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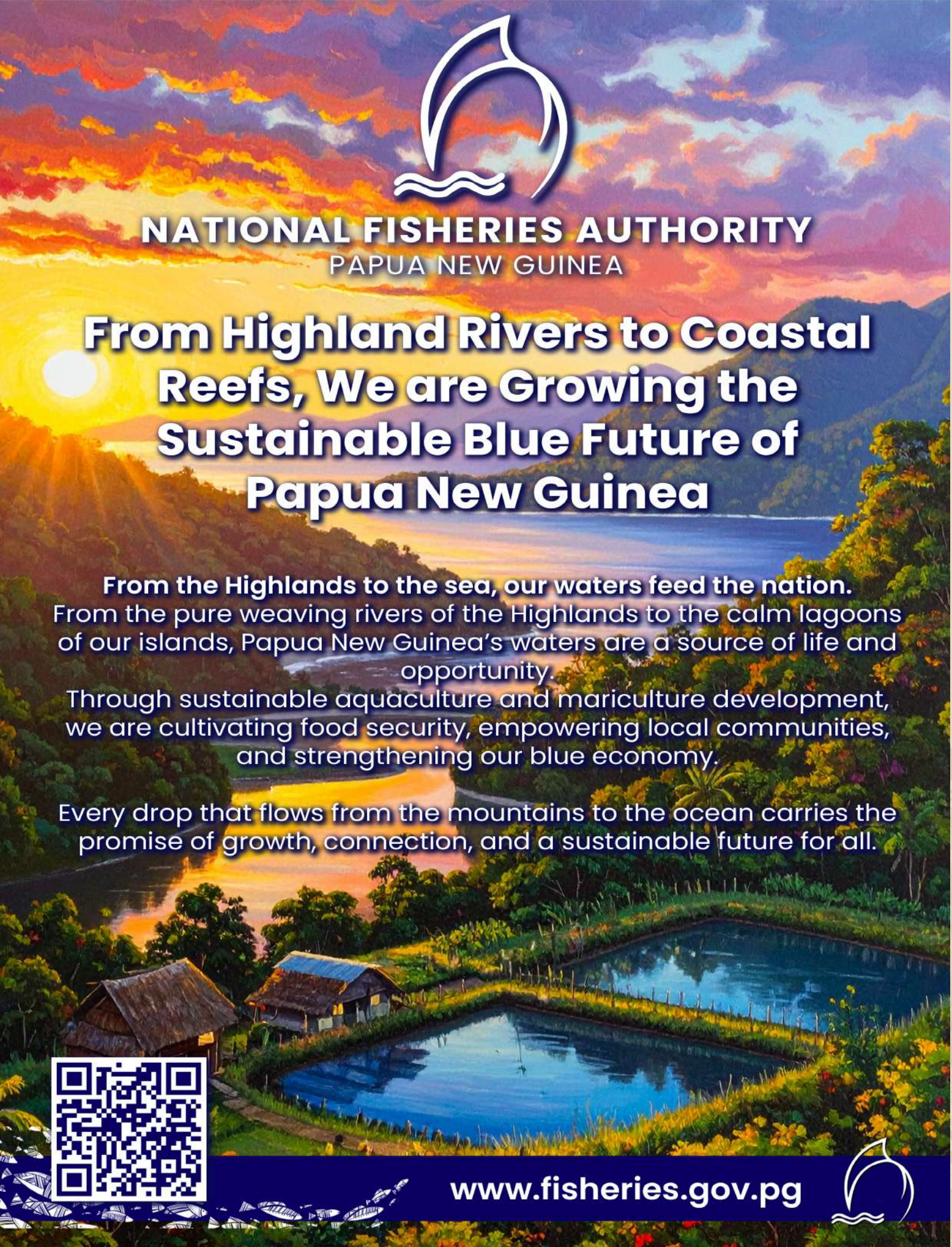
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Credit : *EJ Delgado*

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INFOFISH International – Issue 1, 2026

As we welcome 2026, INFOFISH International continues its commitment to providing timely, insightful and practical perspectives on the transformation of fisheries and aquaculture systems worldwide. Building on the momentum of recent years, this first issue of 2026 brings together global policy reflections, market intelligence and technical innovation, all framed by the shared objective of advancing sustainability, resilience and inclusivity across aquatic food systems.

We open this issue with an in-depth *INFOFISH speaks to…* interview with **Lukas Manomaitis**, East Asia Aquaculture Lead at the U.S. Soybean Export Council (USSEC), who sheds light on evolving dynamics within Asian aquaculture, with a particular focus on tilapia. Topics include the formation of the Southeast Asia Tilapia Association (SEATA); productivity and sustainability in pond-based systems such as the In-Pond Raceway System (IPRS); feed formulation strategies; traceability; and how exporters can better align with the rapidly changing Asian seafood market.

Our feature articles reflect the breadth and complexity of current industry challenges and opportunities. In an important contribution titled *Breaking the Plastic Wave,* The Pew Charitable Trusts presents updated evidence on the scale, impacts and costs of plastic pollution, and underscores the urgency of system-wide transformation. The article highlights the interconnected links between plastic production, climate change, human health and economic outcomes, reinforcing why coordinated global action is critical for aquatic ecosystems and coastal livelihoods.

Food security, nutrition and diversification are addressed in *Edible seaweeds in China support dietary diversification,* which draws on FAO guidance to explore the nutritional value, processing methods and market potential of commercially important seaweed species. The article illustrates how seaweeds can contribute not only to healthier diets, but also to innovation across food, pharmaceutical and industrial sectors.

Sustainable capture fisheries remain a central concern, and in *Fisheries must become more selective and sustainable,* Manfred Klinkhardt examines how technical innovations in fishing gear can significantly reduce bycatch while maintaining economic viability. From gear design adjustments to species-specific behavioural insights, the article demonstrates how incremental technological change can deliver meaningful sustainability gains.

From a market and trade perspective, *Latin America: the next global epicentre for sustainable tilapia fillet production and export* analyses how countries such as Brazil and Colombia are reshaping the global tilapia landscape. Driven by improved genetics, professionalised value chains, certification uptake and proximity to key markets, Latin America is positioning itself as a leading supplier of premium, traceable and sustainably produced tilapia fillets.

Looking ahead, this issue also announces an important milestone for the global tuna industry, as preparations are underway for the **19th INFOFISH World Tuna Trade Conference and Exhibition**, to be held at the Shangri-La Hotel, Bangkok, Thailand, from 7 to 9 September 2026. Convened under the theme **"Strengthening Value Chain Synergies, Blue Economies and Sustainability across the Global Tuna Industry"**, TUNA 2026 will address the evolving dynamics of one of the world's most economically and socially significant seafood sectors. Among the longest-running and most authoritative international forums dedicated to tuna trade, markets and sustainability, every INFOFISH World Tuna Conference has consistently provided a unique platform for dialogue among policymakers, industry leaders, scientists, traders and development partners. The 19th edition comes at a particularly critical juncture, as the sector navigates challenges related to resource sustainability, climate change, supply chain transparency, labour and social responsibility, and shifting market and regulatory expectations. By fostering cross-sectoral engagement across producing, processing and consuming regions, TUNA 2026 will play a vital role in aligning economic and environmental objectives, strengthening cooperation and supporting a resilient, inclusive and future-ready global tuna industry.

All the above, together with segments containing news on the industry from various aspects, reflect a sector at a pivotal point – one where environmental responsibility, technological innovation, inclusive growth and market alignment must move forward hand-in-hand. As always, INFOFISH International remains committed to supporting informed dialogue and knowledge exchange across regions and disciplines.

We extend our sincere thanks to all contributors and partners whose dedication have made this issue possible. We look forward to continuing our engagement with you throughout 2026 as we explore the ideas, solutions and partnerships shaping the future of fisheries and aquaculture.

Thank you, and we hope you enjoy this edition of INFOFISH International.

Gemma Meermans Matainaho
Director

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Resúmenes de los principales artículos

América Latina se perfila como un polo clave de la producción y exportación de filetes de tilapia sostenibles, impulsada por una combinación de ventajas naturales, innovación tecnológica y una elevada adopción de certificaciones. Brasil se ubica entre los mayores productores de tilapia a nivel mundial, mientras que Colombia ha consolidado una reputación basada en filetes frescos de alta calidad, plenamente trazables y destinados principalmente al mercado de Estados Unidos. Otros países, como México y Honduras, contribuyen a una base regional diversificada, respaldada por mejoras genéticas, sistemas productivos modernos y un creciente grado de profesionalización. En los ámbitos de la producción, el comercio, la sostenibilidad y el posicionamiento de mercado, América Latina no solo se integra, sino que contribuye activamente a redefinir la industria mundial de la tilapia.

Si bien se han logrado avances considerables en los esfuerzos por hacer la pesca más sostenible, aún no ha sido posible reducir de forma significativa la proporción de poblaciones sobreexplotadas a nivel mundial. Los cambios en el diseño de los artes de pesca pueden contribuir a alcanzar este objetivo urgente. En algunos casos, incluso modificaciones relativamente pequeñas en las redes son suficientes para mejorar su selectividad. ¿Qué ideas y enfoques están surgiendo actualmente?

Este artículo reúne extractos seleccionados del manual de la FAO Edible Seaweed Food Guide (Guía de algas comestibles), elaborado y publicado con el objetivo de promover un mayor uso de alimentos a base de algas, respaldar la diversificación alimentaria y contribuir a la seguridad alimentaria y nutricional. Si bien el enfoque se centra principalmente en el consumo y la utilización de las especies de importancia comercial para China, la publicación también describe otros aspectos, como el contenido nutricional de determinadas especies de algas, las principales técnicas de procesamiento utilizadas en la elaboración de estos productos y los métodos de preparación de platos populares.

En 2020, The Pew Charitable Trusts y Systemiq publicaron el informe de referencia Breaking the Plastic Wave (Rompiendo la ola de plástico), con el fin de identificar una hoja de ruta creíble para abordar la contaminación por plásticos en los océanos del mundo. En su actualización de 2025, se incorporan nuevos datos para ofrecer una comprensión más profunda de los impactos ambientales, económicos, sanitarios y sociales del plástico. Asimismo, se analiza la influencia del sistema mundial del plástico en los esfuerzos por hacer frente a algunos de los principales desafíos globales. El objetivo es respaldar y alentar a los responsables de la toma de decisiones a medida que responden a cuestiones críticas, evalúan los compromisos necesarios e implementan soluciones.

Rodrigo Misa

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Résumés des articles de fond

L'Amérique latine est en train de devenir un pôle majeur de la production et de l'exportation durables de filets de tilapia, grâce à une combinaison d'avantages naturels, d'innovations technologiques et d'une forte adoption des certifications. Le Brésil est l'un des plus grands producteurs mondiaux de tilapia, tandis que la Colombie s'est forgée une réputation pour ses filets frais haut de gamme et entièrement traçables, destinés principalement aux États-Unis. D'autres pays, comme le Mexique et le Honduras, viennent s'ajouter à une base régionale diversifiée, soutenue par une génétique améliorée, des systèmes de production modernes et une professionnalisation croissante. Que ce soit en matière de production, de commerce, de durabilité ou de positionnement sur le marché, l'Amérique latine ne se contente pas de rejoindre l'industrie mondiale du tilapia, elle la remodèle.

Bien que les efforts visant à rendre la pêche plus durable aient connu un succès considérable, il n'a pas encore été possible de réduire de manière significative la proportion de stocks surexploités dans le monde. La modification de la conception des engins de pêche peut contribuer à atteindre cet objectif urgent. Parfois, même de petits changements apportés aux filets suffisent à les rendre plus sélectifs. Quelles sont les idées qui émergent actuellement ?

Cet article rassemble des extraits choisis du manuel de la FAO intitulé «Guide Alimentaire sur les Algues Comestibles», qui a été compilé et publié afin de promouvoir une utilisation accrue des aliments à base d'algues, de soutenir la diversification alimentaire et de contribuer à la sécurité alimentaire et à la nutrition. Bien qu'il se concentre principalement sur la consommation et l'utilisation de chaque espèce commercialement importante pour la Chine, cet ouvrage présente également d'autres informations détaillées, telles que la teneur en nutriments de certaines espèces d'algues, les principales techniques de transformation utilisées dans la fabrication de ces produits, ainsi que les méthodes de préparation de plats populaires.

