiversity loss and the urgency of climate adaptation demonstrate why greater transparency is essential. In addition, with a third of the global population relying on the sectors for their livelihoods, their impacts on economic development and human rights should not be underestimated," notes Global Reporting Initiative, in a press release.

GRI 13: Agriculture, Aquaculture and Fishing Sectors 2022 is the first global and holistic sustainability reporting standard for all companies in the upstream production of crops, animals and seafood, setting expectations for disclosure of their shared and distinct impacts.

New benchmark for farmed fish welfare

Based on the premise that aquatic animals are farmed in larger numbers than any other animal worldwide and until recently, their welfare has been neglected, the Aquatic Life Institute (ALI) announced the launch of the first edition of a welfare-based, aquaculture certification benchmark tool that analyzes current welfare requirements within the main farming standards of six global seafood certification schemes. The areas of assessment include environmental enrichment, stocking density, stunning and slaughter, feeding practices, and water quality. It also accounts for other fish not directly used for human consumption, such as cleaner fish, feeder animals, and broodstock.

The tool identifies adequate animal welfare considerations in current aquaculture certification standards, but also highlights the areas of opportunity for substantial improvements in the near future. ALI notes that the Aquaculture Stewardship Council (ASC) is currently developing their Fish Welfare Project and when details of this project are complete and shared with the public, this will be incorporated as a new addition to the benchmark.

New international alliance on IUU

At the UN Ocean Conference at the end of June, the UK, Canada and the USA launched the IUU Fishing Action Alliance (IUU-AA). The premise of the IUU-AA is broadly situated around three areas:

- Implementing and building support for key international agreements, arrangements, and frameworks for combating IUU fishing, including the 2009 FAO Agreement on Port State Measures.
- Encouraging support for technology and capacity building that strengthens fisheries MCS, particularly in developing countries.
- Promoting transparency.

The IUU-AA will be underpinned by a pledge that is signed by States who are committed to tackling IUU fishing and States affected by IUU fishing activity.

The Alliance highlights the importance of international partnerships, such as the newly formed Joint Analytical Cell (JAC), that ensure all States can access and effectively take advantage of shared fisheries information and technologies. Founded by the International Monitoring, Control and Surveillance Network, Global Fishing Watch and TMT, the JAC draws on the organizations' expertise and technologies to provide authorities with fisheries intelligence, data analysis and capacity building to combat IUU fishing.

GDST launches verification system

The Global Dialogue on Seafood Traceability (GDST) has introduced new traceability systems that will verify claims made by traceability programmes regarding their ability to achieve GDST-based interoperability. Built as an interactive online interface, the verification system simulates how two traceability systems would share data during a routine business transaction to test whether they adhere to GDST stndards.

GLOBAL DIALOGUE on Seafood Traceability

"As GDST transitions to become an independent, truly global organization advocating for and advancing the standardization and adoption of interoperable traceability throughout fishery and aquaculture supply chains, the launch of this test is an important step in providing tools to the industry in support of that mission," GDST Executive Director Greg Brown said.

The test supports the recently updated GDST 1.1 standard, including communications protocol enabling computer sharing of GDST-compatible data. Traceability systems that have successfully passed the test will be publicly recognized on the GDST's website.

INFOFISH TRADE NEWS

and other Regular Supplements

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☑ **European Price Report (EPR)** is a **monthly** bulletin with comprehensive coverage on European markets. Produced by FAO-Globefish, EPR reports on market trends and prices for coldwater as well as tropical species namely cod, hake, Alaska pollack, herring, farmed salmon/trout, European sea bass/sea bream, tuna, tropical shrimp and chephalopods and more.

☑ **INFOFISH International**, the longstanding **bimonthly** magazine distributed globally since 1981, is also included as a complimentary copy (by surface mail) to subscribers of the fortnightly INFOFISH Trade News.

☑ **Globefish Highlights** is the commodity report which outlines quarterly market trends and outlook on tuna groundfish, shrimp, lobster, chephalopods, small pelagics, fish meal and fish oil.

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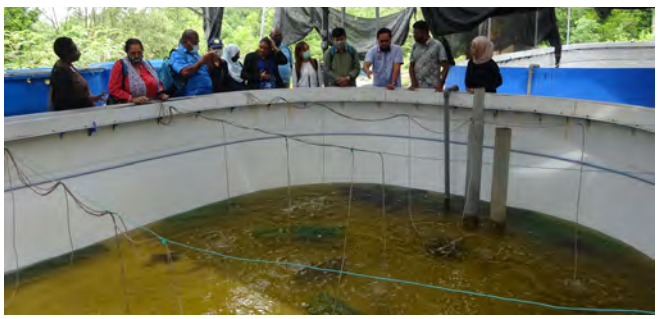
The Thirty-fifth Session of the INFOFISH Technical and Advisory Board (TAB) Meeting was held from 19-21 July 2022 for the first time as a hybrid event, hosted by the Fisheries Development Authority of Malaysia (LKIM) in Puchong, Selangor, Malaysia. The TAB 2022 had participation from nine Member Countries: Bangladesh, Cambodia, Fiji, Republic of Maldives, Malaysia, Papua New Guinea, Philippines, Sri Lanka and Thailand; as well as observers from FAO, World Sustainability Organisation (WSO) and Biolan.

The Opening Address was delivered by Mr Kusuadi bin Sallih, Deputy Director General, LKIM, on behalf of the Director General of LKIM, Tuan Yusoff bin Othman. Mr Kusuadi highlighted the success of the recent INFOFISH Shrimp Trade Conference 2022 and while summarizing the outcomes of the Conference, he thanked the Secretariat and others who were also involved for the hard work and cooperation which ensured its success. He also announced the upcoming Malaysia Agriculture, Horticulture and Agrotourism Show (MAHA) 2022, an event organized by the Ministry of Agriculture and Food Industries of Malaysia, which will take place in Serdang, Selangor, from 4 - 14 August 2022 with the theme of "Food Security for the Future". INFOFISH Member Countries were invited to participate in the event as an opportunity for business-matching and showcasing their products.

Mr Kusuadi also briefed representatives on the National Agrofood Policy 2021-2030 (NAP 2.0) which aims to transform the agro-food industry into a sustainable, competitive and high-technology sector, and to boost economic growth while highlighting that these aims are particularly timely as the fisheries sector, like all other sectors, has been significantly impacted by the COVID-19 pandemic. He added that the COVID-19 pandemic had brought greater urgency to the need to establish an integrated mechanism involving agencies and ministries in order to improve the reliability and efficiency of national food security and distribution. In response, the Ministry of Agriculture and Food Industries (MAFI) has established a COVID-19 Mitigation Subgroup to ensure that these needs are met throughout the country.

The INFOFISH Technical and Advisory Board advises the Governing Council on all technical and economic aspects of INFOFISH activities. An overview of the progress activities by the organization over the past one year was presented to the Board while emphasizing the challenges experienced with the pandemic and how the organization has been adept to these challenges. In addition, the Secretariat also presented the mid-term seafood market review as well as on recent developments in fisheries and aquaculture.

A field trip was organized for delegates on Day 2 to GK Aqua Sdn Bhd located in Port Dickson, state of Negeri Sembilan and to the Fishermen's Association in Teluk Kemang, Port Dickson, state of Negeri Sembilan. GK Aqua is a pioneer freshwater aquaculture biotechnology company formed to commercialize and implement cutting-edge technology to improve efficiency in freshwater prawn farming.



INFOFISH

Vacant Position

TRADE PROMOTION OFFICER

Working under the overall supervision of the Acting Director/Director, INFOFISH, the Trade Promotion Officer shall be responsible for the following:

- Monitor and review fishery trade in the Asia Pacific region and beyond;
- Collect and analyse price and market information on specific fishery products for the 'INFOFISH Trade News', a fortnightly bulletin;
- Attend to queries on supply, marketing and trade of fishery products worldwide;
- Work on identification and export promotion of fishery products from the region;
- Maintain regular contact with institutions, market news correspondents and organisations relevant to the fish marketing information network;
- Write and review articles pertaining to marketing and international trade of fishery products for the INFOFISH International magazine and other publications;
- Undertake other activities as assigned by the Supervisor or the Acting Director/Director

Qualifications:

- Post graduate degree from a reputable university in Fisheries / Fisheries Economics / Economics / Marketing / Trade/Business Management or related fields;
- Experience in international trade and marketing;
- Excellent writing and communication skills in English;
- National of a Member Country* of INFOFISH

Duty station

These positions are based in Kuala Lumpur, Malaysia. Applicants must be prepared to travel if required to do so.

Age limit

40 years; might be extended in the case of highly qualified and experienced candidates or government employees/nominees from Member Countries.

Emoluments

Salary will commensurate with qualifications/experience.

Applications stating the position applied for and containing full curriculum vitae and recent passport size photograph should be sent to the following, preferably through the INFOFISH National Liaison Office in each Member Country* of INFOFISH.

The Director
INFOFISH, 1st Floor, Wisma LKIM,
Jalan Desaria, Pulau Meranti,
47120 Puchong, Selangor Darul Ehsan, Malaysia
Email: info@infofish.org

Closing date: 15 November 2022
for the receipt of application at INFOFISH.
Only short-listed candidates will be notified.

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Please visit our website www.infofish.org for contact details of INFOFISH National Liaison Officers in the respective Member countries.

DOMINANT TRENDS IN THE EMERGING ALTERNATIVE SEAFOOD MARKET: FOCUS ON ASIA

By Amod Ashok Salgaonkar

Alternative seafoods have begun to make a presence in Asian markets but not much is known about their current market share, the increasing involvement of big businesses and governments, and the long-term prospects for growth in the region. Based on his exhaustive research, the author presents reasons why Asia, already leading the world in traditional seafood trade, is expected to gain global dominance in the alternative seafood segment. Highlighting the production initiatives and multi-million dollar investments that are already taking place in several Asian countries such as Singapore, Japan, Thailand and Hong Kong, he opines that continued innovations as well as price parity with traditional seafoods, will be the main drivers in this process.

Some of the alternative seafoods that can be found on supermarket shelves

Seafood, either from the wild or through aquaculture, has always been a traditionally important protein source. As per the FAO's "The State of World Fisheries and Aquaculture (SOFIA) 2022" report, total fisheries and aquaculture production reached a record of 214 million tonnes in 2020 which includes 178 million tonnes of aquatic animals and 36 million tonnes of algae. Per capita consumption of seafood in 2020 was 20.2 kg and global consumption has increased at an average annual rate of three percent since 1961. The seafood business globally is doing better when compared with other food industries; however, overexploitation of some commercial species, increased environmental pressure and higher standards of fish welfare have given scope for the birth of a new segment which can be termed as "alternative seafood". Globally, there are about 100 companies which are involved in this segment.

Alternative seafood, which is emerging as a new source of food with the potential to augment future food supplies, mainly comprises all plant-based, fermentation-derived and cell-based seafood forms that mimic the taste, texture, appearance and/or nutritional properties of conventional seafood. Plant-based seafood is a combination of the following ingredients: legume proteins, soy protein, wheat protein, rice, vegetables, mycoproteins, seaweed, algae and/or plant oils. Cultivated or cell-based seafood is based on the isolation and multiplication of stem cells (capable of differentiating into many cell types) or immortalized cell lines (differentiated muscle, fat, connective tissue cells that continue to propagate) from aquatic animals (Benjaminson et

al. 2002)[1]. The third category, fermentation-derived seafood, is produced through various techniques of fermentations.

Currently the alternative seafood segment has a bigger footprint mainly in the US, but with growing awareness in Asia, a strong pool of talent and innovation, willingness by governments to support the segment on regulatory grounds, involvement from business giants, the upgraded status of universities and research support systems, Asia is likely to assume dominance in the next few years. Plant-based seafood is now available for consumption in some regional markets, fermentation-derived seafood has a niche presence in China, and cell-based seafood is on its way to entering the commercial market next year as per announcements from some companies. Millions of dollars have been attracted by leading alternative seafood companies in Asia, a trend which has become more obvious over the last three years.

The prices are, and will be, higher for alternative seafood in comparison with traditional seafood products for some years from now, and one may expect decreases in the price per unit with an increase in scale. Several factors – taste, health benefits, the desire to reduce carbon emissions, well-developed labelling frameworks, quality, the promise of lower prices with increasing volumes, innovations – will drive consumption of these novel foods strongly in the future.