En 2020, The Pew Charitable Trusts et Systemiq ont publié un rapport novateur intitulé «Briser la Vague Plastique» (Breaking the Plastic Wave) afin d'identifier une feuille de route crédible pour lutter contre la pollution plastique dans les océans du globe. Dans une mise à jour intitulée «Breaking the Plastic Wave 2025», nous nous appuyons sur ces informations améliorées pour fournir une compréhension plus approfondie des impacts environnementaux, économiques, sanitaires et sociaux du plastique. Nous explorons également l'influence du système mondial du plastique sur les efforts visant à relever certains des plus grands défis mondiaux. Notre objectif est de soutenir et d'encourager les décideurs dans leur réponse aux problèmes mondiaux critiques, leur évaluation des compromis et la mise en œuvre de solutions.

DIGRÉ Arriko Calice

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文 章 摘 要

在天然优势、技术创新与认证体系深度落地的多重驱动下，拉丁美洲正崛起为罗非鱼鱼片可持续生产及出口的核心枢纽。巴西是全球最大的罗非鱼生产国之一，而哥伦比亚则凭借高品质、可全程追溯的鲜鱼片树立了良好口碑，其产品主要销往美国市场。其他国家如墨西哥、洪都拉斯等，则凭借优良的育种技术、现代化的养殖体系及日益完善的专业化水平，进一步夯实了该地区多元的产业发展基础。在生产、贸易、可持续发展及市场定位等方面，拉丁美洲并非仅仅融入全球罗非鱼产业行列，更是在重塑这一产业的发展格局。

尽管在全球范围推动渔业可持续发展方面已取得诸多成效，但过度捕捞种群的占比仍未能实现显著下降。改进渔具的设计有助于达成这一紧迫目标，有时甚至仅需对渔网稍作调整，便能有效提升其捕捞精准度。目前，业界涌现出了哪些创新思路?

本文节选了联合国粮食及农业组织（FAO）《海藻食用手册》中的部分核心内容。该手册的编撰与出版旨在推广海藻基食品的广泛应用，助力饮食多样化发展，并为保障粮食安全与改善营养状况 贡献力量。手册重点聚焦于中国市场具有重要商业价值的各类食用海藻的消费与利用情况，同时还详细阐述了部分海藻品种的营养成分、相关产品的关键加工过程，以及多款常见海藻菜肴的烹饪方式。

2020 年，皮尤慈善信托基金会（The Pew Charitable Trusts）与系统变革咨询公司（Systemiq）联合发布了一份具有开创性意义的报告 ——《遏止塑料污染浪潮》，旨在为解决全球海洋塑料污染问题制定切实可行的行动路线图。在新版报告《遏止塑料污染浪潮 2025》中，我们基于更为完善的信息，深入剖析了塑料污染对环境、经济、健康及社会层面产生的多重影响，同时探讨了全球塑料产业链体系对人类应对一系列全球性重大挑战相关举措产生的影响。本报告旨在为决策者提供支持与参考，助力其应对各类紧迫的全球性议题，权衡利弊并推动相关解决方案落地见效。

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FRESH AND CHILLED FISH

While fresh tilapia production expanded significantly in several Latin American countries through much of 2025, international trade remained subdued due to lower supplies.

Accordingly, imports of fresh tilapia fillets into the United States declined in 2025, leading to a shift toward cheaper whitefish like pangasius. New proposed tariffs on Chinese and Vietnamese fisheries and aquaculture products further disrupted trade. Colombia retained its top spot as the main supplier of fresh/chilled tilapia fillets (HS code 030431) to the US with a volume of 5 155 tonnes during January–September 2025, resulting in a decrease of 40.21% compared to 8 622 tonnes in the same period in 2024.

Fresh/chilled tilapia prices in both China and Brazil fell throughout 2024, primarily driven by lower domestic demand. This downward price trend in the domestic markets of these countries persisted during 2025, reflecting ongoing market adjustments and regional production dynamics.

In September 2025, China imported 133 279 tonnes of fresh/chilled fish (HS0302), excluding fillets. In value terms, there was a rise of 19.39% over the same month in 2024. Imports of whole fresh Atlantic salmon thinned in September compared with August, down from 13 057 tonnes to 12 266 tonnes, but prices for both Atlantic and Norwegian salmon (head-on gutted) increased by USD 0.57/kg across wholesale markets in week 49, reflecting firmer international trends and a ripple effect hike in prices of salmon from other origins.

FROZEN FISH (INCLUDING FILLETS)

Overall international tilapia trade during January–September 2025 was characterised by supply chain constraints, tariffs, and changing consumption trends, which pushed demand for frozen product. Frozen tilapia imports totalled approximately 19 000 tonnes (-35.34% in volume) which is valued at USD 1.72 billion as compared to the same period in 2024. Frozen fillet import volume (40 000 tonnes) recorded a 31.89% drop, year-on-year.

According to the International Trade Centre (ITC), the US is the world's largest consumer of tilapia, while China is the leading supplier to the global market. Even though the US and China agreed to lower duties on each other's goods for 90 days in May 2025, Chinese tilapia producers and processors began pursuing several avenues in order to diversify their sales away from the US in an attempt to guard themselves against further trade uncertainty.

Nevertheless, in the first seven months of 2025, the US imported over USD 1.1 billion worth of whitefish, up 8% year-on-year, of which frozen tilapia fillets (HS 030461) accounted for USD 262 million (+19%) representing 23% of total US whitefish imports. As of July 2025, tilapia became the most popular imported whitefish in the US market, surpassing cod and catfish. Vietnam is currently the second-largest supplier of frozen whole tilapia to the US, trailing only China. This reflects significant growth potential for Vietnamese tilapia products.

SHRIMP

The season for farmed shrimp in Asia started to wane from late October 2025 with the approach of winter. Overall production growth in the region for export processing has been low to moderate in South and Southeast Asia (China, India, Indonesia and Thailand) associated with punitive US tariffs in place from August 2025. Farmed shrimp production in Ecuador seemed to be stable and is likely to reach 1.5 million tonnes in 2025.

In China, local production is largely sold in the domestic live and fresh seafood market, while imported frozen shrimp are increasingly used for export processing of value-added products.

During the first nine months of 2025, cumulative imports of frozen shrimp increased in Vietnam by 76% year-on-year at 67 979 tonnes to fill the shortage of domestic raw material in the export processing industry; Ecuador and India were the main exporters to Vietnam. Imports of frozen shrimp also increased in Thailand by 39% year-on-year at 17 460 tonnes for the same purpose.

Exports

During January–September 2025, Ecuador (the number one global exporter of shrimp) sold 1.04 million tonnes (+13.66% year-on-year) to China (501 288 tonnes; +2.92%), US (198 930 tonnes ; +17.66%), Spain (67 072 tonnes; +38.84%), France, Italy, Belgium and the Russian Federation. Next to China, Japan is Ecuador's top market in Asia followed by Vietnam, Taiwan, Malaysia, Thailand, and the Republic of Korea. In the Near East, the leading importers of Ecuadorian shrimp are UAE, Lebanon, Egypt, Libya, Saudi Arabia and Kuwait; imports are on the rise in these markets.

Ecuador is also possibly the largest exporter of whole frozen farmed *vannamei*, exports of which have increased every year during the last five years. In the first nine months of 2025, exports of whole frozen shrimp from Ecuador increased by 2.22% at 145 067 tonnes; the top buyers were China (60.65% of the total volume), US (15.40%) and Spain (9.27%).

India is the second-largest exporter of shrimp, although trailing behind Ecuador by a wide supply gap (455 213 tonnes). Shrimp exports from India increased during January–September 2025 by 10.83% over the same period in 2024, at 588 319 tonnes. Exports to the top market, the US, declined by 2.36% year-on-year at 215 101 tonnes due to the high tariff on Indian shrimp from August 2025. Increased exports to China (+4.28% at 104 696 tonnes), the European Union (+19.67% at 73 599 tonnes) and Vietnam (+93% at 50 481 tonnes), as well as other markets in Southeast Asia and the Far East, combined to offset the export shortfall to the US market.

Imports

At 2.7 million tonnes, the total volume of global shrimp trade during the first nine months of 2025 was about the same as in 2024. Imports of US shrimp into the top market, China, started to decline from August due to the high tariffs effective from that month. At the same time, imports increased in Europe and other Asian markets during the review period.

TUNA

International trade

The international trade volume of fresh and frozen tuna during January–September 2025 totalled 1.72 million tonnes valued at USD 5.46 billion, against 1.93 million tonnes and USD 5.427 billion in January–September 2024.

Global imports of fresh/chilled and frozen tuna declined during the first three-quarters of 2025 as compared to the same period in 2024, but increased for frozen tuna fillets (160 625 tonnes valued at USD 1.06 billion), which are preferred by the non-canned tuna trade worldwide.

The leading importers of fresh tuna during the review period were the United States, Thailand, Spain, Malta and Japan, although imports declined in these five markets during the period under review. On the other hand, summer demand in Europe and also in the emerging markets in the Far East (China and the Republic of Korea,) generated better demand for sashimi and sushi-grade tuna among Japanese restaurants, which are the prime customers of high-value fresh tuna. A similar trend was observed for fresh air-flown tuna in the Near East markets (UAE, Saudi Arabia, Bahrain and Qatar) where the number of Japanese restaurants is on the rise.

Non-canned tuna

Global demand for the higher-value non-canned tuna was stable throughout 2025 mostly for frozen tuna fillets, while demand for fresh tuna fluctuated worldwide. Imports of fresh tuna (mostly air-flown) weakened marginally in the US, Canada and Thailand, but increased in Spain, China, Saudi Arabia and Australia.

Imports of frozen tuna fillets declined marginally in the US, but increased in other markets, including Japan, the European Union, UK, Republic of Korea, Philippines, Vietnam, Thailand and in the Near East.

Japan

Toyosu fish market: Since October, consumer demand for sashimi tuna improved in Japan's catering trade and outdoor dining along with increased visits by foreign and local tourists interested to view the colours of autumn. To cater to this rising demand, imports of air-flown jumbo bluefin (120–180 kg/pc) increased from North America (the US State of Boston, and Canada) but in smaller lots. Supplies and prices of fresh bigeye tuna in the auction market have improved as well; however, imports of Southern bluefin from New Zealand reduced.

Imports

During the first nine months of 2025, overall imports of fresh and frozen tuna in Japan were 10.53% higher year-on-year at 168 718 tonnes. However, fresh tuna imports continued the negative trend for all species except for bluefin of Atlantic origin. Imports increased during this period for whole/dressed frozen bluefin (+79.25% at 527 tonnes), frozen Southern bluefin (+58.41 at 6 194 tonnes), frozen bigeye (+11.11 at 40 624 tonnes), and deep frozen tuna fillets (+8.16% at 53 440 tonnes).

USA

After stable trade in the summer months, consumer demand for high-value tuna softened in the US market from September. Cumulative imports of fresh, frozen tuna and fillets declined during January–August 2025, reaching 63 026 tonnes (-3% year-on-year), with the most reduced import volume in August with the start of enhanced tariff measures.

China

This emerging tuna market celebrated the longest official holiday period comprising the Golden Week (National Day) during the first week of October. Consumption of all types of high-value seafood, including fresh tuna, increased significantly during this period.

The market imported 2 170 tonnes of fresh and frozen tuna (bluefin, Southern bluefin, bigeye) during January September 2025. Among these, imports of frozen tuna fillets were 173% higher than the corresponding period at 621 tonnes (+173%) valued at USD 14.68 million. The main customers comprised the large number of Japanese restaurants in the country (125 000).

Raw materials for canning and other uses: Global imports of whole frozen tuna, generally used to make ready-to-eat products, were 12.20% lower year-on-year during the first three-quarters of 2025. The import shortfall for frozen skipjack was significantly high (-27.90%) with a cumulative total of 777 963 tonnes. In contrast, imports increased by 12.63% for frozen yellowfin at 428 637 tonnes, 28% for frozen bigeye (96 823 tonnes) and 19.72% (85 222 tonnes) for frozen albacore.

During January–September 2025, imports of raw frozen tuna in Thailand decreased by 17.39% year-on-year at 548 344 tonnes, with a significant decline in skipjack supply (-31.21% at 401 145 tonnes). In contrast, imports of frozen yellowfin were higher at 98 614 tonnes (+24% year-on-year). Although the delivery price of frozen skipjack from the Central and Western Pacific to Bangkok weakened from USD 1700/tonne in October to USD 1550/tonne in November, imports of whole frozen tuna continued to weaken. Nonetheless, there is continued strong demand for semi-processed raw material (cooked frozen loins) in Thailand. Imports increased by 3.91% year-on-year at 58 421 tonnes during this review period.

Tuna canners in Europe imported 141 525 tonnes of cooked frozen loins during the first nine months of 2025, 6.82% higher year-on-year. Imports increased in Spain (+12.00% at 93 664 tonnes), but declined in Italy (30 743 tonnes), Portugal (11 925 tonnes) and France (3 615 tonnes).

Overall demand for frozen tuna among tuna canners worldwide is unlikely to rise in the last quarter of 2025 and into 2026; prices of frozen skipjack will hover between USD 1500–1550/tonne.

Canned fish

Global imports of ready-to-eat tuna (canned and other preparations) and semi-processed raw materials (cooked frozen loins) under the HS code 160414, were estimated to be 871 736 tonnes valued at USD 9.36 billion, during January–June 2025. These totals were 2.05% higher in quantity and 2.74% in value over the same period in 2024.

The US, the number one market/importer of canned and processed tuna (mostly end-products) contributed significantly to this growth; imports increased by 17.13% in quantity at 127 940 tonnes and USD 634.28 million (+12.81%) in value against the same period a year ago. Imports from the top source, Thailand, were 16.98% higher at 62 843 tonnes during this period. Vietnam, Ecuador, Indonesia, Fiji and Peru also recorded increased exports to the US during the first half of 2025. There was a significant rise in imports from Spain (+151.15% at 2 050 tonnes) comprising high-value ready-to-eat tuna products.

Source: INFOFISH Trade News (ITN), Issue 10/11, 2025 — For subscription inquiries, contact info@infofish.org

Small pelagics

Expanding Asian appetite for mackerel and herring

During the first quarter of 2025, the leading global exporters of frozen small pelagic fish were Norway, Chile, the Kingdom of the Netherlands, the United Kingdom of Great Britain and Northern Ireland, and the Russian Federation. While some important markets were in Africa and Europe, the biggest shipments went to Asia, with China, Thailand and Viet Nam at the top and the Republic of Korea rising fast up the ladder. Meanwhile, demand for canned sardine and mackerel continues to rise steadily, partly to meet food security needs. In Peru, substantial anchovy landings from both the north-central and southern zones indicate another good year for fishmeal and fish oil production.

Production

Anchovy

By the end of the first quarter of 2025, the first anchovy season in Peru's southern zone, which began on 27 December 2024, had resulted in 176 226.11 tonnes. Constituting 70.2 percent of the allocated quota of 251 000 tonnes, this volume marked the highest level it has been for a decade. The second season in the south, which began on 1 July 2025 immediately after the end of the first, will last until 31 December 2025. In the key north-central region, the first fishing season began on 22 April and was closed on 24 July based on recommendations from the Peruvian Institute of the Sea (IMARPE) to protect spawning and juvenile stock. The catch volume was 2.46 million tonnes, representing 81.9 percent of the total allowable catch (TAC) of 3 million tonnes.

Herring

North Sea herring catches in the first quarter of 2025 were described as modest at about 2 500 tonnes and in the Sea of Japan, catches were down by over 50 percent compared to the same period last year. The Russian Federation also reported a drop of 4.5 percent for Pacific herring in the period under review.

Mackerel

Mackerel harvests from the North Sea area were also disappointing. The situation was brighter for the jack mackerel fishery in South America; in 2025, the quota was set at 1 552 500 tonnes, 25 percent more than last year, with Chile holding a 66 percent share.

International trade: Frozen fish

Imports

Herring

An interesting market to watch in the Asia-Pacific is the Republic of Korea. Imports of frozen herring during Q1 2025 totalled 4 882 tonnes, marking a 41 percent drop from the same period in 2024. However, it is worth noting that a sharp increase of 114 percent was seen in March alone, with imports of 716 tonnes. Herring constituted approximately 2.1 percent of the country's total seafood imports (234 669 tonnes) in Q1 2025. The Russian Federation supplied almost all this volume, with Norway a distant second.

Mackerel

With regard to mackerel, Chinese imports of higher value Norwegian fish increased by 37 percent in Q1 2025 compared to the same period last year, probably driven by rising consumer preference for healthier and safer options. Other leading suppliers of the product to this market were the Kingdom of the Netherlands and the United Kingdom.

Meanwhile, the Republic of Korea is fast catching up to some traditional destinations as a preferred market for mackerel. During January to April 2025, both Norway and the United Kingdom saw substantial increases in shipments to this market. Especially noteworthy is the fact that supplies from the United Kingdom added up to 1 726 tonnes, constituting a rise of almost 250 percent, year-on-year. This surge was attributed mainly to tariff reductions under the Republic of Korea-United Kingdom Free Trade Agreement, as well as the proactive marketing efforts by UK seafood companies.

Exports

Herring

During January–March 2025, Norway exported 55 190 tonnes of herring compared to the same period last year. The biggest markets were Egypt, Poland and Germany, with Egypt alone accounting for 13 230 tonnes of mainly frozen whole herring. Frozen whole Pacific herring exports from the Russian Federation to its main market, China, totalled 48 000 tonnes valued at USD 35 million, up by 2.5 times and 3 times, respectively, compared to the same period last year. The second biggest market for Russian herring was the Republic of Korea. During the first quarter of 2025, global exports of frozen mackerel rose, reflecting increased catch volumes. Among the top ten sources, Chile was in the lead, followed by China, Norway, the Kingdom of the Netherlands, the Republic of Korea and the United Kingdom. Exports were up from all except the Kingdom of the Netherlands and the United Kingdom.

Chilean frozen mackerel was shipped mainly to Africa (Côte d'Ivoire, Nigeria, Cameroon, Burkina Faso and Ghana), while for China, the leading markets were Ghana, Indonesia, Thailand, the Philippines, Côte d'Ivoire and Viet Nam. Norway continues to focus on the Republic of Korea, Viet Nam, China, the United States of America, Thailand and Ukraine.

World exports of frozen mackerel, in tonnes, January–March, 2023–2025

	2023	2024	2025	Percent change 2025/2024
Exporters				
Chile	113 003	105 295	145 698	+38.10
China	92 204	79 193	121 792	+53.16
Norway	68 521	45 969	53 510	+17.77
Netherlands (Kingdom of the)	39 486	44 611	38 359	-13.63
Republic of Korea	34 223	19 241	35 677	+84.21
United Kingdom	26 071	34 221	33 055	-2.94
Peru	49 171	20 938	28 620	+40.00
Japan	12 360	10 578	21 829	+110.00
New Zealand	14 971	18 692	19 802	+5.55
Ireland	14 544	17 737	16 724	-5.88
Senegal	18 822	17 905	14 668	-17.64
Namibia	41 355	39 211	12 844	-66.66
Morocco	4 086	5 211	11 055	-80.00
Total, including others	**594 548**	**512 253**	**595 165**	**+16.21**

Source: Author's own elaboration based on GTT. 2025. Global Trade Tracker. [Cited 1 July 2025]. www.globaltradetracker.com

Norway exported 53 520 tonnes of Atlantic mackerel to global markets, up by 16 percent in volume compared to the same period the previous year. The biggest monthly export increases year-on-year in both volume and value were seen in January, with 24 402 tonnes (+46 percent) valued at NOK 737 million (USD 73.16 million; +93 percent). The large value increase was due to the record high price of frozen whole mackerel at NOK 30 (approximately USD 2.98) per kilogram in January 2025. The main markets were the Republic of Korea, Viet Nam and China.

Sardine

Global exports of frozen sardine increased to 135 449 tonnes during Q1 2025, against 111 468 tonnes in the same period last year. The top exporters were Thailand, Viet Nam, Republic of Korea, China and Indonesia.

International trade: Canned and processed products

Global imports of shelf-stable canned and prepared fish (all types) increased by 7.71 percent in 2024 at 3.49 million tonnes, up by 9.68 percent year-on-year. Nearly 45 percent of these products comprised canned tuna, while small pelagics amounted to 643 468 tonnes, representing 18.40 percent of the total. Canned sardine made up 49 percent of the volume with 315 688 tonnes, followed by mackerel (153 413 tonnes), herring (131 791 tonnes) and anchovy (42 576 tonnes). These products serve a vital food security role in many countries.

World Imports of canned fish, in tonnes, January–March, 2023–2025

		2023	2024	2025	2025
HS Code	Description				
1604	Prepared or preserved fish; caviar and caviar substitutes	4 032 715	3 538 779	3 244 659	3 493 340
160414	Prepared or preserved tunas	1 510 921	1 568 668	1 402 418	1 578 254
	Small pelagics				
160413	Canned, prepared or preserved sardine	334 051	353 455	321 625	315 688
160415	Canned, prepared or preserved mackerel	159 554	171 511	155 560	153 413
160412	Canned, prepared or preserved herring	728 455	143 256	137 220	131 791
160416	Canned, prepared or preserved anchovy	41 697	41 740	39 838	42 576
	Sub-total of small pelagics	**1 263 757**	**709 962**	**654 243**	**643 468**

Source: Author's own elaboration based on GTT. 2025. Global Trade Tracker. [Cited 1 July 2025]. www.globaltradetracker.com

Canned sardine and mackerel are produced for domestic consumption in Asian countries such as Thailand, Philippines, Indonesia and Japan, where the demand for fresh products is also strong in their local trade.

During January–March 2025, overall global imports of canned mackerel declined by 4.43 percent to 34 575 tonnes, despite increases in some major markets including Japan, the United States, the United Kingdom, Fiji and Spain.

Global imports of canned sardine were also down by 6.58 percent at 71 681 tonnes during Q1 2025. The leading importers in ranking were the United States, South Africa, the Dominican Republic, France and Malaysia.

Outlook

In 2024, anchovy generated about USD 3 billion (EUR 2.75 billion) in exports for Peru. Based on the reported catch volumes for anchovy in Peru's southern and north-central zones from January to July, 2025 will be another strong year for the sector.

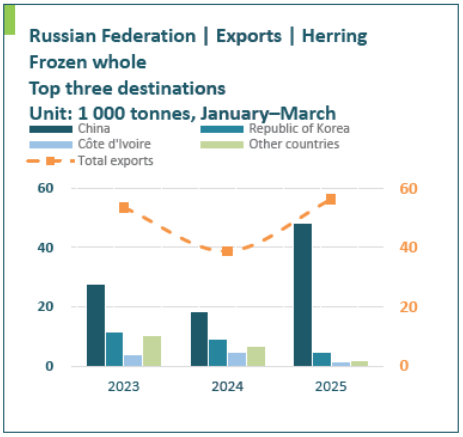
Tight supplies and strong demand for mackerel have propped up the average export price thus far; however, with increased catches anticipated after July in Norway, this level is expected to soften in the second half of 2025. Whole frozen herring will continue to experience high prices compared to fillets.

Demand from Asian markets will remain strong through the year as a result of targeted marketing efforts by exporters from supplying countries, aided by, as in the case of the Republic of Korea, a free trade agreement.

Norway exports of frozen whole small pelagics
January–March, 2023–2025 (1 000 tonnes)

	2023	2024	2025
Mackerel			
Republic of Korea	13.62	9.24	12.12
Viet Nam	6.55	4.93	7.92
China	4.17	2.31	4.74
Other countries	44.20	29.50	28.74
Total	**68.54**	**45.98**	**53.52**
Herring			
Egypt	22.96	6.61	13.23
Poland	12.96	10.10	10.04
Denmark	6.23	22.44	7.81
Other countries	21.64	19.01	24.11
Total	**63.79**	**58.16**	**55.19**

Source: Author's own elaboration based on GTT. 2025. Global Trade Tracker. [Cited 1 July 2025]. www.globaltradetracker.com



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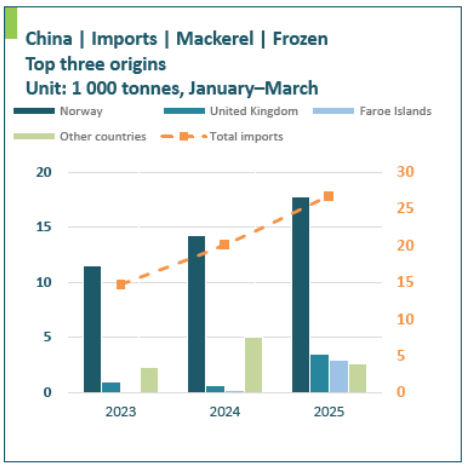

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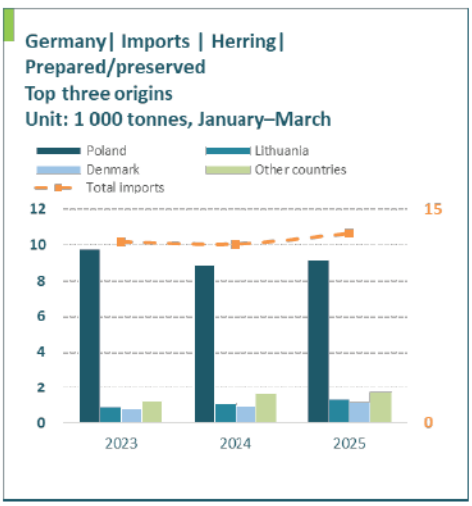

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Source: GLOBEFISH Quarterly species analysis, October 2025

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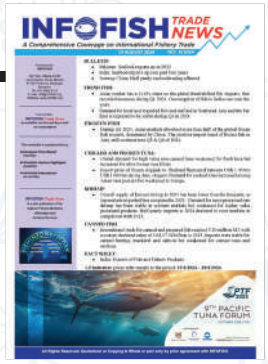

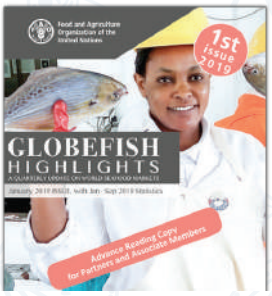

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INFOFISH speaks to.....