Plant-based seafood alternatives in the market

Plant-based seafood now has a presence on the shelves of various supermarkets in Asia. Thai Union, one of the largest seafood manufacturers in the world, launched a plant-based seafood range called"OMG Meat" in 2021. The products they offer are plant-based tuna, plant-based crab meat, plant-based fish nuggets, plant-based crab dumplings and recently in August 2022, plant-based shrimp dumplings (wontons) were released nationwide in Thailand. For most of the products, the major plant-based ingredients used are soy and wheat protein. This popular brand can be seen in 18 provinces covering 58 districts through 18 online/offline sales channels via e-commerce and modern trade stores in Thailand.

The startup Growthwell Foods in Singapore carries its plant-based seafood portfolio through the "HAPPIEE!" brand. It has plant-based fishiee sticks and fishiee patties in its retail range which includes breaded fishiee patties, fishiee nuggets, breaded crabbie patties and salmoniee flakes. The products are based mainly on the ingredient konjac. Products under this brand are spread across more than 92 supermarket stores, mainly in the NTUC supermarket chain, and also at Cold Storage, Hao Mart and PRIME outlets. Leading e-commerce players Amazon, Red Mart and Fair Price offer products under the brand and it is also available at some 70 cafés and restaurants across Singapore.

In 2021, the US-based Gathered Foods brand Good Catch launched plant-based food service tuna, plant-based fish burgers and fish cakes, as well as plant-based crab cakes in the Singapore market. Good Catch uses a blend of peas, chickpeas, lentils, soy, fava beans and navy beans, with an umami flavour from seaweed and algae extracts to make a product that looks, tastes and "behaves" like tuna fish. It is now available across multiple food service outlets in Singapore and also in high-class premium restaurants like the one at the Grand Hyatt Singapore and Privé. Gourmet-casual outfits like Love Handles and delivery-only concepts like Good Food People now also make Good Catch products available. Liang Yi Food Industries of Singapore is an online vegetarian supermarket which has a good portfolio of plant-based seafood products.

Hong Kong-based Green Monday's Omni Food launched its Omni Seafood series on World Ocean Day (8 June) in 2021. The product range includes Omni Classic Fillet, Omni Golden Fillet, Omni Ocean Burger, Omni Tuna and Omni Salmon. Omni Food has a distribution across 40 000 sale points and can be found in some 20 countries. The organization has a strong presence in Asia along with US, Europe and the UK. Omni Seafood is made from a proprietary blend of non-GMO soy; the company states that it has zero cholesterol, is free from trans-fat and has no added preservatives, hormones or antibiotics. Omni Tuna is the first ambient product in the Omni Seafood series – it can be kept at room temperature and the shelf life is about two years from the date of manufacture. This quality makes the product unique from the other alternative seafood products. Omni Seafood has a presence in Hong Kong and Singapore; in August 2022, it was introduced into the UK's Whole Foods market in London, online at Ocado and The Vegan Kind Supermarket.

Various Japanese supermarkets also carry Omni Tuna products. Azu Marche has launched a plant-based seafood brand called Green Surf for Japanese customers whereas Diaz Inc and Next Meats produce alternative tuna. Plant-based seafood is mainly sold in Japan through online platforms although some physical stores also carry the range.

In Spain, Mimic Seafood has launched an eel alternative called Aubergeel which has Japanese eggplant as its main ingredient. The product is seasoned with Asian-style ingredients such as soy sauce, rice vinegar, mirin, sake, and sesame oil.

[1] *M A Benjaminson, J A Gilchriest, M Lorenz. In vitro edible muscle protein production system (MPPS): stage 1, fish*

Israel-based startup Plantish is putting efforts into producing plant-based salmon but this is still being improved upon and the product has not yet hit the market commercially. Meanwhile, SeaSpire, a clean label Indian alternative seafood start-up, has announced its whole-cut snapper alternative which is made using seven plant-based ingredients using its proprietary bio-printing platform. The company claims to be the first of its kind to produce bio-printed whole-cut whitefish products in the Asia-Pacific region and is planning to enter the market soon. There are many other startups working on plant-based seafood in different countries of Asia which may be expected to be seen in the coming years.

Cell-based seafood

The core concept behind this method is the tissue regeneration process, which naturally occurs in all animals; tissues renew themselves by reproducing cells to repair and maintain overall health. Cell-based seafood replicates this process under controlled conditions. If this nascent technology scales, it would alleviate pressure on oceans, lakes and rivers. This process brings many advantages, an important one being less usage of resources when compared with conventional seafood production. This method avoids the usual production of byproducts (trimmings, bones etc) and produces only the desired seafood. Various reports have mentioned that this method is also useful in substantially lowering GHG emissions.

Cultivated meat/seafood begins with taking a number of cells from an animal and nurturing them in a nutrient-rich, animal-free growth medium, where they are capable of multiplying. Subsequently, the cells can be stimulated to differentiate into muscle, fiber, or fat cells, and through tissue engineering techniques supporting the three-dimensional organization of the cells, a tissue is grown that mirrors that which is traditionally produced.

Singapore-based Shiok Meats is the leading name in the cell-based seafood category. The startup has developed cell-based shrimp dumplings, lobster meat, crab meat and is working meticulously to launch cell-based shrimp commercially for the first time by 2023 at USD 50/kg. Umami Meats (Singapore) has experimented with a legume-derived growth serum and conducted lab trials to grow the cells of Japanese eel and yellowfin tuna. The company's next step is to create the first prototypes of a product and to develop a production system around its serum.

Avant Meats (Hong Kong) is the first biotechnology company which has announced plans to tap into the market for alternative fish maws, one of the most popular seafood items in China. In South Korea, CellMEAT has successfully made a prototype of dokdo shrimp in 2022. According to Mr Kim of CellMEAT, the pink-coloured dokdo shrimp can only be found in the Arctic Ocean and the seas of Japan. He added that the shrimp is considered a delicacy and is sold at around USD 160/kg whereas they are aiming to market their cell-based dokdo shrimp for under USD 5/kg. CellMEAT plans to distribute its cultured dokdo shrimp products throughout Korea, Singapore and the US by 2024.

Several Israeli companies are also worth mentioning: (i) Forsea aims to produce cell-based eel because of its commercial value. A kilogram of eel in Japan sells for USD 60 and smoked eel or vacuum-packed eel sells for €50 per kilogram in Europe; (ii) Using R&D facilities in the US and Israel, Wanda Fish has established a proprietary, GMO-free platform for producing cell-based finless fish fillets of varying species; and (iii) E-FISHient Protein is working on cell-based tilapia.

Fermentation-derived alternative seafood

There are three basic types of fermentation, namely traditional fermentation, biomass fermentation and precision fermentation. So far, alternative seafood companies have worked with traditional processes for producing fermentation-derived seafood products. Hong Kong-based New Singularity Limited has developed a technology which uses plant algae as a fermentation substrate to produce mycelium with a shrimp flavour, as well as mushroom hyphae mixed with peas and rice which gives rich flavour, stronger water binding ability and high protein content. In 2020, New Singularity had announced that plant-based shrimp will be launched in 100 000 deli stores in China by June 2021; however to date, recent updates are not available.

Mermade Foods is an Israel-based cellular aquaculture company which aims to bring a novel approach in the production of scallop analogues using a recyclable fermentation-based process. The technique upcycles spent cell growth media by feeding it to microalgae to produce algal biomass. This new algal biomass can then be fed back to the cells, thus reducing or eliminating waste and lowering input costs.

Investments and partnerships

Millions of dollars have been invested in Asian alternative seafood companies since the last few years. In January 2021, Thai Union invested in Californian cell-based seafood startup Blue Nalu through its corporate venture fund. Additionally,

Preliminary analysis of funding in alternative seafood companies in Asia, January 2021 –June 2002

Type	Name of the Company	Country	Total Funding Till Date	Last Funding Round	Last funding Month & Type
Cell-based	Shiok Meats	Singapore	$ 30.7 M	$ 10 M	July 2021, Series A
Plant-based	Green Monday (Omnifoods)***	Hong Kong	$ 100+ M		
Cell-based	Avant Meats	Hong Kong	$ 13.9	$ 10.8 M	June 2022, Series A
Cell-based	Cell Meat**	South Korea	$ 14.1 M	$ 8.1 M	April 2022, Series A
Cell-based	Umami Meats	Singapore	$ 2.4 M	$ 2.4 M	Dec 2021, Seed
Plant-based	Growthwell Foods****	Singapore	$ 30 M	$ 22 M	Sept 2021, Series A
Plant-based	Plantish	Israel	$ 14.5 M	$ 12.5 M	Mar 2022, Seed
Cell-based	E-Fishient	Israel	$ 2 M	$ 2 M	2021, Pre Seed
Cell-based	Sea2Cell	Israel	$ 1.2 M	$ 1.2 M	Oct 2021, Pre Seed
Cell-based	Wanda fish Technologies	Israel	$ 3 M	$ 3 M	2021, Pre Seed
Cell-based	Forsea	Israel	$ 1 M	$ 1 M	2021
Plant-based	Thai Union Alternative Proteins"	Thailand	Invested in companies through their Capital Venture Fund		
Plant-based + Fermentation	New Singularity	China	Undisclosed	Undisclosed	
Cell based + Fermentation	Mermade Foods	Israel	$ 1.5 M	$ 1.5 M	Early stage VC
Cell-based	SeaWith*	South Korea	$ 5.49 M	$ 5.43 M	April 2022, Series A

Source: A2S2 Enterprises Research, India (July 2022), *Company utilizes seaweed as cell-culture medium & scaffolds but making final product as cultured meat steak, **Company involves in both cell-based meat & seafood, ***Company involved in Plant-based pork & seafood, they also have plant-based concept store Green Common, ****Company involves in both plant-based meat & seafood, "Company has both plant-based meat & seafood; also made collaborations for development of cell-based seafood products

Thai Union Group PCL and V Foods (Thailand) Co., Ltd. signed a Memorandum of Understanding in June 2021 for the production of V Foods' existing and new range of plant-based products using Thai Union's manufacturing facilities. In July 2021, Thai Union announced that its Corporate Venture Capital (CVC) Fund had joined other industry-leading strategic and financial partners investing in Israel-based cell-based company Aleph Farms' USD 105 million Series B fundraising round.

On 26 April 2021, Avant Meats announced its intention to establish pilot manufacturing facilities in Singapore with the support of the Singapore Economic Development Board (EDB). On 20 September 2021, A*STAR Bioprocessing Technology Institute (Singapore) announced its collaboration with Avant Meats to accelerate cultivated fish technology for the mass market. Avant Meats was the only alternative seafood company to join World Economic Forum's Technology Pioneer community among the top 100 global startups in the 2021 cohort.

Another major 2021 investment was in July when Vietnam's largest seafood exporter Vinh Hoan invested in Singapore's Shiok Meats. In December the same year, the latter officially inaugurated a mini-plant in Singapore with advanced R & D facilities to achieve scaling-up of its production on the commercialization of cell-based shrimp.

The alternative protein pioneer, Hong Kong-based Green Monday, announced a partnership with global coffee company Starbucks in November 2021, and as a part of that collaboration, Omni Crab Cake has been launched in 250 outlets of Starbucks Hong Kong. The Omni Seafood range has been available in Green Common vegan grocery stores since June 2021; it has also attracted the restaurant segment in Hong Kong which includes the upscale hotel Cordis Hong Kong and the Michelin-starred Chinese restaurant Ming Court Wanchai, which promised to use the products for making innovative dishes from July 2021.

Moving on to 2022, during the first half of the year there has been an investment of over USD 31 million in alternative seafood companies. In January, Japan's largest sushi restaurant operator, Food & Life Companies (F & LC), announced a partnership with California-based cell-based seafood startup Blue Nalu. F&LC operates restaurant brands including Sushiro and Kyotaru, managing over 1 000 restaurants in Japan, Korea, Taiwan, Hong Kong, Singapore, Thailand, and China. Japan's Mitsubishi Corporation, Sumitomo Corporation and South Korea's Pulmuone have also signed a MoU with Blue Nalu.

This year's largest investments so far were in March when Israeli company Plantish successfully raised USD 12.5 million followed by Avant Meats which closed a round of

USD 10.8 million through a Series A funding round in June 2022. Another Israeli food-tech startup called Wanda Fish Technologies announced an agreement with Tufts University in April 2022 for advanced research into the development of cultivated (cell-based) fish as a food item.