LUKAS MANOMAITIS

East Asia Aquaculture Lead, U.S. Soybean Export Council (USSEC)

Q: *First, thank you for your invaluable personal and institutional support of the recently-held 5th INFOFISH World Tilapia Trade and Technical Conference (TILAPIA 2025). In your capacity as the US Soybean Export Council's East Asia Aquaculture Lead, could you provide readers with some background of USSEC itself and an update on the USSEC-led initiative to form the Southeast Asia Tilapia Association (SEATA) held on the margins of TILAPIA 2025?*

A: The U.S. Soybean Export Council (USSEC) works to build preference, improve value, and enable market access for U.S. Soy in international markets. We partner with customers and industry stakeholders across soy foods, animal feed, and aquaculture to support the use of high-quality, reliably supplied, and sustainably produced U.S. Soy through market development, technical collaboration, and knowledge exchange.

In aquaculture, USSEC has supported industry development by working closely with feed manufacturers, farmers, researchers, and other stakeholders to improve feed efficiency, farm performance, and sustainability outcomes. Our approach is highly collaborative and tailored to local needs, particularly across Asia, where aquaculture plays a critical role in food production and livelihoods.

Tilapia holds a unique position in Southeast Asia due to its adaptability, affordability, and long commercial history. Through our engagement across national tilapia industries in ASEAN, we observed that many of the challenges facing producers—such as productivity, sustainability, data quality, and market perception—were shared across countries. This created a strong rationale for closer regional coordination, which led to the formation of the Southeast Asia Tilapia Association (SEATA).

Tilapia 2025 provided an important opportunity to advance these conversations. By co-organizing the conference with INFOFISH and industry partners, USSEC helped bring together farmers, feed experts, researchers, and other stakeholders to exchange perspectives on best practices, emerging challenges, and future priorities for the tilapia sector.

Beyond conferences, USSEC's regional aquaculture teams are actively engaged on the ground. This includes supporting on-farm demonstrations, advising feed mills on formulation strategies, conducting trials, and sharing practical tools and data to help address issues such as feed efficiency, disease management, and sustainability requirements. A key part of our role is listening to industry challenges and working collaboratively to identify solutions that are practical, science-based, and commercially relevant.

The concept of the Southeast Asia Tilapia Association (or SEATA) came about through USSEC's previous efforts to help to either form or further develop national tilapia associations in the ASEAN region.

Through these efforts, USSEC aims to support the continued development of the tilapia sector in Southeast Asia by strengthening technical capacity, improving coordination across the value chain, and helping producers grow in a way that is both efficient and sustainable.

Q: *In your view, how will SEATA work with East Asian aquaculture industries in their efforts to enhance productivity while ensuring sustainability and traceability? What about other regions of the world – are there plans for similar bodies to be set up?*

A: SEATA is designed to support collaboration and shared learning within Southeast Asia's tilapia sector, bringing industry stakeholders together to address common challenges around productivity, sustainability, and market expectations. The initiative focuses on ASEAN countries, beginning with Indonesia, the Philippines, Thailand, and Vietnam, which together represent a significant share of regional tilapia production and have strong industry engagement.

A key objective of SEATA is to improve the availability and use of accurate, industry-level data. Tilapia producers across the region face many similar issues, and outcomes in one market can influence perceptions of the species more broadly. By encouraging data sharing and coordinated dialogue, SEATA helps the industry identify priorities, improve practices, and address challenges more collectively rather than in isolation.

USSEC takes a collaborative, hands-on approach in supporting these efforts. Across Southeast Asia, we work closely with producers, feed companies, researchers, and government stakeholders to share knowledge and build capacity. This includes organizing and co-sponsoring technical conferences and workshops, such as the Tilapia 2025, as well as day-to-day technical engagement by USSEC's regional aquaculture specialists. These activities help connect best practices in feed formulation, farm management, sustainability, and traceability to local industry needs.

Similar industry-led platforms exist in other regions. In Latin America, for example, USSEC has supported initiatives such as the Organization for Sustainable Aquaculture (OLAS). Together, SEATA and OLAS reflect USSEC's broader approach: supporting responsible growth in feed-based aquaculture by encouraging collaboration, improving data and transparency, and helping the industry strengthen productivity and sustainability over the long term.

Q: *One of the criticisms regarding Asian aquaculture is that culture intensity tends to be too high, which affects sustainability. USSEC is reported to have helped farmers China and Southeast Asia to implement the In-Pond Raceway System (IPRS), an approach developed in the United States for catfish farmers, as a sustainable path for pond aquaculture growth. Could you give readers an update on how IPRS aquaculture is working in these countries, and USSEC's role going forward?*

A: In many parts of Asia, where land and water resources are limited and population density is high, aquaculture producers are under pressure to improve productivity within existing pond systems. The challenge is not simply increasing intensity, but optimizing production while staying within biological, environmental, and economic limits.

The In-Pond Raceway System (IPRS) addresses this by allowing farmers to better control water quality, stocking density, and waste management within a pond environment. By concentrating fish in raceways and continuously circulating water, IPRS improves oxygen delivery, feed utilization, and waste removal, enabling higher productivity from the same water volume while reducing environmental stress on the pond.

IPRS has seen meaningful uptake in China and parts of Southeast Asia, as well as in Latin America, particularly where producers are looking for scalable, pond-based solutions rather than fully closed systems. While USSEC has played a supporting role through technical guidance and knowledge sharing, the continued advancement and adoption of IPRS is being driven by commercial producers, equipment suppliers, and service providers responding to market needs.

To support broader understanding and responsible adoption, USSEC has developed IPRS manual and materials. Today, there is an established ecosystem of commercial IPRS equipment and service providers globally. Going forward, USSEC's role remains focused on technical support and knowledge exchange, recognizing that IPRS is one of several tools available to help the aquaculture industry improve efficiency and sustainability.

Q: *Specific to feed formulation, what are the opportunities for soy usage in Asian aquaculture, and the associated challenges? This question is related to both on-land and offshore marine farming, which is a large part of Asian aquaculture (one study estimates that in 2020, 95.33% of the global offshore surface mariculture area was concentrated in Asia). Are there plans to develop a USSEC sustainability certification system for feeds?*

A: Soybean meal has become a cornerstone of modern aquafeeds because it is a high-protein, nutritionally balanced ingredient that can reliably replace a portion of marine ingredients. As global demand for seafood continues to rise, the use of soy in aquaculture feeds supports producers' ability to scale efficiently while managing cost and performance. U.S. Soy offers advantages in this context due to its consistent quality, digestibility, and well-understood nutritional profile, which help feed manufacturers maintain reliable formulations and predictable on-farm results across a wide range of species and production systems.

By incorporating U.S. Soy, aquafeed producers also benefit from verified sustainability practices at origin. This supports improved feed efficiency and growth performance while helping farmers, customers, and regulators gain confidence that feeds align with responsible sourcing expectations.

In Asia, key challenges related to soy use in aquaculture feeds are less about ingredient availability and more about variability in species, production systems, and farm management practices, which can make feed performance difficult to evaluate in isolation. These factors highlight the importance of professional feed formulation and close collaboration between feed manufacturers, nutritionists, and producers.

USSEC supports aquaculture feed efficiency – across both pond-based or offshore farming systems - through technical collaboration and practical tools that help feed manufacturers and producers apply soy ingredients effectively across species and production systems. This includes

knowledge transfer, formulation support, and science-based resources that improve feed performance, cost efficiency, and sustainability outcomes.

From a sustainability perspective, there are already well-established certification systems for aquaculture production, including the Aquaculture Stewardship Council (ASC) and Best Aquaculture Practices (BAP). In addition, the sustainability of U.S. Soy is verified through the U.S. Soy Sustainability Assurance Protocol (SSAP), which documents sustainable production practices at origin and is widely accepted by the industry. Feed manufacturers using U.S. Soy may also qualify for the Sustainable U.S. Soy and Fed with Sustainable U.S. Soy logos, which help communicate verified sourcing and sustainability credentials to customers and buyers.

Q: *We're now seeing that seafood produced in Asia is increasingly being sold to meet domestic demand due to rapidly rising incomes and demand for quality seafood in the continent. For instance, though China is the world's biggest consumer of seafood (by volume), imports have been declining slowly as domestic supplies rise. Would you agree that exporters in Europe and the Americas need to step up their game in understanding the Asian market better? What are some leading approaches you would recommend to exporters in Europe and the Americas who want to increase their sales of seafood to Asian markets?*

A: While seafood remains a globally traded commodity, production and consumption patterns are becoming more regionally anchored. As incomes rise and demand for seafood increases, particularly in Asia, a larger share of production is likely to remain closer to end markets. In this context, the United States may increasingly look to Latin America as a key producer, while Europe may see Africa emerge as a more important source of seafood. In Asia, improved incomes and a strong cultural preference for seafood suggest that a significant portion of production will continue to be within the region itself.

That said, high-quality products will continue to find demand beyond their regions of origin. There is already substantial seafood trade from Europe and the Americas into Asia, with salmon being a clear example despite limited local production. Asia also plays a major role as a global processing hub, with seafood imported for processing and re-exported to other markets.

For exporters seeking to grow their presence in Asia, success increasingly depends on understanding local market preferences and applications. Freshness and familiarity are highly valued, and in many Asian markets, freshness often means live or minimally processed products. Where live delivery is not feasible, particularly in premium segments, preserving product quality as close to harvest as possible is critical. New species may face challenges gaining market acceptance, but as the salmon category has shown, this can be achieved through clear positioning, targeted applications, and alignment with consumer preferences.

Q: *Moving on to other regions, in 2018, you completed a research project for USSEC looking into the potential for aquaculture in sub-Saharan Africa. You had made an interesting prediction: Africa will become a significant supplier of seafood to international markets. Your prediction seems to have been prescient; for example, delegates at the recent World Economic Forum 2025 said that Africa's growing aquaculture sector is worth investing in. What can countries in sub-Saharan Africa do to create an enabling policy and regulatory environment for investors while also protecting their own national interests?*

A: Specific to sub-Saharan Africa, the 2018 study I led for USSEC examined the region's aquaculture potential and highlighted that significant growth was not only possible, but already beginning to emerge. Improvements in basic infrastructure—such as transport and logistics—combined with increased investment, including from countries with long-standing aquaculture experience, have helped accelerate development. These trends help explain why Africa is increasingly viewed as a region of opportunity for aquaculture investment today.

Drawing on broader experience in aquaculture development, one of the most important factors is balance—particularly a willingness to learn from both the successes and challenges seen in more established aquaculture regions. In many parts of Asia, aquaculture growth has been supported by practical, industry-focused systems—ranging from technical services and disease monitoring to export facilitation and market access—which have helped create more predictable operating environments for private investment.

A key lesson from Asia is the government support for research and development in capital- and time-intensive areas such as hatchery technology. This early support can help overcome technical bottlenecks and establish best practices, before transitioning activities to the commercial sector to support efficiency, scale, and long-term viability. This approach has been applied successfully in markets such as Türkiye.

Another important consideration is balancing support for small-scale producers with the development of commercially viable aquaculture industries. While smallholder participation remains important, broader industry development can generate employment across the value chain—including feed, processing, and logistics—while strengthening long-term sector resilience.

Finally, attracting investment increasingly depends on data. Investors are generally more comfortable backing initiatives where performance metrics are transparent and comparable. For aquaculture production, building credible, long-term datasets on productivity, health, and returns will be critical to improving investor confidence and unlocking capital for sustainable growth.

Q: *According to FAO, by 2050 the world's population will reach 9.1 billion and nearly all of this population increase will occur in developing countries. In your opinion, is merely increasing the supply of farmed fishery products (including aquatic plants) enough to ensure food security across rural and urban areas, amidst challenges such as climate change? (This question is related to partnerships between government and industry, investment, policy frameworks, etc)*

A: Aquaculture is one of the most efficient ways to increase protein production and deliver high-quality nutrition to a growing global population. Aquaculture will play a critical role alongside other livestock in meeting rising demand, particularly in developing regions.

Climate change is an ongoing reality that affects all forms of food production. One potential strength of aquaculture lies in its diversity and adaptability. Aquaculture systems also offer flexibility through a range of production approaches—from open systems to more controlled, recirculating technologies—allowing producers to adapt to changing environmental and market conditions.

Low feed conversion ratios, wide acceptance of seafood products and the ability to rapidly change species and production approaches give aquaculture a strong capacity to contribute to global food security. Aquaculture offers meaningful potential for growth as demand for efficient, sustainable protein continues to increase.

***Q:** And finally, what are some highlights that stand out for you throughout your career in the global seafood industry?*

A: Aquaculture was still a relatively young industry when I first started my career. Since then, I've seen it grow significantly, delivering greater seafood volumes, more efficient and sophisticated production approaches, and meaningful employment opportunities across the value chain.

One of the most important highlights for me has been watching aquaculture increasingly recognized as a key contributor to global food security. Its future growth will depend on doing more with fewer resources—improving efficiency while maintaining environmental and social responsibility. From a feed perspective, this has meant a steady shift toward ingredients that support animal performance while also meeting higher sustainability expectations.

Soy-based feed ingredients have become an integral part of that shift. Over time, soy has proven its value in aquaculture feeds due to its consistent quality, strong nutritional profile, and flexibility across species and production systems. As sustainability requirements continue to evolve, responsibly produced feed ingredients will play an even more important role in helping producers meet both performance and market expectations.

Another major highlight has been the growing role of innovation and data in aquaculture. Tools that support better feed formulation, farm management, and decision-making are helping producers improve efficiency and reduce risk. Supporting this kind of practical, data-driven progress—through technical collaboration and knowledge exchange—has been a rewarding part of my work.

Finally, on a personal note, one of the great pleasures of working in aquaculture and seafood has been the people and the food. The opportunity to experience some of the freshest, highest-quality seafood, and to share it with passionate professionals around the world, has made this career especially fulfilling. I remain optimistic and excited about where the industry is headed.

Credit: U.S. Soybean Export Council


What's nourishing your business?
USSEC
U.S. SOYBEAN EXPORT COUNCIL

The 5th INFOFISH World Tilapia Trade and Technical Conference & Exhibition 2025 (TILAPIA 2025) was successfully held from 3–5 November 2025 at the Jubilee Prestige Hotel, Ratchadapisek, Bangkok, reaffirming its position as a premier global platform for the tilapia industry.

Themed ***"Innovation, Integration and Profitability in Tilapia Aquaculture: Modernisation for a New Era",*** TILAPIA 2025 was organised in collaboration with the 13th International Symposium on Tilapia in Aquaculture (ISTA13). This prestigious event was jointly convened by INFOFISH, the University of Arizona, and the U.S. Soybean Export Council (USSEC).

TILAPIA 2025 was hosted by the Department of Fisheries, Thailand, along with technical support from FAO GLOBEFISH. Additional support was provided by the Tilapia International Foundation (TIF), Asian Institute of Technology (AIT), Network of Aquaculture Centres in Asia-Pacific (NACA), China Aquatic Products Processing and Marketing Alliance (CAPPMA), Institute of Aquaculture at the University of Stirling, Australian Centre for International Agricultural Research (ACIAR), Vietnam Association of Seafood Exporters and Producers (VASEP), and the United Nations Industrial Development Organization (UNIDO).

The event was also backed by the support of eight (8) sponsors representing various backgrounds and multinational regions. The Platinum Sponsors were the National Fisheries Authority (NFA) - Aquaculture and Inland Fisheries Unit, Papua New Guinea; GenoMar Genetics AS, Norway; and the Saudi Aquaculture Society, Saudi Arabia. The Silver Sponsor was Grobest Seafood Global Inc, USA; and the Bronze Sponsors were JBT Marel, Thailand; The Center for Aquaculture Technologies (CAT), USA; and FAI Farms, United Kingdom. TILAPIA 2025 was also sponsored by ODS Seafoods Trading L.L.C, UAE as a Support Sponsor.

The opening ceremony was inaugurated by **Dr Pholphisin Suvanachai,** Executive Advisor on Fisheries Management, Department of Fisheries, Thailand, with opening remarks delivered by **Ms Gemma Meermans Matainaho,** Acting Director of INFOFISH. **Mr Lukas Manomaitis,** East Asia Aquaculture Lead, USSEC, delivered special remarks as the representative of the main TILAPIA 2025 co-organiser, while **Professor Dr Kevin Fitzsimmons** from the University of Arizona, USA, presented the keynote address, emphasising innovation and international cooperation in the tilapia industry. In collaboration with the Department of Fisheries Thailand, invitations to the ceremony were also extended to additional guests from the Department of Fisheries and international organisations in Thailand.

Group photo of the VIPs and sponsors of TILAPIA 2025.

Dr Pholphisin Suvanachai (Guest of Honour) officiated the event, together with Prof Dr Kevin Fitzsimmons (TILAPIA 2025 Chairperson); Mr Lukas Manomaitis (USSEC East Asia Aquaculture Lead); and Ms Gemma Meermans Matainaho (INFOFISH Acting Director).

TILAPIA 2025 was specially designed to bring C-Suite executives, key policymakers and decision-makers, renowned researchers, small-scale and key commercial producers together. Emphasis was also given to providing opportunities for one-to-one networking, effective collaboration, and impactful investment in tilapia aquaculture.

Over 266 participants from more than 40 countries, including 63 international speakers, panellists and moderators attended TILAPIA 2025, reflecting the event's strong global engagement and continued reputation as the key platform for the international tilapia industry. They comprised academicians, scientists, government agencies, development partners, investors and industry leaders, farm managers, breeders, tilapia associations, feed millers, nutritionists, aquatic animal health experts, traders, IGO/NGO representatives, processors, certification and standard agencies, as well as tilapia welfare associations.

Mr Amorn Luengnaruemitchai (Managing Director of Manit Genetics) receiving the Monsignor Heine Award 2025 from the President of the Tilapia International Foundation and Chairperson of TILAPIA 2025.

Presentations and discussions throughout the 3-day event looked at a wide range of topics, including:

- Global and regional tilapia production, trade and outlook for commercial tilapia farming (Asia, Latin America and the Caribbean, Middle East, Europe and North America, Oceania, and Africa);
- Developments in tilapia genetics and reproduction;
- Innovative and integrative tilapia production technologies focusing on brackishwater tilapia farming, IPRS and Bio-RAS;
- Biosecurity and health management;
- Advancing tilapia nutrition and feed technology focusing on soy protein in tilapia feed as an important ingredient;
- Value-addition and market diversification, highlighting enhanced market access for tilapia and tilapia-based products in domestic and international markets;
- Collaboration and partnership, and building an inclusive tilapia sector;
- Strengthening investment and funding for downstream industries; and
- Tilapia welfare and certification in line with the concepts of "One Health, One Welfare" and "Happy Fish, Higher Profits".

In addition to the presentations, the launch of a new regional body called Southeast Asian Tilapia Association (SEATA), was announced at a side-event to facilitate more coordinated growth, frequent knowledge-sharing, and vital policy alignment in the world's major tilapia producing region (Southeast Asia).

Concurrently, the Tilapia International Foundation's Monsignor Heine Award 2025 was presented to Mr Amorn Luengnaruemitchai, Managing Director of Manit Genetics and President of Tilapia Association Thailand (TAT) for his invaluable contribution in the genetic development of red tilapia and dissemination of information regarding sustainable and profitable tilapia farming in Thailand and beyond.

The Exhibition

TILAPIA 2025 featured 20 exhibition booths representing the US Soybean Export Council (USSEC); University of Stirling/ThinkAqua; the Asian Fish Welfare Network; FutureFish; ALGAEBA; Nam Sai Farms Co. Ltd.; Department of Fisheries, Thailand; PC Farm Thailand/Farm Story Co. Ltd.; Tilapia Association of Thailand; Saudi Aquaculture Society; AKVA group ASA; Manit Genetics Company Limited; OxyGuard International A/S; GenoMar Genetics AS; Asian Institute of Technology (AIT) Thailand; Aqua Culture Asia Pacific; and FAO GLOBEFISH.

Tilapia-themed products displayed at one of the exhibition booths

Commercial farm visit

A commercial farm visit to Manit Group farm and INTEQC Global Feed Mill was organized the day after the Conference ended, providing attendees with the opportunity to witness tilapia industry operations in Thailand.

A more detailed report on the 5th INFOFISH World Tilapia Trade and Technical Conference & Exhibition 2025 can be accessed at: https://v4.infofish.org/index.php/report-tilapia-2025

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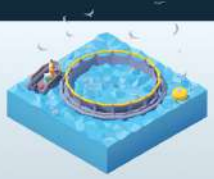

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LATIN AMERICA: THE NEXT GLOBAL EPICENTRE FOR SUSTAINABLE TILAPIA FILLET PRODUCTION AND EXPORT

By Rodrigo Misa

Latin America is emerging as a leading hub for sustainable tilapia fillet production and export, driven by a combination of natural advantages, technological innovation and strong certification uptake. Brazil is one of the world's largest tilapia producers, while Colombia has built a reputation for premium, fully traceable fresh fillets destined mainly for the United States. Others, like Mexico and Honduras, add to a diversified regional base supported by improved genetics, modern production systems and growing professionalisation. Across production, trade, sustainability and market positioning, Latin America is not merely joining, but reshaping, the global tilapia industry.

Tilapia juveniles

For decades, the global tilapia industry has been shaped primarily by Asian producers, whose scale, market integration and long-standing experience established them as the dominant suppliers of fresh and frozen tilapia products worldwide. Yet, in recent years, a profound structural shift has been taking place: one not driven by sudden external shocks, but by the steady, consistent maturation of a region that once played only a modest role in the industry. Latin America and the Caribbean are emerging not only as strong suppliers of fresh fillets to the United States of America, but increasingly as a region capable of positioning itself as the next global epicentre for sustainable tilapia fillet production and export.

This transformation is neither accidental nor purely market-driven. Instead, it reflects a long-term alignment of environmental advantages, investment in modern production systems, the professionalisation of supply chains, and a strategic focus on sustainability certifications. These elements, combined with favourable logistics to the giant North American market and a growing interest from importers in reliable, high-quality fresh fillets, have placed countries such as Brazil, Colombia and Mexico at the forefront of a regional shift that is now impossible to overlook.

This article examines how and why the region has reached this point, drawing on the latest production and trade trends, regulatory developments, and market signals from the United States. It also explores the opportunities and challenges that lie ahead as Latin America consolidates its role as a leading hub for sustainably produced tilapia fillets.

A region quietly reshaping the global tilapia landscape

The central pillar of Latin America's growing influence in the tilapia market is its production capacity, both in terms of volume and in terms of consistency. Among producing countries, Brazil stands out for its sheer scale and dynamism. With over 600 000 tonnes of annual tilapia output (662 230 tonnes in 2024), the country has consolidated itself as the region's largest producer and one of the most important globally (4th place worldwide). Much of this growth is rooted in well-developed freshwater aquaculture production hubs, strengthened by cooperative networks, the introduction of improved genetics, and a growing number of farms adopting best aquaculture practices.