In July 2022, Vietnamese shrimp processor Minh Phu Seafood signed a Memorandum of Understanding with Shiok Meats to set up a joint research and development facility in Vietnam. Also in July 2022, to build the technology platform for cultivating fish muscle and fat in order to produce a variety of structured products, Singapore's Umami Meats began to collaborate with Israel-based MeaTech to utilize their 3D printing capabilities.

The latest development as at the time of writing was noted in August 2022, when German cell-based seafood startup, Bluu Seafood, presented the first market-ready products made from cultivated fish cells. Their fish fingers and fish balls made from cultivated fish cells are expected to be introduced into Singapore by the end of 2023 while applying for approval in other developed markets. Bluu Seafood also has a collaborative arrangement with cell-based meat entrepreneur CellX (China) since April 2022.

Some major challenges

The biggest challenges faced by the alternative seafood industry presently are the higher cost of production, perfecting the taste of the food, and scaling up the production. Various surveys have suggested that the taste of plant-based seafood is good but that it needs to be a closer match to traditional seafood; companies are therefore investing further in research to make the improvements.

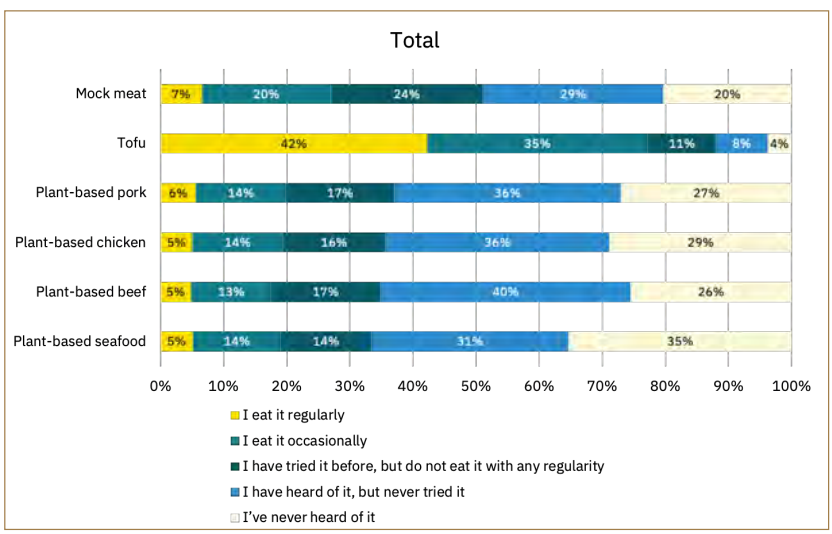
For cell-based food products, the most common cell growth medium is foetal bovine serum (FBS), a laboratory-grade compound derived from the blood drawn from a bovine foetus taken from a slaughtered cow at an abattoir. FBS can cost as much as USD 2 960 per litre and companies are working to develop less expensive and animal-free sources of cell growth media as well as cultivation techniques that require lower quantities of cell growth media. Additionally, bioreactors have an upper volume limitation of 20 000 litres that produces a small amount of cultivated meat, and any modifications may require costly collaboration with biotech companies. As per company sources, with a multi-pronged approach and patent-pending methods, Avant Meats has achieved over 90 percent cost reduction with an animal component-free cell culture medium. Avant's pilot plant in Singapore, which will utilize bioreactors of up to 2 000 litres in volume, will be in operation in 2023.

Another hurdle is related to consumer attitudes in Asia towards alternative seafood as few studies have been done to determine its acceptability. The most recent was a study commissioned by the Good Food Institute Asia Pacific in collaboration with Getwizer, involving a survey of one thousand residents each in Japan, Singapore, South Korea and Thailand. The major outcome of the study was that taste is the base factor for both plant-based and cell-based seafood in all four countries. Respondents in Thailand were more aware and would like to try more diverse alternative seafoods, whereas Japanese consumers showed more interest in plant-based seafood rather than cell-based seafood. One of the major barriers observed in all these countries was the perceived lack of "freshness" and "naturalness" of plant-based seafood products.

The regulatory framework in Asia

Singapore became the first country in the world to officially approve cell-cultured meat and seafood products in 2020. In 2019, the Singapore Food Agency (SFA) had introduced a novel food regulatory framework which includes pre-market assessment of novel food, monitoring and submission of safety assessments including toxicity, allergenicity, safety of production method, and dietary exposure arising from its consumption. Singapore is therefore is one of the fastest growing markets for alternative food products in Asia and globally, driven partly by its national "30 by 30" policy.

Cumulative Result of Consumer Behaviour Study in Asia for Alt Seafood: August 2022



Other initiatives in Asia include: (i) China's National Development and Reform Commission (NDRF) has included alternative protein in its agricultural policy objectives under the 14th Five Year Plan in 2022; (ii) The Food Safety and Standards Authority of India (FSSAI) introduced the "Food Safety and Standards (Approval of Non- Specified Foods & Food Ingredients) Regulation 2017 which covers novel food products/ingredients, as well as food and food ingredients processed with the use of novel technology; (iii) Thailand's Ministry of Public Health has created a notification for "Novel Food" in 2016; (iv) In Japan, the Centre for Rule-making Strategies (CRS) has formed the Japan Association of Cellular Agriculture (JACA) which brings together more than 70 entities from industry, academia, business, media, and the authorities for the purpose of working closely on the aspects of cellular agriculture.

An important development has been the formation of the Asia Pacific Society for Cellular Agriculture (APAC-SCA) in March 2022, involving the leading 11 major Asian cell-based meat and seafood companies. Based in Singapore, the Society was formed with the intention of engaging with consumers, facilitating the development of regulatory frameworks, and advocating for a safe and sustainable future across the APAC region.

Asia's export potential for alternative seafood to the US

There is no official data available for the export of plant-based seafood from Asia to the US. Quoting Maarten Geraets, managing director for alternative proteins at Thai Union, alternative seafood was worth USD 30-50 million on the global retail side in 2020. Plant-based fish and plant-based shellfish recorded retail sales of USD 10.4 million and USD 3.5 million respectively in the US market in 2021.

Companies from Asia have started exporting plant-based seafood products to the US. Green Monday's Omni Seafood range is now available at the US online retailer GTFO It's Vegan since July 2022. Its Omni Pork range was launched last year in the US at nearly 200 Whole Foods Market and all 371 Sprouts Farmers Market, so if the same support is extended for the Omni Seafood range, then that may drive huge sales for this category.

Thai Union, which is a strong player in traditional shrimp as well as tuna, has launched plant-based tuna successfully in 375 stores in Europe earlier this year (February 2022), followed by the launch of a plant-based protein range of seafood in the US market through collaboration with the ISH Food Company in August 2022. Meanwhile, collaborating with distribution chain SNOFOX (which operates sushi bars at 1230 grocery locations in the US) may bring huge benefits to Asian alternative seafood players. This is similar to the partnership between the world's largest fast-casual pork chain POKEWORKS and US cell-based startup Wild Type – putting similar efforts in may give leverage to alternative seafood producers from Asia.

Conclusion

The alternative seafood segment can complement traditional seafood business for the next few years and then it may create its own space as a major food category. Though scaling the production is a major challenge, this can be solved through deeper research. The most crucial point to take into consideration is establishing appropriate legal frameworks, an area in which countries in Asia have taken the lead. Plant-based seafood is witnessing growing volume sales, and with improvements on taste as well as comparable price levels, the sector may pick up at a faster pace. The involvement of all stakeholders (government, industry, academia, research institutes, businesses, political entities) may help the segment to expand, thus contributing towards feeding 10 billion people by 2050.

Amod Ashok Salgaonkar *is the co-founder & Chief Operating Officer of A2S2 Enterprises. The organization is based in India and is involved in market research, trade, food business development across various food categories and geographies. He has extensive experience in the domestic and international seafood trade as well as in sustainable seafood businesses.*

COVID-19 IMPACTS ON FARMED SPECIES: FOCUS ON CAVIAR

By European Market Observatory for Fisheries and Aquaculture Products

In this study of the impact of COVID-19 on the global caviar industry, there were lower exports and imports overall during 2020 but by the first quarter of 2021, sales were estimated to have exceeded pre-pandemic levels. The pandemic also gave a big boost to online marketing strategies such as in China where Kaluga Queen (the world's largest producer of caviar) launched a livestream campaign on the Chinese online shopping platform Taobao. Some major producers and retailers chose to create new packaging (e.g. value meals); others targetted special occasions such as Valentine's Day or created "Click and Collect" solutions as a new direct marketing channel to consumers.

Caviars differ in qualities and grade, and thereby the price is determined by factors such as pearl size, texture, colour, lucidity, uniformity, separation, fragrance, firmness, taste, and maturity.

In March 2022, the European Market Observatory for Fisheries and Aquaculture Products (EUMOFA) published the results of a study on the impact of COVID-19 on farmed species, amongst them sturgeons. The study was carried out at the request of the Market Advisory Council (MAC) and can be considered an extension of the previously published EUMOFA study, "The caviar market production, trade, and consumption in and outside the EU (2021)". The MAC drew attention to the need for specific studies to assess the impact of the COVID-19 pandemic on the entire seafood supply chain. The sturgeon caviar market was prioritized, as caviar is mainly distributed by the HoReCa sector.

Historically, sturgeons were harvested in the Caspian Sea and their roe sold as caviar, mainly by Russia and Iran. The most well-known and highly prized caviars are beluga from the beluga sturgeon *(Huso huso)*, osetra from the Danube sturgeon *(Acipenser gueldenstaedtii),* and sevruga from the starry sturgeon *(Acipenser stellatus*). All species originate in Eurasia, primarily in the Caspian Sea, the Black Sea and connected rivers. While these three species are the most well-known, most of the caviar on the market today is from several other sturgeon species. More common varieties are from the white sturgeon *(Acipenser transmontanus)*, or the shortnose sturgeon *(Acipenser brevirostrum)* with more highly prized caviar originating from Siberian sturgeon *(Acipenser baerii)* and the beluga-like kaluga sturgeon *(Huso dauricus)*.

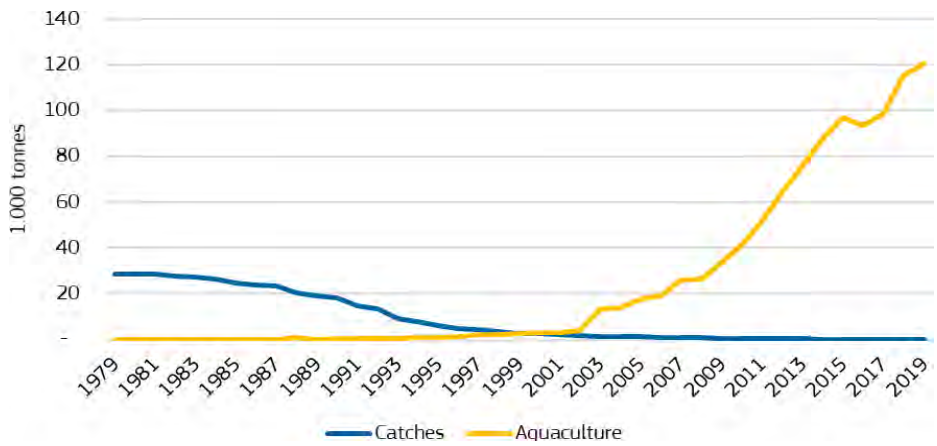
Overfishing of sturgeon has almost led to the extinction of several of these species. Globally, the largest capture was recorded in 1977 at 31 800 tonnes. Since 1998, international trade in all sturgeon species and related products has been regulated under CITES. In 2006, Romania, as the first of several countries, introduced a ban on sturgeon fishing in the Caspian and Black Sea. In 2019, a total global capture of 289 tonnes was recorded. Nearly all caviar on the market today is harvested from farmed sturgeon.

Production volumes from aquaculture

Aquaculture production of sturgeon has gradually increased since the first FAO-recorded harvest of 150 tonnes in 1984 to the beginning of the 2000s, at which point it started increasing rapidly year by year. In 2019, the world aquaculture production of sturgeon was about 120 750 tonnes[1].