Colombia, while smaller in absolute tonnage, has achieved a level of specialisation that positions it differently within the global supply chain. According to national export statistics from AUNAP, Colombia exported 17 000 tonnes of tilapia during the first half of 2025. Although comparable first-semester data for 2024 are not available, annual figures from GTT indicate that Colombia exported 13 841 tonnes in 2024, representing a 10 percent decrease compared with the previous year. Most of this volume consists of high-quality fresh fillets destined for the US market. The country's competitive edge lies in its integration of vertically aligned companies, high sanitary standards, and a combination of favourable water temperatures and year-round production cycles that enable consistent supply.

Other countries in the region, notably Mexico, Honduras and Costa Rica, contribute to a growing and diversified production base, though their export shares remain more modest. What distinguishes Latin America as a whole is not only the volume being produced, but the accelerating improvements in productivity and yield. Investment in genetics and breeding has played a key role. One notable example is the genetically edited tilapia line developed through collaboration between Brazilian producers and the Center for Aquaculture Technologies. Early evaluations indicate improved growth rates, better feed efficiency and higher fillet yields. These developments could have long-term consequences for cost structures and environmental performance if regulatory frameworks evolve accordingly.

Selective breeding of tilapia broodfish aims to improve traits like growth, survival and disease resistance for commercial farming.

This intersection of natural conditions, technological innovation and professional management is gradually redefining the region's identity from a promising but peripheral player to a consolidated pillar of the global industry.

A surge in exports: fresh fillets and the US connection

While Latin America's production growth is essential, the region's rise as an export hub is even more striking. Fresh tilapia fillets have become the defining feature of the region's global presence, particularly in the United States market. During the first half of 2025, the United States imported 9 600 tonnes of fresh tilapia fillets, according to Global Trade Tracker (GTT) data provided by FAO GLOBEFISH. Of this volume, Brazil alone supplied 3 380 tonnes, positioning itself as one of the top sources of fresh fillets (around one third).

This is a significant development, especially considering that the United States, the world's second-largest importer of fish and seafood after the European Union, plays an outsized role in shaping global demand patterns for tilapia. Fresh fillets remain a niche segment compared to frozen whole fish and frozen fillets, yet they command higher prices and are closely associated with supply reliability, traceability and sustainability, characteristics the region is increasingly known for.

Colombia's export profile complements Brazil's growth. Whereas Brazil is scaling up rapidly, Colombia has consolidated its reputation for premium-quality fillets with consistent sensory attributes, strong certification adoption and excellent compliance with US regulatory requirements. The presence of integrated companies with control over all production stages, including breeding, grow-out, processing and logistics, has ensured tight control of product quality and cold-chain integrity. In the first half of the year, Colombia shipped 3 840 tonnes of fresh tilapia fillets to the United States, a volume that, like Brazil, also represents close to one-third of total US imports. However, Colombia's share has been gradually declining as Brazil continues to gain ground in this segment.

Beyond Brazil and Colombia, Mexico and Honduras maintain stable trade flows of fresh fillets and processed tilapia products, contributing to a regionally diversified supply portfolio. Taken together, these countries are redefining expectations around what Latin America can offer to global buyers.

In Mexico's case, the dynamics differ from the export-oriented model seen elsewhere in the region. Although domestic tilapia farming has expanded steadily, production still falls short of national demand, and the country continues to rely heavily on imported supply to meet consumption needs. This gap has prompted authorities to frame tilapia as a strategic species for food security and rural development, with efforts now directed at strengthening technical capacity, promoting innovation and improving production efficiency. Public programmes aimed at small-scale farmers, coordinated by national research and aquaculture institutions, have begun to modernise the sector and reinforce its long-term resilience. Together, these initiatives reflect Mexico's intention to reduce its dependence on imports while modernising the sector and positioning tilapia more prominently within national food systems.

Brazil, Colombia, Mexico and Honduras are the leading Latin American exporters of premium-quality fresh tilapia fillets to diversified markets.

In Honduras, the picture has shifted more dramatically. The country played a key role in fresh tilapia fillet exports for many years, largely supported by the cage-farming operations in Lake Yojoa. However, a series of regulatory and environmental developments significantly altered the sector. The administration suspended environmental licences for industrial aquaculture in Yojoa on technical and scientific grounds, halting the start of new production cycles and triggering a progressive closure of farms. This measure, combined with the elimination of exploitation permits in natural reserves, rising production costs and reported fish mortality linked to climate variability, led to a marked decline in output. Authorities later confirmed that Yojoa will remain closed to tilapia farming and that production plants will be transferred, amid concerns about employment and the long-term restructuring of the sector.

Ecuador was also an important supplier in the early 2000s, when tilapia farming expanded rapidly as producers diversified in response to shrimp disease outbreaks, particularly white spot syndrome. During that period, the country increased its exports of fresh fillets to the United States, positioning tilapia as a complementary aquaculture product alongside shrimp. However, this momentum gradually slowed as regional competitors consolidated their presence in the US market and Asian producers strengthened their role in frozen tilapia trade. Although Ecuador maintains a stable, US-oriented tilapia industry, its current export scale is significantly smaller than that of Brazil, Colombia, Mexico, or Honduras, and the sector plays a secondary role compared with shrimp.

Ripple effects of new market regulations

A key factor influencing global tilapia trade, and one that directly affects Latin America, is the changing regulatory landscape, particularly in the United States. Environmental and human-rights considerations are increasingly embedded into import policies, influencing purchasing decisions by retailers, distributors and foodservice companies.

Recent tariff adjustments, although applied broadly across sectors, have introduced higher costs for certain Asian suppliers. While the intention of these measures is not specifically tied to tilapia, the indirect effect has been a re-evaluation of sourcing strategies by US buyers. For Latin America, this creates an immediate opportunity: geographic proximity reduces transportation times and costs, enabling fresher products and lower emissions per unit of product delivered.

Moreover, US regulatory agencies have intensified scrutiny of traceability and labour conditions, areas where many Latin American producers have already made significant investments in recent years. Colombia, Brazil and several Central American producers have achieved strong penetration of certification schemes such as Aquaculture Stewardship Council (ASC) and Best Aquaculture Practices (BAP), providing a competitive advantage in a market where corporate buyers increasingly rely on independently verified sustainability metrics.

The result is a shifting trade environment that favours suppliers capable of demonstrating high standards of environmental management, food safety and social responsibility. In this respect, Latin America's regional consolidation around certification and responsible farming practices has allowed it to position itself strategically at a time when global buyers are looking for reliable, compliant and sustainability-focused partners.

Why sustainability is becoming the region's signature

One of the most defining features of Latin America's emergence as a tilapia hub is its strong alignment with sustainability. Far from being an optional add-on, sustainability has become a structural pillar of the region's competitive identity.

Environmental performance is rooted partly in natural conditions. Many of the region's major producing regions benefit from favourable water

quality, stable temperatures, and hydrological conditions conducive to responsible aquaculture. These natural advantages translate into lower energy costs, reduced disease incidence, and more predictable growth cycles.

However, the region's sustainability credentials extend far beyond environmental circumstances. Producers throughout Latin America have invested heavily in:

- Recirculating and semi-intensive systems designed to optimise feed conversion and water use.
- Improved genetics and breeding programmes focused on robustness and performance.
- Effluent management and environmental monitoring technologies.
- Professionalisation of production through technical training and capacity building.
- Certification as a cornerstone of market positioning.

Today, ASC and BAP certifications are widely adopted across major producing companies in Brazil and Colombia. This adoption has strengthened the transparency and traceability of supply chains while providing direct assurance to buyers that environmental and social standards are being met.

In parallel, many companies are incorporating digital tools for farm management, integrating improved biometrics, feeding systems, water quality monitoring and traceability platforms. These tools enable more efficient use of resources and improve both productivity and environmental outcomes.

The combined effect of these factors is a regional product offering that is increasingly identified by global buyers as not only competitive in quality, but exemplary in sustainability.

Market opportunities and the road ahead

Latin America's growing footprint in the fresh tilapia fillet segment opens a series of strategic opportunities, but also challenges that must be addressed to consolidate long-term regional leadership.

1. Expanding beyond the US market

Today, the United States absorbs the vast majority of Latin American and the Caribbean tilapia exports, a pattern consistent with FishstatJ (FAO) data showing a 98 percent share in 2023. While this is advantageous in terms of logistics and consumer preference for fresh fillets, it also creates dependence on a single market. Diversification toward markets in Europe, Canada, and the Middle East, where demand for sustainably certified products is increasing, represents a promising future avenue.

2. Addressing logistical and cost constraints

The region continues to face challenges in transportation costs, especially air freight for fresh fillets. These costs can reduce competitiveness during periods of price volatility. Continued investment in cold-chain optimisation, alternative logistics routes, and potential expansion into value-added products may help mitigate these constraints.

3. Sustaining competitiveness under evolving trade rules

While recent tariffs have benefited Latin American suppliers indirectly, future regulatory adjustments, whether in the United States, Asia or Europe, could redefine competitive dynamics. Maintaining strong regulatory compliance, documentation and traceability will be essential.

4. Balancing growth with environmental stewardship

The region's natural advantages cannot be taken for granted. As production scales, water-use efficiency, disease prevention, feed sustainability and land-use considerations will become increasingly relevant. Ensuring that growth is accompanied by strong environmental oversight is key to maintaining market reputations.

5. Strengthening regional cooperation and knowledge-sharing

Many of the strengths that have propelled Latin America forward are the result of coordinated efforts among producers, research institutions, governments and certification bodies. Deepening these networks will be crucial to maintaining momentum and addressing cross-border challenges.

Conclusion: a region ready for global prominence

The emergence of Latin America and the Caribbean as a new epicentre for sustainable tilapia fillet production is not a speculative projection; it is already visible in the data, in the market dynamics, and in the strategic decisions of producers and buyers alike. Brazil's and Colombia's considerable production and export growth, combined with high levels of certification, technological advancement and favourable conditions for year-round production, have positioned the region on a trajectory of increasing global relevance.

Looking forward, the challenge is not merely to maintain growth, but to consolidate a model in which sustainability, quality and resilience form the foundation of long-term competitiveness. The global tilapia industry is evolving, driven by new consumer expectations, regulatory pressure and demand for traceability and environmental responsibility. In this context, Latin America is exceptionally well-placed to play a leading role.

Rodrigo Misa *is Communications and Institutional Relations Adviser to the Director General of INFOPESCA, the Latin American intergovernmental organisation serving governments, associations and enterprises in the fisheries and aquaculture sector. Since 2016, he has authored the Americas regional tilapia report for FAO's GLOBEFISH Highlights and monitors tilapia markets as part of his work on the INFOPESCA Trade News. At INFOPESCA since 2013, Rodrigo also serves as editorial coordinator of the INFOPESCA International Magazine and is an active contributor to regional market information exchanges within the FIN network. A bilingual professional, he holds a Master's in Communication Management and a degree in Communication, with an early background in journalism.*

This article is based on the presentation "Latin America: the next global epicentre for sustainable tilapia fillet production and export," delivered by the author at the 5th World Tilapia Trade and Technical Conference & Trade Exhibition 2025 (TILAPIA 2025), organised by INFOFISH.

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AQUACULTURE

WAS receives global recognition from FAO for its leadership

FAO Director-General Dr Qu Dongyu presents the Global Technical Recognition award to WAS, accepted by Blessing Mapfumo, Executive Officer of the World Aquaculture Society, African Chapter, on behalf of Dr Antonio Garza D Yta, the WAS-FAO Global Liaison person.

World – On October 15, 2025, the World Aquaculture Society (WAS) was honored with a prestigious award from the Food and Agriculture Organization (FAO) for its significant role in sustainable aquatic food systems. The award was presented by FAO Director-General Dr Qu Dongyu during a ceremony held at FAO Headquarters in Rome, Italy. This event marked FAO's first-ever Global Technical Recognition Ceremony, which took place as part of the organization's 80th anniversary celebrations and the World Food Forum 2025.

During the ceremony, special recognition was given to several FAO partners for their technical leadership, collaboration, innovation, and best practices in transforming sustainable agrifood systems. These contributions were highlighted across six key areas: (1) Sustainable livestock transformation, One Health, animal health, and Reference Centres; (2) South-South and Triangular Cooperation; (3) Land, soil, and water resource management for resilient agriculture and food security; (4) Sustainable aquatic food systems; (5) Sustainable Forest production and protection; and (6) Sustainable plant production and protection.

Receiving this honorary accolade underscores the importance of the WAS as a pivotal vehicle and instrument for the development of sustainable aquaculture globally. It reaffirms WAS' role as a global leader in fostering enhanced international communications, collaborations, education, and information exchange on aquaculture. This has been important to FAO's programme of work on aquaculture for several decades, since the 1970s.

The award was accepted by Mr Blessing Mapfumo, Executive Officer of the World Aquaculture Society, African Chapter, on behalf of Dr Antonio Garza D Yta, the WAS-FAO Global Liaison person.

Farmed fish welfare project planned

Southeast Asia – The University of Stirling has received a GBP 2.7 million (USD 3.6 million, EUR 3.1 million) grant for a project that aims to improve farmed fish welfare in Southeast Asia. The grant, given by Open Philanthropy, will build on previous work by the university on the welfare of farmed fish in Thailand and Vietnam and expands the project into Indonesia. Through the program, the university will run workshops and perform outreach activities to increase local knowledge of aquaculture practices and enhance fish welfare.

"Across Asia, there are serious welfare issues that affect millions of aquatic animals, and there is an urgent need to drive change. In

addition, there is very little awareness about the importance of improving the situation, and we believe that projects such as this can help to change that," University of Stirling Professor Dave Little said in a release. He added that the research will build on the University's prior work on animal welfare in Southeast Asia, a region where farmed fish is an important part of local diets.

Dr Timothy Wiese, Professor Dave Little and Arnan Hirunratanakorn conducting observational research at a wholesale fish market in Thailand.

"Understanding consumers' and other stakeholders' perceptions is critical to improving practices throughout the value chain by identifying and targeting areas that could improve welfare the most," Little said. "In the first project, we identified harvest through to slaughter as being critical points where practice could most effectively be improved."

State-of-the art aquaculture vessel

China – Zhanjiang, a coastal city in western Guangdong province, recently received "the world's first floating, dynamically positioned cage-type aquaculture vessel". Named Zhanjiang Bay 1 and built by Jiangsu Dajin Heavy Industry Co, the vessel is reported to be capable of floating aquaculture, autonomous navigation, electric propulsion, and emergency typhoon avoidance, among others. Once it begins operating in waters about 30 nautical miles off Zhanjiang's Naozhou Island, it will launch pilot farming of large-sized yellow croakers. Additional species, including golden pompano, will be introduced in the first half of 2026, with batch-by-batch sales to follow depending on farming results and market conditions.

According to a statement from the Southern Marine Science and Engineering Guangdong Laboratory, Zhanjiang Bay 1 is the first of its kind worldwide and represents Guangdong's largest aquaculture platform by water volume. Described as a "mobile marine ranch", the vessel is 154 metres long with a 44-metre beam and an aquaculture water volume of 80 000 cubic meters. It contains 12 independent farming zones capable of cultivating multiple fish species simultaneously, and has an annual production capacity of 2 000 to 5 000 tonnes.

Unlike the Guoxin 1 design or cargo ship conversions that have a conventional hull enclosing fish tanks, the Zhanjiang Bay 1 is a semi-submersible aquaculture platform with open sides to allow water to flow through net pens. Sensors provide real-time data on metrics such as water temperature and dissolved oxygen, while AI visual recognition systems rapidly assess fish health status, laying a solid foundation for achieving intelligent fish farming.

Ban on octopus farming

Chile – A bill to ban octopus farming in Chile is being discussed by the Chilean Congress' Committee of Environment and Natural Resources. Focusing on driving aquatic animal welfare in both aquaculture and wild-capture fisheries, the bill was prepared by parliamentarians with support from local NGO Fundación Veg and international nonprofit Aquatic Life Institute. Both organisations that supported the bill's drafting are grouped under the Aquatic Animal Alliance – a coalition of more than 180 organisations hailing from over 75 countries.

Octopus maya (Mexican four-eyed octopus)

The bill argues that a ban on octopus farming is urgent to protect marine ecosystems, reduce public health risks and support food security for coastal communities. Opponents also say that octopuses are sentient, solitary, inquisitive creatures, and that confining them in crowded pens would be inhumane, cruel, and stressful.

Octopus farming is a relatively new industry. In Mexico, an operational facility in the Yucatán Peninsula is farming the *Octopus maya* species while in 2022, Pontevedra, Spain-based vertically integrated seafood firm Nueva Pescanova submitted a plan to build the world's first commercial octopus farm in Puerto Las Palmas on Spain's Canary Islands. The company said it is ready to commercialise the technology for the incubation, hatching, and raising of *Octopus vulgaris*, proposing a EUR 50 million (USD 58 million) farm with an annual production capacity of 3 000 tonnes. In the United States, Washington and California have already adopted their own commercial octopus farming bans, and New Jersey lawmakers are currently considering adopting a ban, as well.

"Right-by-the port" project

Japan – In 2021, Kawasaki Heavy Industries, Ltd, together with Maruha Nicihro Corporation, launched a pilot project called MINATOMAE (literally, "right-by-the-port" project), using a 30 cubic metre closed pen, with the aim of improving food security and assessing the viability of sustainable fish farming in the sea near urban areas. The stocking density was 60 kg of fish/cubic metre; according to the company, this was four times higher than conventional marine aquaculture systems and one of the highest in the country.

MINATOMAE is a coined term derived from the Japanese words 'minato' (port) and 'mae' (in front), signifying the concept of conducting aquaculture in close proximity to the port.

Kawasaki's closed containment aquaculture system was developed using the company's proprietary technologies for filtering, sterilising, and other water treatments used for industrial plants. This prevents viruses and parasites from entering the aquaculture farms, performs 24/7 monitoring of water properties and other farming conditions, and optimises aquafeeds, supply of oxygen, and water circulation inside the pen.

Kawasaki said that despite the test farm being located where many vessels passed by, they

successfully harvested 850 salmon weighing about 2 kg each after a culture period of four months. The project is preparing to perform verification for scaling-up the pen facilities with an eye toward starting full-fledged commercialisation by fiscal 2027, aiming to achieve 10 billion yen in sales by around 2040.

Seahorse farming as an alternative to wild capture

Portugal – Seahorses are sought for use mainly in traditional Chinese medicine, and also in aquaria. As their numbers from wild capture dropped, they became the first marine fish to be protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 2004. However, a Portuguese company called Ecomare is setting out to prove that aquaculture can become an alternative to wild capture.

The Ecomare facility, a joint venture between the University of Aveiro, the Municipality of Ílhavo and Port of Aveiro, relies on natural seawater sourced directly from the Atlantic to maintain optimal conditions. It focuses on the industrial production of lined seahorses *(Hippocampus erectus)* for the aquarium trade. One challenge is that seahorses are reluctant to accept pelleted feed, relying instead on live or freshly frozen prey such as *Artemia,* mysis shrimp, copepods and amphipods.

Hippocampus erectus

The females deposit eggs into the male's brood pouch during the early morning hours, where fertilisation occurs. "Recent studies indicate that eggs are enveloped in the internal structure of the brood pouch, almost like a placenta. However, until now, no direct fluid exchange between embryos and parent has been demonstrated. The term 'pregnancy' is used due to the contraction movements that the male makes when expelling the offspring," explains Portuguese marine biologist Daniel Alexandre, who works at Ecomare.

FISHING

ILO-FFA partnership on labour rights

Pacific Islands – In a news release on 20 November, the Pacific Islands Forum Fisheries Agency (FFA) announced a new partnership with the International Labour Organisation (ILO) aimed at strengthening the protection of human rights and labour standards for crews working on fishing vessels across Pacific Islands Countries waters.

The signing of this Memorandum of Understanding (MOU) comes at a critical time as the region works to address ongoing concerns around crew welfare and labour conditions in the fishing industry. Under the MOU, ILO and FFA will work together through agreed contracts or Memoranda of Agreement (MOA) to combine resources, expertise, and training materials to support Pacific Island Countries. It will remain in place for two years, with the possibility of extending it if both parties agree.

The partnership is grounded in key labour standards frameworks, including ILO Convention No. 188 on Work in Fishing, and the Western and Central Pacific Fisheries Commission's (WCPFC) Conservation and Management Measure on Crew Labour Standards (CMM 2024-04), and FFA's Harmonised Minimum Terms and Conditions (HMTC) for the employment of fishing vessels workers.

Martin Wandera, Director of the ILO Office for Pacific Island Countries, said that "This collaboration will focus on improving workplace safety, ensuring fair employment contracts and equitable wages, eliminating forced and child labour practices, reducing risks of human trafficking, improving accommodation and working conditions, supporting the ratification of ILO conventions, and guiding legislative reforms. The work will extend across all fishing vessel categories operating within WCPFC waters". FFA Director General, Noan David Pakop said "This MOU represents a pivotal achievement in protecting the rights and welfare of fishers. It demonstrates our commitment to work with ILO in strengthening and implementing the FFA Second Phase of the Labour Standards on Fishing Vessel Project, in line with regional and international obligations, and reinforces the region's position as a global advocate for ethical labour standards and sustainable fisheries development."

MSC: Migratory species at risk from climate change

World – A new research paper "Climate change risks to future sustainable fishing using global seafood ecolabel data" by the Marine Stewardship Council (MSC) suggests that fisheries targeting migratory species including tunas, bonitos and billfishes are most at risk from the impacts of shifting fish stocks and the reduction in the number of fish in the ecosystem, due to climate change. As ocean temperatures change, migratory species change their routes in favour of cooler waters. For example, Atlantic bluefin tuna have returned to waters around the UK, having disappeared decades ago. In the Pacific, there are growing signs tuna are moving away from the west of the region to the east. As tuna appear in new jurisdictions, or in the high seas, they move into areas of the ocean governed by different countries and subject to different regulations. This is likely to increase disagreements between governments over how much of each stock they are allowed to catch, potentially leading to overfishing.

The MSC paper says that the next most vulnerable are fisheries targeting small pelagic species like mackerel, herring, capelin, blue whiting, followed by those targeting whitefish like cod, haddock, plaice, sole and monkfish. In contrast fisheries targeting invertebrates such as bivalves, crabs and prawns, were least likely to suffer climate change impacts like international management disagreements because these species are sedentary or live on the bottom of the ocean and do not migrate. The researchers noted however that these species may suffer from climate-driven impacts not included in the scope of the study, such as ocean acidification and marine heatwaves.

This latest research has been supported by the Tuna Project of the Common Oceans Program which is led by FAO, and the Ocean Stewardship Fund. It suggests that to mitigate these risks, greater international cooperation is needed, for example by implementing adaptive allocations, where countries' shares of fish stocks are adjusted in response to shifting fish populations. Governments also need to further reduce greenhouse gas emissions if they want to continue to sustainably harvest some species and ensure stocks for future generations.

Plan of Action for SSF

Indonesia – On 5 November 2025, the Ministry of Marine Affairs and Fisheries of Indonesia (MMAF) officially launched the National Action Plan for Small-Scale Fisheries Management (NPOA-SSF). The Plan aligns national policy with the principles of FAO's Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SSF Guidelines) and national legislation (Law No. 7/2016 on Protection and Empowerment of Fishers, Fish Farmers and Salt Farmers).

The NPOA-SSF is intended as a strategic document to protect and empower small-scale fishers, foster collaborative governance, increase supply-chain value, and ensure measurable implementation. It also integrates three key pillars: the Ecosystem Approach to Fisheries Management (EAFM); decent work and social protection for fishers; and occupational safety for small-scale fishers across Indonesia. The NPOA-SSF's success will be measured by the increase in fishers' income, the quality of their catch, and the sustainability of Indonesia's marine ecosystem.

"This national action plan marks a significant milestone in Indonesia's journey toward inclusive and sustainable fisheries,", explains Rajendra Aryal, FAO Representative in Indonesia and Timor Leste who jointly launched the document together with MMAF. "FAO will stand behind the efforts of the country to move towards sustainable and equitable small-scale fisheries and ensure that no one is left behind."

MARKETS/MARKETING

Japanese seafood exports face renewed ban

China/Japan – China has reimposed the recently lifted ban on Japanese seafood imports, thought to be due to Japan Prime Minister Sanae Takaichi's comments on Taiwan. This happened barely weeks after the first Japanese seafood shipments had started to re-enter China. Japanese seafood companies have expressed frustration at the setback. Some 700 firms had applied for export permits to China after the end of the first ban, and now this possibility appears to be dim.

Japan's seafood exports to China fell to 6.1 billion yen (USD 39 million) in 2024 from 87.1 billion yen in 2022 as Beijing banned Japanese seafood imports in August 2023 after Japan began releasing treated water from the Fukushima Daiichi nuclear plant. Last year, China accounted for less than two percent of Japan's total seafood exports, compared with 22.5 percent in 2022. Before the previous ban, China was Japan's top scallop buyer and a major importer of sea cucumbers.