[1] *Note that FAO has updated their database adjusting quantities. Production numbers listed in the previous report are higher than the current reported numbers.*

Figure 1: Catches and aquaculture production of sturgeons globally



According to the Federation of European Aquaculture Producers (FEAP), EU Member States produced 164 tonnes of caviar in 2018, an increase of 12 percent from 146 tonnes in the year before, and a 55 percent increase from 106 tonnes in 2015 when FEAP first recorded production volumes. The largest producers were Italy, France, Poland, and Germany, accounting for 84 percent of total production in 2018. Global production of caviar in 2018 has been estimated at 380 tonnes[2]. There are currently no estimations for caviar production for 2019, 2020, and 2021; thus at the time of writing, quantitative analysis of the COVID- 19 impact on production is not possible. However, a qualitative assessment is provided in this study according to the methodology described below.

Over the past 20 years, there has been a steep growth in aquaculture production of sturgeons, mainly driven by China. According to FAO, global production was 4 100 tonnes in 2002, half of which took place in Russia and the remaining part in the EU. In 2003, world production more than tripled when China reported a production of over 9 000 tonnes. Since then, Chinese production has increased by tenfold to over 102 000 tonnes in 2019. In 2019, China accounted for 85 percent of global sturgeon production, followed by Russia at 3 percent (4 021 tonnes), and Armenia at 3 percent (4 000 tonnes).

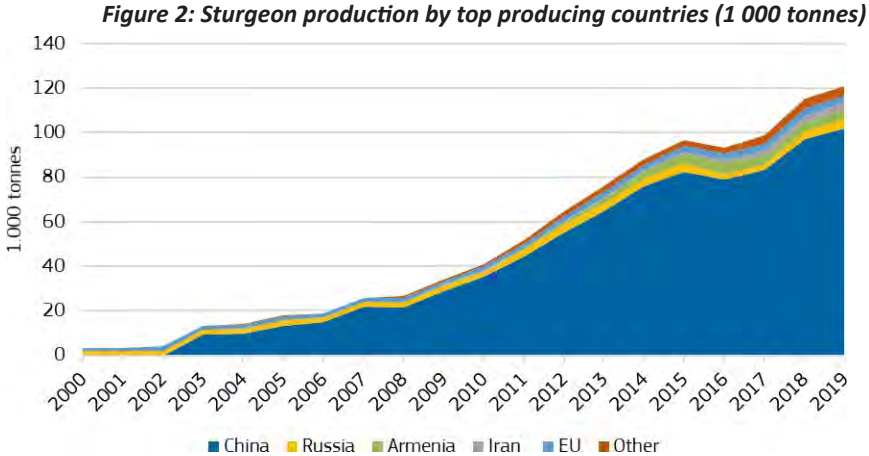
Exploiting sturgeons for caviar production is costly because it takes many years for female sturgeons to reproduce. Included in the cost is also the process of selecting females for caviar production. The sex can be determined after an average of three years of farming, depending on the species, using ultrasound. During this period, both male and female sturgeons are reared, and after the determination of sex, the males are harvested.

To harvest the caviar, female fish are monitored using ultrasound to determine if they are ready to spawn, and if the eggs are ready for harvesting. Females that are near harvest are purged in separate tanks with fresh, colder water, and taken off feed for four to six weeks. This mimics the natural breeding habits of the fish and prevents undesired flavours in the eggs. After purging, the fish are slaughtered, and their egg sac is removed. Once removed, the egg sac is rolled by hand over a sieve/metal grate to separate the eggs from the surrounding membrane. A control process then takes place to remove discoloured eggs and other impurities as well as to determine the size of the eggs. The eggs are salted by hand and either immediately placed in cans that are weighed down to press out excess air, allowing the caviar to absorb salt, or directly placed in small cans placed under vacuum. Caviar that is only lightly salted is called *malossol* and has a short shelf life, but higher value. Additives such as Borax and LIV- 1 may be added in small amounts to the caviar to extend the shelf life, in addition to pasteurising the caviar.

International trade – exports

In March and April 2020, the number of new COVID-19 infections rose in Europe, and lockdowns were implemented

Figure 2: Sturgeon production by top producing countries (1 000 tonnes)



[2] *First World Caviar Forum, 7 May 2019.*

with restrictions on travel, closing of restaurants, cafés, offices, and schools. Overall, 2020 saw lower exports and imports of caviar. The sharpest decline in trade was seen during the initial impact of the pandemic, in March and April 2020. Logistical problems, as well as a decline in demand are explaining factors. As the year progressed and the peak season of Christmas drew closer, volumes increased to approach pre-pandemic levels. During the first half of 2021, the trade of caviar seemed to be higher than ever before. As there is no production data available, it is unsure how production was affected, but several stakeholders reported postponing their spring harvest.

Caviar has previously primarily been sold to the HoReCa and other "luxury" segments such as the airline industry. As traditional market outlets closed during lockdown periods, retail became an important point of sale for producers. In addition, many producers appealed to domestic consumers to purchase caviar produced nationally. This strategy appeared to have had some success. However, the competition from cheaper Chinese caviar remains a major issue for other caviar producers.

Many producers of caviar innovated during the pandemic period, finding new ways to market and sell their products. Solutions created, such as web shops, are likely to continue post-pandemic.

As mentioned above, with the exception of a few minor exporters such as Ukraine, Switzerland, Denmark, and Bahrain, all caviar-exporting nations saw a decrease in export volume in 2020 compared with 2019.

China is the largest exporter of caviar in the world. Since 2019, China's share of total export volumes has risen from 83 percent in 2018 to 91 percent during the first six months of 2021. However, the average weighted prices of exports from China were low, usually hovering around 200 EUR/kg.

China

The Chinese company Kaluga Queen is estimated to produce one-third of the world's caviar and is thereby the largest producer of caviar in the world. In 2019, Kaluga Queen provided caviar to 22 of the 27 3-star Michelin restaurants in Paris and supplied Lufthansa Airlines. COVID-19 resulted in a shorfall of international orders. To compensate, efforts were made to promote Chinese-produced caviar to domestic customers. Stakeholders report increasing domestic comsumption of Chinese-produced caviar, which offset some of the impact from reduced exports. However, Kaluga Queen is reported to have produced 20 percent less caviar in 2020 than the year before.

Chinese exports of caviar in 2020 were 12 percent lower than in 2019, and 5 percent lower than in 2018. During the first half of 2021, the export volume was 134 percent higher than the corresponding period in 2020.

Chinese exports are primarily destined for the United States, Germany, and France. Together, these three destinations have made up between 60 – 65 percent of total exports since 2018. The United States is the largest destination for Chinese exports of caviar. In contrast to most other destinations, the volume exported to the US was 10 percent higher in 2020 than in 2019. However, during spring 2020 (March – May) total exports to the US were 36 percent lower than in the same period in 2019. Chinese exports to the second and third largest markets, Germany and France, completely stopped in April. Overall, China's caviar exports to Germany and France from March to May 2020 were lower than in 2019 by 73 percent and 92 percent respectively.

Table 1: Total exports of caviar by all exporter nations (volume in kg, value in EUR)

	2018		2019		2020		2021*		% change 19-20	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
China	128 500	26 226 984	139 839	29 206 184	122 607	24 503 714	115 611	24 155 307	-12 %	-16 %
Uruguay	4 799	1 606 934	9 323	2 741 658	6 950	1 971 160	4 712	1 520 942	-25 %	-28 %
Russia	8 273	1 959 932	7 864	2 277 508	1 972	572 995	2 383	656 785	-75 %	-75 %
United States	9 516	1 648 895	4 493	880 974	771	144 769	227	44 174	-83 %	-84 %
Belarus	811	392 252	1 356	573 638	1 005	330 107	464	139.403	-26 %	-42 %
United Kingdom	419	207 104	1 115	435 510	882	358 811	534	120 043	-21 %	-18 %
Other	2 633	3 736 224	1 838	2 718 373	3 148	4 672 475	3 434	1 684 813	71 %	72 %
Total	**154 952**	**35 778 325**	**165 828**	**38 833 845**	**137 335**	**32 554 031**	**127 364**	**28 321 466**	**-17 %**	**-16 %**

**Until September 2021*

Source: IHS Markit

Normally, caviar is transported as belly freight on passenger planes in cool-boxes with synthetic ice and must endure no more than two days of travel. This caused some logistical problems for exports of caviar as air transport was reduced during the first wave of COVID-19 and may explain why exports to several markets stopped.

Uruguay

Uruguay saw a sharp drop in exports (90 percent) during the months of March, April, and May 2020 compared to the same months in 2019. Overall, total exports in 2020 were 25 percent lower than in 2019, but 45 percent higher than in 2018. During the first six months of 2021, the export volume of caviar from Uruguay was 44 percent higher than in 2020, but 17 percent lower when compared to 2019.

The United States, Russia, and France are the main destinations for Uruguayan exports of caviar. Since 2019, these three destinations have made up between 63 percent and 73 percent of exports.

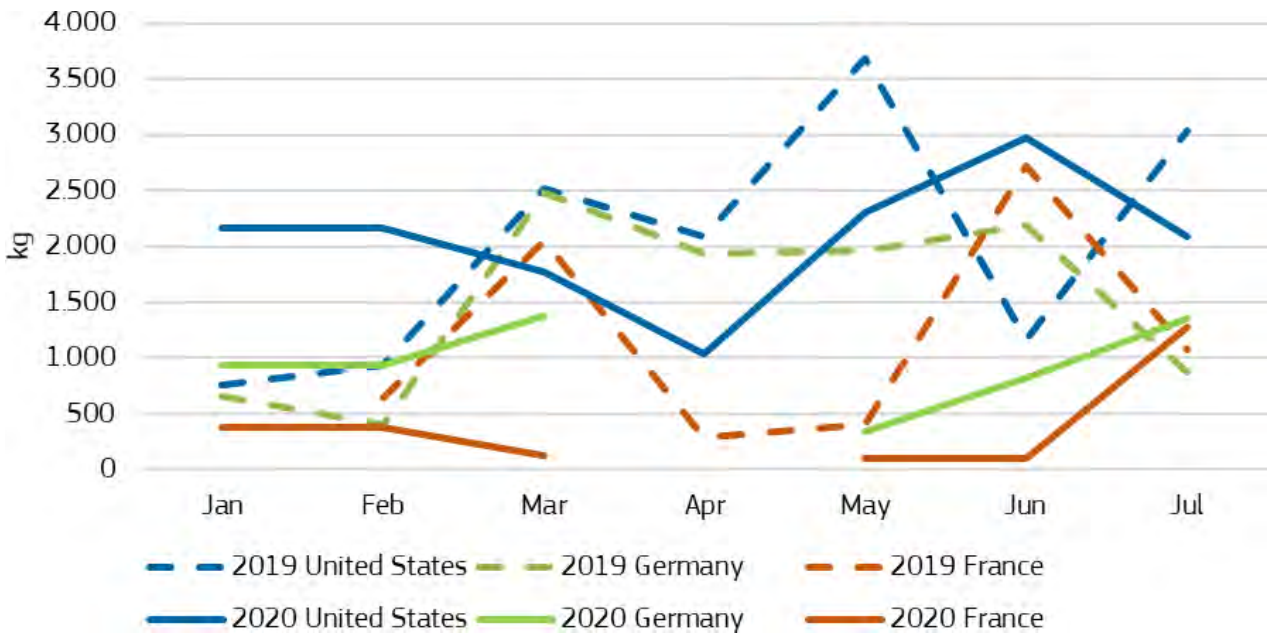
Stakeholder experiences during COVID-19

According to stakeholders, between 40 percent and 70 percent of the revenues from caviar sales are usually generated in December, prior to the Christmas season. As the lockdown periods began in late March and April, the effects did not immediately hit the caviar sector severely as the high season was over. Some stakeholders reported that they slowed the marketing of their product during the first wave of the pandemic, waiting for the winter high season. Other stakeholders, such as Rova Caviar in Madagascar, postponed the spring harvest of 2020 due to supply chain challenges. Although sales of caviar resumed as the year progressed, stakeholders report missing a whole season of breeding and selling fry abroad as air freight was grounded.

As the closure of the HoReCa segment threatened pre-holiday sales, French producers joined together to form the Aquitaine Caviar Association, which covers 70 percent of the French caviar production. The Association issued a manifesto "Demand French Caviar" signed by politicians, chefs, and journalists prior to the winter of 2020 to encourage French consumers to buy domestically-produced caviar. Other promotional actions included advertisements for French caviar and interviews about the situation in the media. In addition to mitigating the impact of COVID-19, French producers also hoped to shift domestic demand away from cheaper Chinese imported caviar towards their own product.

The Caviar Association considered the domestic mobilisation campaign largely successful. During the first wave of the pandemic, the Association estimated that the closure of the HoReCa segment would result in a sales reduction of between 35 percent and 40 percent . The actual sales reduction in 2020 was only 10 percent – roughly 5 tonnes less caviar than the previous year. The Association also estimates that around one hundred jobs were saved as potential layoffs were prevented.

Figure 3: Chinese caviar exports to major markets by volume (kg) in 2019 and 2020



In Russia, sellers of caviar reported generally stable conditions with some increased demand for sturgeon caviar during the pandemic. Russian stakeholders offer two explanations. Firstly, consumers who were not economically affected by the pandemic continued to purchase caviar. Secondly, demand from the average consumer shifted away from travel and vacations to accessible luxury items such as caviar which could be enjoyed at home. In addition, sturgeon caviar is traditionally considered to have health benefits, reputedly helping recovery from illness as a "natural medicine".

Not all caviar producers were shielded from the full force of the pandemic. A stakeholder in Uruguay who was already struggling declared bankruptcy as the pandemic brought a fall in demand from their main customers in the restaurants, hotels, cruises, and the tourism industry. In the United States, Tsar Nicoulai Caviar reported losing 50 pecent of its revenue as sales dropped. To overcome the reduction in income for the latter, the owners and top managers of the business did not take salaries to avoid layoffs, in addition to selling some of the male sturgeon for meat. In Russia, pandemic restrictions meant fishers were unable to come to work, thereby lowering the total catch in 2020.

One Italian stakeholder reports that around two-thirds of sales normally go to catering, with the remaining one-third to mass distribution, while in France it is estimated that half the production goes to restaurants. The closure of the HoReCa segment during the COVID-19 pandemic was offset by a boom in retail sales. An American stakeholder already selling to the American supermarket chain Whole Foods, said continued sales there were crucial to the survival of the business.

Many producers now offer direct sales to their customers through web shops. Although some producers already had a running web shop, one stakeholder saw the need to change the advertising to something more "pandemic-appropriate," moving away from images of people eating caviar together, hugging, and eating caviar off the back of each other's hands. In the web shop, customers can buy tins of caviar, in addition to accessories such as mother-of-pearl caviar spoons, gift boxes, or other complimentary products such as blinis, spirits, etc. One stakeholder reported online sales accounting for a sales growth of 30-40 percent. Some producers report that skipping the wholesaler intermediation is more satisfying both for the producer and for the customers in terms of price and profit. Direct sales allowed for direct contact with the customers, although there were some logistical issues.

The COVID-19 period saw innovation among producers. Some producers created new packaging to market the product in larger quantities in supermarkets and to make the product more affordable. In China, packaging centred around specific holidays where splurging is normal, such as Valentine's Day or Mid-Autumn Day (a festive day celebrated in China) Many companies have also created "Click and Collect" solutions as a new direct marketing channel to consumers. Other stakeholders, such as Caviar Giaveri in Italy, expanded their operations to include gastronomical tours with tasting of their different caviar products together with champagne, and tours of their facilities and production. In the United States, a similar concept is offered by Tsar Nicoulai Caviar, which collaborated with a local winery for a combined tasting experience. As many luxury restaurants are closed at the time of writing, it appears many consumers buy and savour luxury foods, such as caviar, at home. In the United States, Passamore, a seller of caviar, has expanded on its members-only caviar club, where members can recreate restaurant experiences at home.

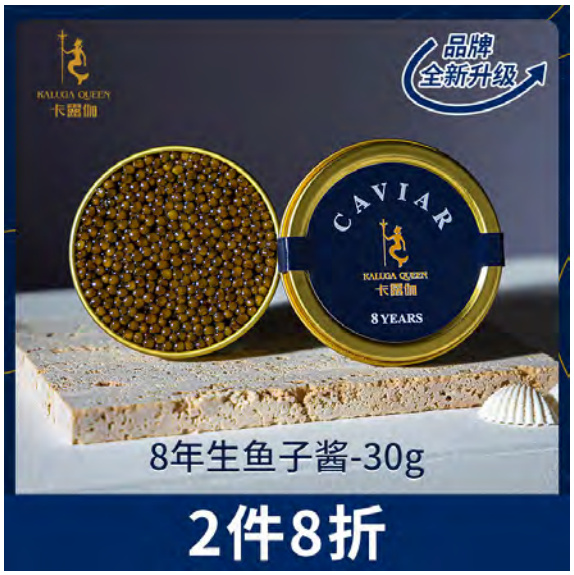
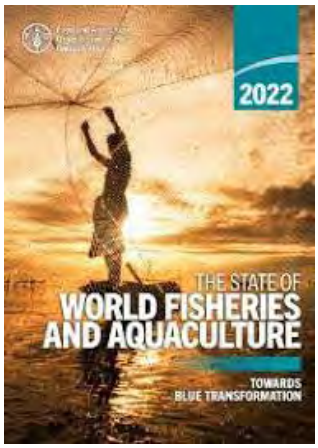


Photo credit: Taobao.com

In China, Kaluga Queen (the world's largest producer of caviar) launched a livestream campaign on the Chinese online shopping platform Taobao which set a new record for the most expensive transaction of agricultural products as it sold 18 kg of caviar. Other steps taken to increase domestic consumption by Kaluga Queen include using influencers, such as celebrities, to market their products in live streams, TV programmes and commercials, and social media.

This article is an excerpt from "COVID-19 IMPACTS ON FARMED SPECIES: FOCUS ON TURBOT AND CAVIAR" which was published in March 2022 by the European Market Observatory for Fisheries and Aquaculture Products (EUMOFA). Prior to this, EUMOFA had published a study on the caviar market, entitled " The Caviar Market: production, trade, and consumption in and outside the EU". EUMOFA collects monthly trade data reported by third countries from IHS Markit.



The State of World Fisheries and Aquaculture (SOFIA) is the biennial flagship report of the FAO Fisheries and Aquaculture Division that analyses the status of global stocks as well as trends in fisheries and aquaculture at a global and regional level.

The 2022 edition of The State of World Fisheries and Aquaculture coincides with the launch of the Decade of Action to deliver the Global Goals, the United Nations Decade of Ocean Science for Sustainable Development and the United Nations Decade on Ecosystem Restoration. It presents how these and other equally important United Nations events, such as the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022), are being integrated and supported through Blue Transformation, a priority area of FAO's new Strategic Framework 2022–2031 designed to accelerate achievement of the 2030 Agenda for Sustainable Development in food and agriculture.

Bellow are excerpts from the "In Brief" version of SOFIA 2022, with specific focus on Asia (where possible).

PRODUCTION

Total fisheries and aquaculture production reached an all-time record of 214 million tonnes in 2020, comprising 178 million tonnes of aquatic animals and 36 million tonnes of algae, a slight increase (3 percent) from the previous 2018 record (213 million tonnes). The limited growth is mainly caused by a 4.4 percent decline in capture fisheries due to reduced catches of pelagic species, particularly anchoveta, a reduction in China's catches, and the impacts of the COVID-19 pandemic in 2020. This decline was compensated for by a continued growth of aquaculture, albeit at a slower yearly rate in the last two years.

In 2020, Asian countries were the main producers accounting for 70 percent of the total, followed by the Americas, Europe, Africa and Oceania. China remained the first major producer with a share of 35 percent of the total. The expansion of aquaculture in recent decades has boosted the overall growth of aquatic animal production in inland waters, from 12 percent of total production in the late 1980s to 37 percent in 2020.

Capture fisheries

In 2020, global capture fisheries production (excluding algae) was 90.3 million tonnes, with an estimated value of USD 141 billion, including 78.8 million tonnes from marine waters and 11.5 million tonnes from inland waters – a fall of 4.0 percent compared with the average of the previous three years. Finfish represent about 85 percent of total marine capture production, with anchoveta once again the top species harvested. In 2020, catches of the four most high-value groups (tunas, cephalopods, shrimps and lobsters) remained at their highest levels or declined marginally from peak catches recorded previously.

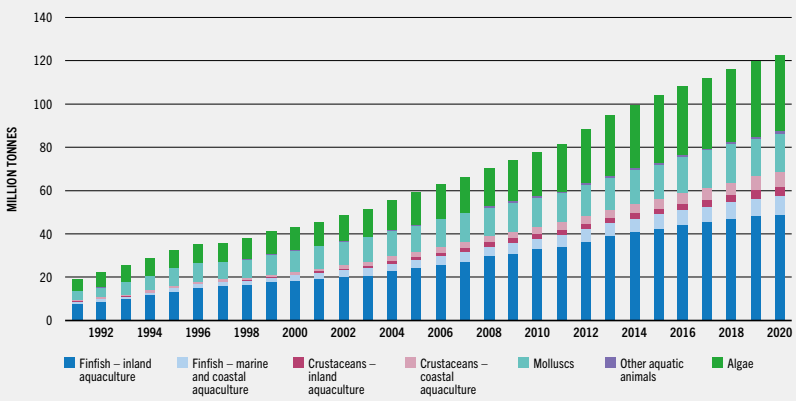
Asia produced almost two-thirds of total inland fisheries, followed by Africa – inland catches are important for food security in both these regions. For the first time since the mid-1980s, China was not the top inland fisheries producer, overtaken by India at 1.8 million tonnes.

Aquaculture

Global aquaculture production in 2020 reached a record 122.6 million tonnes (Figure 1), including 87.5 million tonnes of aquatic animals worth USD 264.8 billion and 35.1 million tonnes of algae worth USD 16.5 billion. Around 54.4 million tonnes were farmed in inland waters and 68.1 million tonnes came from marine and coastal aquaculture. Asia continued to dominate world aquaculture, producing over 90 percent of the total.

The contribution of aquaculture to the global production of aquatic animals reached a record 49.2 percent in 2020. Aquaculture of fed aquatic animals continues to outpace that of non-fed aquatic animals. Despite the great diversity in farmed aquatic species, only a small number of "staple" species dominate aquaculture production, particularly grass carp for global inland aquaculture and Atlantic salmon for marine aquaculture.

FIGURE 1 WORLD AQUACULTURE PRODUCTION, 1991–2020



NOTES: Data exclude shells and pearls. Data expressed in live weight equivalent.
SOURCE: FAO.

EMPLOYMENT IN FISHERIES

An estimated 58.5 million were engaged in the primary production sector as full-time or part-time workers. Some 35 percent were employed in aquaculture, a figure which has flattened in recent years, while the global number of fishers has contracted.

In 2020, 84 percent of all fishers and fish farmers were in Asia. Overall, women accounted for 21 percent of those engaged in the primary sector (28 percent in aquaculture and 18 percent in fisheries), but they tend to have more unstable employment in aquaculture and fisheries, representing only 15 percent of full-time workers in 2020. However, when considering the available data for the processing sector only, women accounted for just over 50 percent of full-time employment and 71 percent of part-time engagement.

UTILIZATION AND PROCESSING

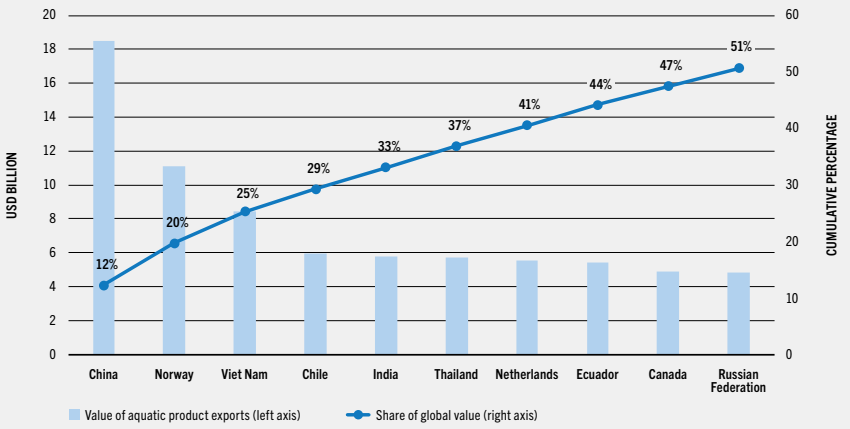
In 2020, 89 percent (157 million tonnes) of world production (excluding algae) was used for direct human consumption, compared with 67 percent in the 1960s. The remainder (over 20 million tonnes) was used for non-food purposes – the vast majority for fishmeal and fish oil. Live, fresh or chilled forms still represented the largest share of aquatic food (excluding algae) for direct human consumption, followed by frozen, prepared, and preserved and cured. In Asia and Africa, the share of aquatic food production preserved by salting, smoking, fermentation or drying is higher than the world average. A growing share of by-products is used for food and non-food purposes. For example, over 27 percent of the global production of fishmeal and 48 percent of the total production of fish oil were obtained from by-products.

TRADE OF FISHERIES AND AQUACULTURE PRODUCTS

International trade of fisheries and aquaculture products has grown significantly in recent decades, expanding over continents and regions. In 2020, world exports of aquatic products, excluding algae, were worth USD 151 billion – a 7 percent decline from the 2018 record high of USD 165 billion. The value of traded aquatic products accounted for 11 percent of total agricultural trade (excluding forestry) and about 1 percent of total merchandise trade in 2020.

China remains the world's largest exporter of aquatic animal products, followed by Norway and Viet Nam (Figure 2), with the European Union the largest single importing market. The largest importing countries are the United States of America, followed by China and Japan. In terms of volume, China is the top importing country of species not only for domestic consumption but also as raw material to be processed in China and then re-exported.

FIGURE 2 TOP TEN EXPORTING COUNTRIES OF AQUATIC PRODUCTS BY VALUE, 2020



NOTE: Excluding aquatic mammals, reptiles, amphibians, turtles, algae, sponges and corals.
SOURCE: FAO.

TOWARDS BLUE TRANSFORMATION: A VISION FOR TRANSFORMING AQUATIC FOOD SYSTEMS

The current Decade of Action to deliver the Global Goals must accelerate actions to address food security while preserving our natural resources. Aquatic foods can provide a larger proportion of humanity's nutritious food requirements. Blue Transformation is a vision for sustainably transforming aquatic food systems, a recognized solution for food and nutrition security and environmental and social well-being, by preserving aquatic ecosystem health, reducing pollution, protecting biodiversity and promoting social equality.

Blue Transformation focuses on sustainable aquaculture expansion and intensification, effective management of all fisheries, and upgraded value chains. This requires holistic and adaptive approaches that consider the complex interaction in agrifood systems and support multi-stakeholder interventions using existing and emerging knowledge, tools and practices to secure and maximize the contribution of aquatic food systems to global food security and nutrition.

Sustainable aquaculture expansion and intensification

Blue Transformation aims to: (i) increase the development and adoption of sustainable aquaculture practices; (ii) integrate

Harvesting freshwater fish in Myanmar

aquaculture into national, regional and global development strategies and food policies; (iii) expand and intensify aquaculture production to meet the growing demand for aquatic food and enhance inclusive livelihoods; and (iv) improve capacities at all levels to develop and adopt innovative technology and management practices for a more efficient and resilient aquaculture industry.

Fundamental barriers facing aquaculture production systems, governance, investment, innovations and capacity building must be addressed. Focus priority areas for innovative aquaculture practices are aquafeeds and feeding, digitalization, and the promotion of efficient and pro-environment practices.

Implementing these solutions requires adequate capacity and skills, training, research and partnerships, and can benefit from developments in information and communications technology and the wider access to mobile applications and platforms. Good governance, based on sound and enforceable legal and institutional frameworks, is fundamental to create an enabling environment to attract investment in aquaculture expansion. A balanced mix of finance and insurance services is needed at all scales to improve infrastructure and support technological innovations and mechanisms, such as carbon or nitrogen credits and blue bonds to reward blue investment for environmental benefits and ecosystem services.

Effective management of all fisheries

Effective management of all fisheries is a core objective of Blue Transformation. Improving fisheries management is essential to rebuild fishery stocks, increase catches and restore ecosystems to a healthy and productive state while managing exploited resources

within ecosystem boundaries. International instruments such as the United Nations Convention on the Law of the Sea, the Code of Conduct for Responsible Fisheries and related implementation tools, should guide governance and policy reform worldwide. Intergovernmental organizations (IGOs), non-governmental organizations (NGOs) and the private sector should intensify cross-sectoral collaboration and cooperation arrangements to further strengthen their complementary roles in addressing local, national and regional fisheries management issues.

Effective management should adopt the ecosystem approach to fisheries with due consideration of tenure, rights and co-management, taking into account the benefits and trade-offs of environmental, social and economic objectives of fishery resources and aquatic ecosystems. Through co-management mechanisms, relevant stakeholders should be involved in decision-making, supported by effective monitoring, control and surveillance (MCS), increased information exchange, enforcement and strengthened coordination.

Technological advances are instrumental for effective implementation of conservation and management measures, by improving data collection, analysis and dissemination, MCS, efficiency, environmental protection and safety at sea. Social protection programmes positively impact resource conservation and the protection of livelihoods.

Developing – especially least developed – countries have limited technical and institutional capacities to ensure effective fisheries management. They require tailored capacity development initiatives with approaches adapted to their financial and human capacity constraints.

Upgraded value chains

Aquaculture expansion and effective fisheries management depend on innovating fisheries and aquaculture value chains, which in turn need public and private partnerships to support new technologies, increase availability of aquatic foods, enhance consumer awareness of their benefits, reduce food loss and waste (FLW), and improve access to lucrative markets. Reducing FLW entails the implementation of multidimensional actions integrating governance, technology, skills and knowledge, services and infrastructure, and market linkages. Access to lucrative markets requires the capacity to respond to market requirements, in particular the non-tariff measures addressing consumer, environmental and social protection and using transparent and reliable traceability systems.

EMERGING ISSUES AND OUTLOOK

COVID-19, a crisis like no other

Since March 2020, the COVID-19 pandemic has swept through continents and countries causing unprecedented health, social and economic damage, including to fisheries and aquaculture. Worldwide, COVID-19 entailed lockdowns and closures of markets, ports and borders, causing disruption in aquatic food production and distribution and loss of employment and livelihoods. Fishing was disrupted and aquaculture struggled to maintain its planned production cycles. Supply chains dominated by small and medium enterprises were particularly vulnerable to COVID-19 restrictions. Vulnerable and marginalized people were disproportionately affected, with women enduring greater employment declines and loss of household livelihoods. Recovery was gradual by diversifying household income with other agricultural activities, streamlining business costs, targeting local markets and embracing online marketing and direct delivery. Governments adopted diverse and complex support measures, depending on national priorities, capacity and resources.

Countries with functioning social protection systems responded more efficiently to mitigate the impacts of the pandemic. Unfortunately, informal workers, numerous in the fisheries and aquaculture sectors, were often excluded. The pandemic exposed the interconnectivity of markets and supply chains and the need for inclusive and shock-responsive national social protection systems. On the positive side, the crisis accelerated digitalization, and encouraged e-monitoring and enforcement, the use of green energy and clean technologies and the development of local production and markets.

Fisheries and aquaculture adaptations to climate change

Increased warming has caused irreversible changes requiring urgent ocean-based action to strengthen and accelerate climate mitigation and adaptation measures, increasing the urgency of fisheries and aquaculture adaptations to climate change. This calls for the explicit consideration of climate stressors in fisheries and aquaculture management by connecting adaptation plans and management or development actions, including local and context-specific indicators associated with climate stressors of fisheries and aquaculture

Transformative adaptation plans are required at national and local levels, using an inclusive and participatory approach and considering the needs and benefits of small-scale fisheries and aquaculture. These plans would benefit from adopting climate-informed spatial management approaches, integrating equity and human rights considerations and investing in innovation. At the twenty-sixth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Glasgow (COP26), the key role of oceans was strengthened, opening opportunities for fisheries and aquaculture to expand its contribution to global efforts, sharing adaptation and mitigation solutions, and raising the profile of inland fisheries and aquaculture within the international climate discussions.

Advancing towards gender equality in fisheries and aquaculture

Gender equality in fisheries and aquaculture is fundamental for sustainability and inclusiveness. Despite their significant role in the sector, women are mostly engaged in the informal, lowest paid, least stable and least skilled segments of the workforce. Because of social, cultural and economic contexts, they often face gender-based constraints that prevent them from fully realizing and benefiting from their roles in the sector. This is further complicated by limited access to information, services, infrastructure, markets, social protection and decent employment, decision-making and leadership positions. The FAO Policy on Gender Equality guided the adoption of key FAO instruments and ways to promote gender transformative approaches.

Fisheries and aquaculture projections

FAO fisheries and aquaculture projections to 2030 point to an increase in production, consumption and trade, albeit at slower growth rates. Total production of aquatic animals is expected to reach 202 million tonnes in 2030, with the main increase coming from aquaculture, contributing 106 million tonnes in 2030. World capture fisheries is projected to increase to reach 96 million tonnes, as a result of recovering stocks of certain species owing to improved resource management, growth in catches of underfished resources, and reduced discards, waste and losses.

In 2030, 90 percent of all aquatic animal production will be for human consumption, an overall increase of 15 percent compared with 2020. This means annual per capita consumption will increase from 20.2 kg in 2020 to 21.4 kg in 2030. Aquatic food supply will increase in all regions, while per capita consumption is expected to decline slightly in Africa, raising concerns in terms of food security.

Trade in aquatic products will continue to expand, but at a slower pace than in the previous decade, reflecting the slowdown in production growth, higher prices restraining overall demand and consumption, and stronger domestic demand in some of the major producing and exporting countries, such as China. A stable share (36 percent) of total production will be exported in 2030 with an increasing contribution from aquaculture. Prices of internationally traded aquatic products are estimated to increase by 33 percent in nominal terms in 2030. This increase will be driven by improved incomes, population growth, strong demand, reduced supply and increased production cost pressure from inputs such as feed, energy and fish oil.

Source: FAO. 2022. The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome, FAO. https://doi.org/10.4060/cc0461en

FISH INFOnetwork NEWS
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https://www.fao.org/in-action/globefish/background/fishinfonetwork/en/

EUROFISH

Eurofish and FAO host artisanal fisheries webinar
Collaboration, initiative, and support from the EMFF

Speakers from five European sea basins – the Adriatic, the Baltic, the Black Sea, the Mediterranean, and the North Sea – presented stories that illustrated how small-scale fishers' success often stems from collaboration and the ability to take initiatives.

To commemorate the International Year of Artisanal Fisheries and Aquaculture, Eurofish in cooperation with the FAO Subregional Office for Central Asia, hosted on 15 June 2022 a two-hour webinar that highlighted successes in small-scale fisheries in Europe.

Eurofish welcomed five speakers: Ante Sladoljev from Croatia, David Lange from Denmark, Erko Veltson from Estonia, Nuri Basusta from Turkey, and Valentina Cappanera from Italy. Ante Sladoljev discussed the success of small-scale fishermen in embracing European Maritime and Fisheries Fund (EMFF) assistance and grants to, among other benefits, expand their business, gain access to resources, plan for long-term development, and get new equipment. He also shared the development of a fishing cooperative that allowed small-scale fishermen to develop a processing facility, be recognized as a producer organization, and gain a bigger market influence. Finally, he discussed the success of the "Fishermen Recommend" quality label. The label is designated for fish that are local, wild, and fresh. The label allows small-scale fisherman to establish a greater foothold in local restaurant and tourism markets and thereby limit their individual carbon footprint from transporting fish.

David Lange spoke on low-impact fishing in Denmark and the challenges in optimizing low-impact fishing practices which are less effective but have reduced consequences in terms of bycatch, fuel use, and sea floor impact. Mr Lange highlighted the opportunities to increase the sustainability of fisheries by developing technology, labelling, public information, political initiatives, limiting quotas, and diversifying fisheries. The organization FSK-PO, that he is a board member of, creates awareness of the issues among the public and supports the continued development of low-impact fishing in Denmark.

Erko Veltson discussed the diversification of the fish market in Estonia. The Estonian company, Stonefish, received an EMFF grant to develop a processing and sales facility for a diverse range of value-added products including fishing equipment, processed fish, fish chocolate, and fish-based snacks. The company focuses on personal branding in telling the life story of the fishermen who catch the product, and has successfully increased opportunities for the local fishermen.

Nuri Basusta spoke on the development of rapa whelk fisheries in the Black Sea. Rapa whelk is a non-indigenous species to the Black Sea and is used for human consumption in parts of Asia. The species threatens indigenous populations of bivalves such as mussels and oysters. Rapa whelk is a profitable export; yet given its invasive status, there remains very limited information on management strategies. However, rapa whelk exports have successfully provided economic opportunities for marginalized communities and women in Turkey.

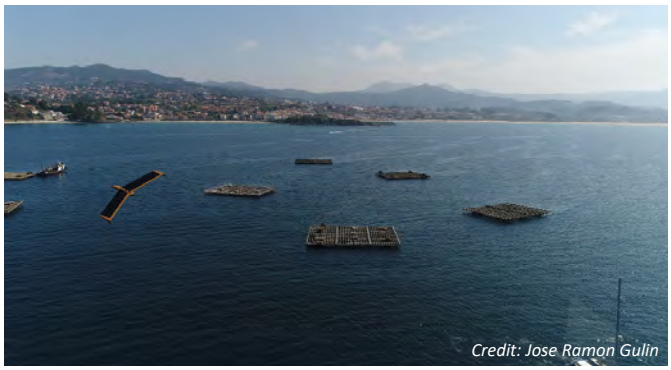
Valentina Cappanera shared the success of the tonnarella fishing practices in coexisting with the environmental protection of the Portofino marine protected area. Tonnarella is a historic way of fishing that uses nets to catch the fish by exploiting the currents. The fishing has provided an opportunity to cooperate with science to create a biological record of changes in biodiversity over time. The cooperation between interested scientists and the fisherman is valuable for the data it generates. The presentations prompted a lively discussion with the active participation of the attendees emphasizing the importance of artisanal fisheries for communities around the world.

The programme, presentations, and a video recording of the event can be viewed at https://eurofish.dk/events/2022-06-artisinal-fisheries-webinar/

As this issue of the INFOFISH International will be distributed at our flagship event TUNA 2022 in October 2022, the focus of the Innovations page this time is on technology in the tuna industry.

Drones and buoys help in fishery management

The Tunadrone is designed as a search device to locate free schools of tuna and the birds that feed on the surface above them. Its combination of solar and battery power provides it with a nine-hour endurance period at speeds of up to 30 knots. Once in flight, the Tunadrone relays securely encrypted HD images back to the catching vessel, while the proprietary software allows the user to plan and manage routes in real time or automatically.



The tunadrone for tuna fishing allows for the easy identification of birds and tuna schools to help sustainable and efficient fishing operations.

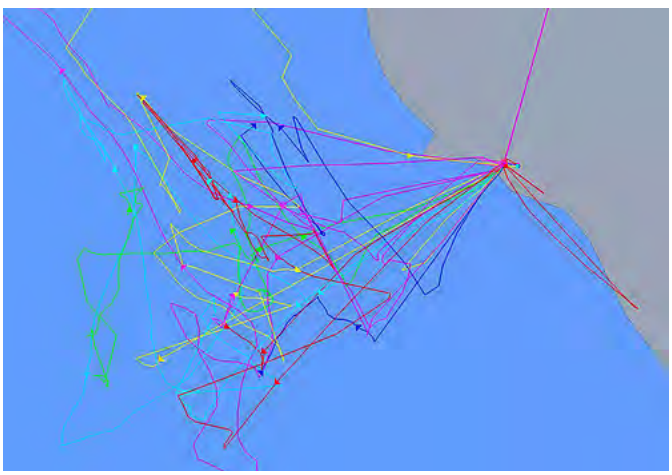
Weighing only 4kg, it is launched from the catching vessel and at the end of its tour of the ocean, the drone is flown into a recovery net. However the Tunadrone, manufactured by Marine Instruments (Spain), is not only useful for fishing efficiency, it also helps to ensure the security of fishing vessels, particularly tuna purse seiners, which tend to be targeted by pirates.

The company has also designed satellite buoys for tuna vessels which fish using FADs. When paired with the Marine View software, the buoys effectively collect and transmit data which is useful for skippers to analyse conditions over a wide area, thereby identifying the optimal areas for catches by species, size, and quantity. Marine View also displays an overview of the drifting FADs on screen, while polling them for data.

Satellite trackers for small-scale tuna fishers

Two global organizations, World Wildlife Fund and NAVAMA, have implemented a project to track the routes of tuna fishing boats in the Philippines' Mindoro Strait. In this Smart Track Project, a total of 13 vessels have been outfitted with satellite trackers, the same kind used for commercial cargo. In addition to the local fishers, partners in the project include government leaders and the Bureau of Fisheries and Aquatic Resources (BFAR), Philippines.

"These use cellular or satellite networks to plot GPS coordinates and visually depict vessel routes. This is crucial for safety and to ensure that boats fish only in proper zones," explained NAVAMA chief engineer Simon Struck. "The devices are about the size of a matchbox. They're weatherproof, economical and simple to use."



The routes of all 13 vessels fitted with the satellite trackers can be seen here

The Smart Track project is under the WWF's Public Private Partnership Programme Towards Sustainable Tuna (PPTST) which has been working since 2011 to enhance yellowfin tuna management practices for 5 800 fishers in 112 tuna fishing villages in Bicol and Mindoro. Funded by Bell Seafood, Coop, Marks & Spencer, New England Seafood, Seafresh, Waitrose and the German Investment and Development Corporation, PPTST has spearheaded the registration and licensing of tuna fishers, vessels and gear to minimize bycatch and illegal fishing.

According to the WWF, one of every five tuna is caught in the Coral Triangle, a 6-million kilometre expanse that covers the waters of the Philippines, Indonesia, Malaysia, East Timor, Papua New Guinea and the Solomon Islands. The region generates 40 percent of the Western Central Pacific's total tuna catch and employs millions of people, fuelling the economies of several nations. Next to Indonesia, the Philippines is Asia's largest tuna exporter.

Online tracking of tuna

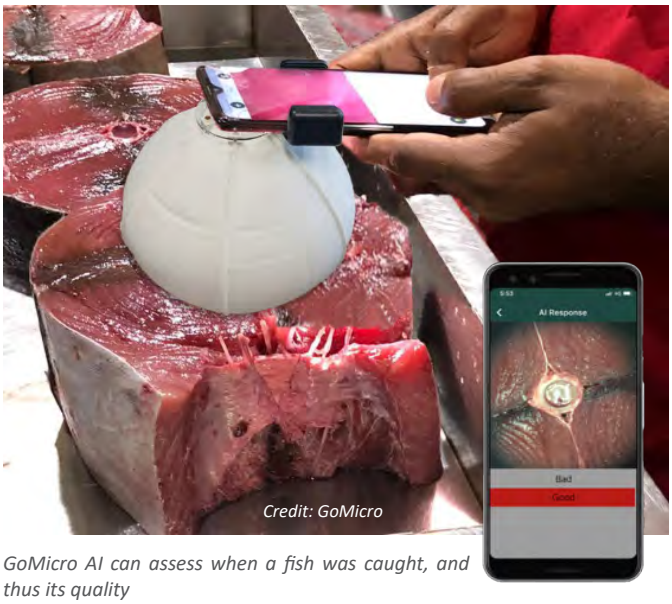
After a successful WWF-led pilot programme on using blockchain to track tuna caught in the Pacific Ocean, WWF-Australia and investment firm BCG Digital Ventures launched an online platform called OpenSC. The platform enables businesses to track their products - anything from food to tissue paper - by assigning a unique ID to an individual product at its point of origin, such as the moment a fish is caught at sea.

The blockchain is a digital ledger that cannot be tampered with. It can store a range of data, such as: (i) when, where and how the product was produced; (ii) when and how it moved from origin to the consumer; and (iii) information about its social or environmental credentials.

WWF says that consumers can also use OpenSC to learn more about the products they purchase. By simply scanning a product QR code with their smartphone camera, OpenSC will show where the fish in front of them was caught, how it journeyed along the supply chain, and importantly - that it comes from a certified sustainable fishery and was not caught inside an established marine protected area.

Phone-based AI assessment of tuna quality

Australian technology company, GoMicro, has signed a deal with over 100 supermarkets in Sri Lanka for the use of its proprietary AI technology which will allow for easy assessment of the quality of the tuna before being sold to consumers. The GoMicro technology combines a mobile phone microscope attachment with an AI suite that is able to recognised patterns and objects with a fraction of the number of photos usually required. Warehouse staff use their phones to take a photo of the tuna, before the AI-supported app then quickly determines a grade so they can label it and send it to the appropriate store.



GoMicro AI can assess when a fish was caught, and thus its quality

Real Peel technology for tuna consumers

In an example of innovations at the consuming end of the tuna supply chain, Calvo Group (Spain) says that its "Real Peel" technology for packing tuna in cans will revolutionize the sector. With its flexible aluminium lid, each Vuelca Fácil (Easy Flip) can is easier to open and the tuna comes out on its own without the need for a fork. The oil content has also been reduced in response to consumers wanting a more healthy product. The new container, launched in January 2021, is the most visible result of an industrial transformation project backed by a 30-million-euro investment over four years.

In June 2022, a report on the FMCG sector in Spain named the Vuelca Fácil tuna can as the most innovative product of 2021 as "it meets relevant needs that had not been met till now".

The Equipment & Supplies section in this issue deals with an ongoing challenge in the fish production and processing sectors.

Quoting from "Food Loss and Waste in Fish Value Chains (https://www.fao.org/flw-in-fish-value-chains/en/)", technology is the application of scientific knowledge to minimize loss and waste and produce and market desired fish products. Examples of appropriate technology which can help reduce FLW are:

- Production: improved and more selective fishing gear, and, in aquaculture, equipment to improve water quality and prevent disease
- Post-harvest: raised drying racks, ice machines, insulated boxes, freezers, refrigerated vehicles, improved fish smoking kilns, mechanical dryers, packaging equipment
- Preservation methods: smoking, salting, freezing, and packaging methods
- Use of mobile phones to undertake transactions, make distribution and marketing more efficient
- Equipment to make use of underutilized species or rest raw materials (e.g. surimi production)
- Use of flesh bone separation technology to remove fish meat from by-products such as fish frames

The focus of the Equipment & Supplies section in this September/October issue is on processing machines which represent one of the examples mentioned above, i.e. use of flesh bone separation technology to remove fish meat from by-products.

From one to five different cuts of the fish

The EU-funded project called WaSeaBi (https://www.waseabi.eu/about-waseabi/) has reported that sorting technology has successfully been implemented at the herring processing company Sweden Pelagic AB in close cooperation with Chalmers University of Technology, Sweden.

The project points out the fact that when filleting pelagic fish, the common practice is to collect all off-cuts such as heads, tails and backbones in one bin. This immediately reduces the quality of the off-cuts as they become contaminated with e.g. blood, enzymes and residues from the intestines. Consequently, the use and value become limited, which is why the off-cuts typically are sold for feed production. However, if handled correctly, there is great potential for using the off-cuts for more valuable purposes such as high-quality food ingredients for fish burgers as they are rich in proteins.

The new sorting technology makes it possible to separate the herring into head, backbones, viscera and belly flap, and tail in addition to the fillet. It was developed by re-building a filleting line for pelagic fish, which now fractionates and separates the fish into five different clean parts. This means that Sweden Pelagic AB now has five cuts instead of one, which they can sell for subsequent production of food raw materials and ingredients such as minces, protein isolates, hydrolysates and oils.

Said Martin Kuhlin, CEO of Sweden Pelagic AB: "The technology will make it possible to extend our product range. This year, we estimate that we will produce around 200 – 300 tons of 'herring mince', and the ambition is to increase that number every year."

New healthy and tasty seafood produced in the WaSeaBi project. Utilizing the whole fish makes it possible to expand the product range and reduce fish loss and waste.

Further information: Sweden Pelagic AB (www.swedenpelagic.se)

Decanters play a big role

Widely used in the fish industry, decanters play – and will continue to play – a key role in separation processes for fish products, such as fish meal and fish oil. Among the decanter separation processes are the:

- Removal of oil and solids from fish press water or from whole fish to produce fish meal and fish oil;
- Removal of solids from fish products hydrolyzate proteins for onward processing and concentration; and
- Low-temperature extraction of proteins from fish meat (surimi) and/or fish oil extraction for human consumption.

Each decanter application in the fish industry requires a specific design to overcome various challenges, these being among them: (i) variable solids content (the solids load in fish press water), fine solids (tiny solids are more difficult to separate than larger particles), (iii) sand and fish bones (hard particles), (iv) food-grade safety (v) feed flow rate, and (vi) high feed viscosity or temperature (the higher the feed temperature, the lower the feed viscosity, and the faster the sedimentation velocity).

To maximize decanter performance, all parameters must be tailored to your specific process conditions – from fish type, farmed or wild, freshwater or saltwater to the properties of

the fish press water or stick water, through to the desired quality of the products clarified out of, or extracted from the decanter.

The company also markets a surimi processing line in which advanced centrifugal separation technology replaces the rotary screens and filters that are the traditional method of separation.

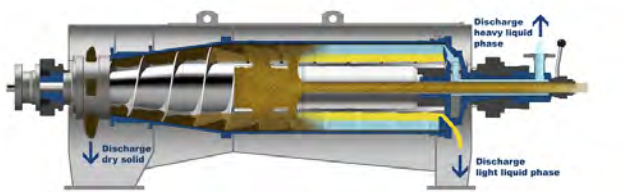
Credit: Alfa Laval

Decanter centrifuges such as this are important in the technical grade recovery of animal products

Further information: Alfa Laval Corporate AB, Sweden (www.alfalaval.com)

Adding a tricanter to the line

Together with a decanter (two-phase separation), a tricanter (three-phase separation) is a useful addition to the processing line, including on-board vessels. Its structure and function are similar to those of a decanter, with the difference being the way that the liquid is discharged. There are two liquid phases in a tricanter: a "heavy" liquid phase (higher density and discharged under pressure), as well as a "light" liquid phase (lower density and discharged without pressure).



Three-phase separation with the Tricanter Credit: Flotwegg

An adjustable impeller discharges the "heavy" liquid phase, which the operator can use to adjust the pond depth of the heavy liquid without difficulty during ongoing operation. An adjustment mechanism causes the position of the impeller to change, therefore changing the separation line of the liquids. The process engineering results can then be influenced to achieve the required separation result. This would usually require a manual adjustment of the wear plates on the rotor, which can be time-consuming.

Further information: Flotwegg SE, Germany (www@flotwegg.com)

Mince free from bones and fins

Credit: BAADER

Fish mince produced by the BAADER 608

A fairly new entrant on the separation technology scene is the BAADER 608. In a process which the company has termed "BAADERING", fish materials fed into the equipment are separated, producing a mince free from bones, fins, and other impurities while preserving the muscle fibre structure. In principle, a squeezing belt feeds the material onto a perforated drum and pushes the soft components through the holes. The solid components, such as tendons, connective tissue, cartilage, bone shards, foreign bodies, etc., remain outside the drum and are discharged.

Further information: BAADER, Germany (https://fish.baader.com/products/baader-608)

Fish meal and fish oil production

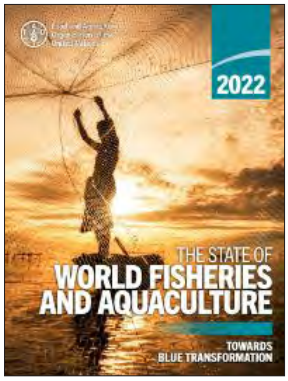
The processing of byproducts into fish meal and oil can add value to the product range of companies while reducing the amount of waste that would otherwise have been discarded into the environment. Such processing equipment could be sited on land or on-board, depending on available space.

Standard processing lines tend to be compact and cost less to run, whereas the high-grade processing lines are specially designed to provide high-grade fish meal and oil that can comply with higher specifications (such as 3% higher digestibility), and thus sell for higher prices.

Credit: Haarslev Industries

Land-based fish meal and fish oil plant

Further information: Haarslev Industries A/S, Denmark (info@haarslev.com)



THE STATE OF WORLD FISHERIES AND AQUACULTURE 2022: TOWARDS BLUE TRANSFORMATION

Published by the Food and Agriculture Organization of the United Nations (FAO), 2022.

The 2022 edition of The State of World Fisheries and Aquaculture coincides with the launch of the Decade of Action to deliver the Global Goals, the United Nations Decade of Ocean Science for Sustainable Development and the United Nations Decade on Ecosystem Restoration. It presents how these and other equally important United Nations events, such as the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022), are being integrated and supported through Blue Transformation, a priority area of FAO's new Strategic Framework 2022–2031 designed to accelerate achievement of the 2030 Agenda for Sustainable Development in food and agriculture.

The concept of Blue Transformation emerged from the Thirty-fourth Session of the FAO Committee on Fisheries in February 2021, and in particular the Declaration for Sustainable Fisheries and Aquaculture, which was negotiated and endorsed by all FAO Members. The Declaration calls for support for "an evolving and positive vision for fisheries and aquaculture in the twenty first century, where the sector is fully recognized for its contribution to fighting poverty, hunger and malnutrition." In this context, Part 1 of this edition of The State of World Fisheries and Aquaculture reviews the world status of fisheries and aquaculture, while Parts 2 and 3 are devoted to Blue Transformation and its pillars on intensifying and expanding aquaculture, improving fisheries management and innovating fisheries and aquaculture value chains. Blue Transformation emphasizes the need for forward-looking and bold actions to be launched or accelerated in coming years to achieve the objectives of the Declaration and in support of the 2030 Agenda. Part 4 covers current and high-impact emerging issues – COVID-19, climate change and gender equality – that require thorough consideration for transformative steps and preparedness to secure sustainable, efficient and equitable fisheries and aquaculture, and finally draws some outlook on future trends based on projections.

This document can be downloaded at: https://doi.org/10.4060/cc0461en

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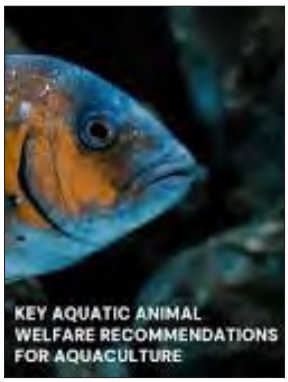

KEY AQUATIC ANIMAL WELFARE RECOMMENDATIONS

Produced by the Aquatic Animal Alliance

Recent research shows that many aquatic animals are capable of both positive and negative physical and psychological experiences. Thus, standards set by the Aquatic Animal Alliance (AAA) will include both positive and negative welfare parameters in order to provide aquatic animals the developmental opportunities required for a true allostatic "life worth living" rather than focusing merely on freedom from the worst forms of suffering.

This document is intended to provide an overview of what the AAA, having consulted with experts globally, has identified as key areas where welfare intervention is most needed for animals used in aquaculture. Information about more detailed and species-specific recommendations can be found in the extended version of this text and the accompanying references.

The signatories to the document are: Aquatic Life Institute, Animal Equality, Compassion in World Farming, Dyrevernalliansen, Essere Animali, Fish Welfare Initiative, The Humane League, and Mercy for Animals.

This document can be accessed at: https://aquaticanimalalliance.org

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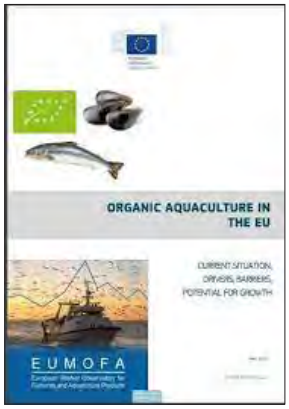
GLOBALTUNA MARKET REPORT AND FORECAST 2022-2027

Published by Research and Markets, March 2022. 205 pp.

According to this report, 'Global Tuna Market Report and Forecast 2022-2027', the global tuna market attained a value of USD 57.96 billion in 2021. Aided by the rising consumer awareness regarding the nutritional value of tuna, the market is projected to further grow at a CAGR of 5.1% between 2022 and 2027 to reach a value of USD 78.20 billion by 2027. The report looks into the market shares, plant turnarounds, capacities, investments, and mergers and acquisitions, among other major developments, of the key players in the industry.

This report can be purchased from Research and Markets (https://www.researchandmarkets.com/);

Telephone USA (toll-free):1-800-526-8630



ORGANIC AQUACULTURE IN THE EU

Published by the European Market Observatory for Fisheries and Aquaculture Products (EUMOFA), 2022

The objective of the study is to update the EUMOFA study on organic aquaculture published in 2017. The study covers the whole sector, with a focus on the main species, namely: Atlantic salmon, rainbow trout, carp, gilthead seabream, European seabass, oysters, mussels, clams and algae (micro and macro).

The study also provides qualitative information to understand better the patterns of organic farming, the barriers and drivers for growth, as well as the growth's prospects. Interviews have been conducted with public and professional bodies in charge of the aquaculture and organic sector, as well as with selected stakeholders.

This report is structured in the following sections:

- An introduction to provide context on the development of organic aquaculture;
- Data on the development of EU organic aquaculture; and
- Analysis of the drivers, barriers, and prospects for growth.

This document can be accessed at: https://www.eumofa.eu

2022

SEPTEMBER

14-16
Seafood Expo Asia
Singapore
https://www.seafoodexpo.com/asia/

26-27
13th Seafood Expo & Seafood Processing Expo 2022
Dubai, UAE
https://www.dubaiseafoodexpo.com/

OCTOBER

11-13
17th INFOFISH World Tuna Trade Conference & Exhibition
Bangkok, Thailand
www.tuna.infofish.org

26-28
China Fisheries & Seafood Expo
Qingdao, China
https://chinaseafoodexpo.com/

NOVEMBER

9-12
SEAFOOD SHOW OF ASIA EXPO 2022
Jakarta, Indonesia
https://kristamedia.com/events-2?page=3

29-Dec 2
World Aquaculture Singapore 2022
Singapore
https://www.was.org/Events/Calendar#.YhwO9t8RWIE

EDITORIAL PLAN 2022

INFOFISH

ISSUE	SMALL-SCALE SECTOR	PROCESSING & MARKETING	FISHING & AQUACULTURE	GLOBAL
1/2022 (Jan/Feb) **Deadline: 15 Nov 2021**	• Insurance services for the Asian small-scale fisheries sector • Assessing and improving value chains in small-scale fisheries	• Innovation in seafood packaging	• Achieving resilience and sustainability in the seaweed industry in Malaysia	• Leading seafood supply chains towards sustainability • International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022)
2/2022 (Mar/Apr) **Deadline: 15 Jan 2022**	• Illuminating Hidden Harvests: contributions and drivers of change in small-scale fisheries	• Selling fish to Generation Z	• Sensible seaweed technologies • Aquaculture business and information networks in Indonesia	• Towards industry 4.0: digital transformation in the tuna industry • Ballast water management – implications for fisheries
3/2022 (May/June) **Deadline: 15 March 2022**	• Small-scale businesses that thrived during the pandemic in South and Southeast Asia	• The alternative seafood sector	• The urgent need for comprehensive fishery stock assessment in Asia • Investment opportunities in aquaculture	• Impact of climate change on fisheries and aquaculture
4/2022 (July/Aug) **Deadline: 15 May 2022**	• Role of Civil Society Organisations (CSOs) in the implementation of SSF Guidelines	• e-commerce in the seafood sector • Business ecosystem in Indian fisheries: prospects and strategies	• Restorative aquaculture systems • Reduction of greenhouse gases from aquaculture	• Plastic neutral fisheries: feasibility and global opportunities
5/2022 (Sep/Oct) **Deadline: 15 July 2022**	• Gender equity in small-scale fisheries: leaving no one behind	• The role of retailers in sourcing food responsibly	• Intelligent aquaculture • Reduction of greenhouse gas emissions from shrimp aquaculture	• Value added products from aquaculture: a global trend • The fisheries industry in a zero poverty/zero hunger world
6/2022 (Nov/Dec) **Deadline: 15 September 2022**	• Small-scale seaweed production and trade: factors influencing success	• Biodegradable seafood packaging	• Inclusive business models in aquaculture: suitability and growth potentials • Welfare considerations in shrimp and fish culture	• UN Decade of Ocean Science 2021-2030: The science we need for the ocean we want • Inland fisheries and its contribution to the Sustainable Development Goals

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PTF 2023

8th PACIFIC TUNA FORUM

SEPTEMBER 2023

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