First air shipment of Newfoundland lobsters

Canada – Marking a major milestone in market diversification, thousands of pounds of premium, live Newfoundland and Labrador lobster took off from the remote Newfoundland airport of Gander in June, for Madrid, Spain. This pioneer flight was able to take place after investments had been made to the airport; prior to that, live lobster had to be shipped to mainland Canada to find a suitable airport. With the new investments, lobster exporters estimate that live lobsters can be on display for sale in Madrid just 16 hours after leaving holding tanks in Newfoundland.

Gander airport has a holding capacity of 75 tonnes of fresh or live seafood. Investors in the new seafood holding facility say that diversification into lucrative fresh markets will 'futureproof' them against potential tariffs from the United States, and also enable them to obtain higher prices.

A spokesperson from Whitecap International Seafood Exporters, one of the companies involved in the shipment, said that "Whilst the first flight was focused on lobster and the Spanish market, the broader plan includes expansion into France, the UK and eventually high-value Asian markets such as South Korea and Japan."

Europe imported 8 000 tonnes of Canadian lobster in 2024, but this was almost entirely cooked, frozen product that retailed for as little as USD 6.50 per lobster. With stocks in Newfoundland booming as the waters there warm, Canada is hoping to increase both this volume, and also the prices received for what will be repositioned as a premium live product on European markets. In addition to lobster, the exporting companies plan to deliver fresh North Atlantic cod from Newfoundland and Labrador to customers across Europe.

Canadian dominance hit by tariffs and competition

Canada – As reported in the FAO GLOBEFISH Highlights Issue 4/2025, in the first half of 2025, exports of Canadian lobster were significantly affected due to a retaliatory import tariff imposed by its second-largest market, China. With no signs as yet of any softening in trade relations between the two countries, the total export volume for this year is likely to be lower than in 2024. Other countries, notably Viet Nam, Australia and New Zealand, have benefitted from the space created by declining Canadian lobster supplies into the Chinese market.

Of particular significance is the fact that exports of lobster from Viet Nam to China showed triple-digit growth during the first half of 2025. According to the Vietnam Association of Seafood Exporters and Producers (VASEP), during H1 2025, these exports amounted to 11 680 tonnes as compared to 2 840 tonnes and only 150 tonnes in the corresponding periods of 2024 and 2023, respectively. As Viet Nam is reported to produce about 4 000 tonnes of lobster annually, there is speculation that some of the exports during January–June 2025 comprised Canadian lobster which had been imported into Viet Nam to avoid the high tariff rate imposed by China on direct imports from Canada. Viet Nam benefits from the Regional Comprehensive Economic Partnership (RCEP) treaty which facilitates trade with China.

Another recent development that has exporters worried is the new trade agreement signed on 21 August between the United States and the European Union, the latter being the third-largest market for Canadian live lobster. Under the terms of this deal, the European Union pledged to eliminate tariffs on all imports of US seafood, including processed products. In addition, the European Union agreed to extend a recently-expired bilateral deal originally signed in 2020 that had eliminated tariffs on US lobsters. Against this backdrop, Canadian lobster is likely to face stiffer competition from the United States in the near future, notwithstanding its own tariff-free entry under the Canada-EU Comprehensive Economic and Trade Agreement (CETA) signed in 2017.

New agreement expected to boost trade

Ecuador/Rep. Korea – Ecuador signed a strategic economic cooperation agreement (SECA) with the Republic of Korea on 2 September, under which 98.8 percent of Ecuador's exportable products will enter tariff-free to the Asian country of more than 51 million consumers. With the agreement, non-oil exports to the Republic of Korea are expected to grow 27 percent, according to government estimates.

"Ecuador and the Republic of Korea have complementary economies. While the Asian country depends on the import of agricultural and fishery products, Ecuador stands out for its biodiversity and productive capacity," Ecuador's Ministry of Production, Foreign Trade, and Investments said in a release announcing the agreement. "At the same time, the Republic of Korea's technological and industrial experience represents an opportunity to modernize Ecuador's productive sectors and increase its competitiveness on the global stage."

Digital certificates replace tedious paper trail

Norway/China – A landmark agreement signed between Norwegian and Chinese authorities is set to transform the multibillion-dollar seafood trade, replacing mountains of paper with a streamlined, digital health certificate system.

The agreement focuses on developing a joint solution for the electronic exchange of health certificates. These are essential documents used by the General Administration of Customs of the People's Republic of China (GACC) to verify the quality and safety of imported food products. Currently, the Norwegian Food Safety Authority manually issues over 19 000 paper health certificates to China each year, making China the top recipient of such documents from Norway.

This shift to digital certification promises immediate, tangible benefits: faster processing, a dramatically reduced risk of delays at ports like Shanghai, and enhanced traceability of shipments from the source. The move also aligns with China's broader efforts to digitize its food import compliance, offering a more transparent and secure supply chain.

The signing of the e-certificate agreement coincided with the official approval for live brown crab exports to China. These live, high-value exports, along with key products like salmon (valued at 5.11 billion NOK in 2024) and mackerel, are expected to see even greater demand, now that bureaucratic hurdles are reduced.

Strategic partnership extended

Brazil – The Brazilian Trade and Investment Promotion Agency (ApexBrasil) and the Brazilian Association of Fish Industries (Abipesca) have renewed an agreement valid until 2027, to collaborate in initiatives aimed at expanding the global presence of Brazilian seafood. Investments of approximately USD 2.4 million are foreseen, together with participation in international activities, events, and trade fairs to seek alternative markets. In the previous phase, USD 1.776 million was invested between 2023 and 2025, contributing to the sector's improved performance over the last 15 years.

In 2010, seafood exports totaled USD 30 million, while in 2024 they reached USD 150 million. Despite this growth, Brazil's share of the global market is still modest at approximately 0.12% of an estimated USD 120 billion.

TUNA2026

"Strengthening Value Chain Synergies, Blue Economies and Sustainability across the Global Tuna Industry"

7-9 SEPTEMBER 2026
Shangri-La Hotel, Bangkok, Thailand

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- **US$ 1150** *(After 31 March 2026)*

Others

- **US$ 1150** *(Before 31 March 2026)*
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BENEFITS

Delegates attending TUNA 2026 will receive full access to all Conference sessions and the Exhibition, as well as Conference materials and presentations. In addition, TUNA 2026 offers an unparalleled opportunity for delegates to network with industry leaders and pursue business interests.

TUNA 2026: Shaping a Competitive, Sustainable Future for the Global Tuna Industry

TUNA 2026 will be a forward-looking, industry-driven forum that responds directly to lessons from TUNA 2024 and the evolving commercial realities of the global tuna industry. With a strong focus on value chain synergies, blue economy opportunities and sustainability, the Conference aims to help shape practical, profitable and inclusive pathways for the industry's future.

The event will deliver a high-quality professional platform that balances strategic dialogue, market intelligence and innovation with real business opportunities. Through a combination of executive-level discussions, market insights, technology showcases and structured networking, the Conference is designed to deliver tangible value for participants across the global tuna value chain.

THE CONFERENCE

Under the theme ***"Strengthening Value Chain Synergies, Blue Economies and Sustainability across the Global Tuna Industry"***, the 19th INFOFISH World Tuna Trade Conference & Exhibition (TUNA 2026) will convene senior industry leaders and decision-makers from across the global tuna value chain to address the commercial realities, strategic priorities and enabling policy frameworks shaping the industry's future competitiveness.

Building on the outcomes, insights and feedback from TUNA 2024, the 2026 Conference responds directly to industry calls for stronger alignment between sustainability initiatives and market realities; deeper coverage of global and regional tuna markets; enhanced focus on trade, pricing and investment; and greater representation of industry-led perspectives across fishing, processing, logistics and branding.

TUNA 2026 will bring together executives from fishing companies, processors, traders and brand owners alongside policymakers, Regional Fisheries Management Organisations (RFMOs), technological service providers, financial institutions, research organisations and development partners. Together, participants will examine how value chain synergies can be strengthened to improve resilience, manage risk and support long-term commercial performance in an increasingly complex global operating environment.

As the global blue economy continues to expand, the tuna industry remains one of its most commercially significant pillars. Tuna fisheries contribute substantially to food security, employment, export earnings and economic development in many coastal and island nations, while supplying affordable, nutritious protein to markets worldwide. At the same time, the industry is operating in a rapidly evolving context characterised by climate variability, shifting fish stocks, regulatory reforms, digitalisation, heightened consumer scrutiny and geopolitical uncertainty.

TUNA 2026 provides a timely platform for the industry to examine how these challenges can be addressed collectively and strategically. By strengthening coordination across harvesting, processing, trade, logistics and marketing, the industry can improve efficiency, enhance transparency, reduce volatility and create greater value at every stage of the supply chain. This integrated approach is increasingly essential to ensure sustainability outcomes that are not only environmentally and socially credible, but also economically viable.

A central focus of TUNA 2026 will be the role of innovation and technology as **commercial enablers** of stronger value chain synergies.

Advances in digital traceability, artificial intelligence, electronic monitoring, data interoperability and smart fishing technologies are reshaping how tuna is caught, processed, traded and marketed. The Conference will examine how these tools can be deployed effectively and at scale, supporting both large commercial operations and smaller producers, while enhancing efficiency, compliance and market access.

In parallel, TUNA 2026 will address the evolving dynamics of global tuna markets. Dedicated sessions will examine regional demand trends, price formation and volatility, trade flows, tariff regimes and investment patterns across major consuming and producing regions. By linking market intelligence with sustainability and innovation discussions, the Conference will provide participants with clearer insight into how commercial decisions intersect with policy, certification and consumer expectations.

The Conference will also address the human dimension of the tuna industry. Labour standards, crew welfare, gender inclusion and equitable benefit-sharing are increasingly central to operational continuity, reputation management and market access. TUNA 2026 will explore practical, industry-led approaches to strengthening social accountability across the value chain, recognising that people are fundamental to productivity, resilience and long-term value creation.

TUNA 2026 will provide an open, timely and commercially relevant forum for dialogue, knowledge exchange and partnership-building. With strong participation anticipated from the Asia-Pacific, Europe, the Americas, Africa and the Middle East, the Conference offers a unique opportunity for stakeholders to engage directly with decision-makers and shape collective responses to shared challenges and opportunities.

THE INDUSTRY

The global tuna industry is one of the most valuable, traded and commercially significant sectors within international seafood markets. Tuna remains a cornerstone of food security, nutrition and livelihoods for millions of people worldwide, while playing a critical role in national development, employment generation and foreign exchange earnings across producing and processing economies.

At the same time, the tuna industry operates within one of the most complex fisheries management environments globally. Highly migratory stocks span multiple jurisdictions and are governed through Regional Fisheries Management Organisations (RFMOs). Effective cooperation between States, industry and institutions is therefore essential to ensure sustainable resource use, regulatory predictability and long-term commercial viability.

Within the expanding Blue Economy framework, the tuna industry is uniquely positioned to demonstrate how sustainable management, innovation and value creation can be mutually reinforcing. Strengthening value chain synergies is central to this ambition, enabling greater efficiency, reduced waste, improved traceability and more equitable distribution of economic benefits.

Global tuna supply chains have become increasingly integrated, linking fishing operations, processing hubs, logistics networks and retail markets across continents. While this integration has supported scale and market reach, it has also increased exposure to disruption. Climate impacts, fuel costs, labour availability, regulatory change and geopolitical tensions have underscored the need for more resilient and adaptive value chains.

TUNA 2026 will explore how enhanced coordination, commercial alignment and information-sharing across the value chain can mitigate these risks while improving margins, market access and operational resilience. Aligning fisheries management measures with processing capacity, logistics planning and market demand will be central to managing volatility while maintaining sustainability commitments.

Market dynamics remain a key driver for decision-making. Consumer demand for sustainably sourced, transparently labelled and responsibly produced tuna continues to grow, while price sensitivity and competition from alternative proteins remain significant. Understanding these dynamics is essential for businesses seeking to position products effectively across diverse markets.

Investment will also be a defining factor in shaping the future competitiveness of the industry, especially in the downstream processing. Capital is increasingly directed towards operations demonstrating strong environmental, social and governance performance alongside financial returns. TUNA 2026 will examine how sustainability-linked finance, blended finance mechanisms and public–private partnerships can support fleet modernisation, innovation and value addition, particularly in developing economies.

The industry's workforce remains central to productivity, reliability and long-term commercial performance. Ensuring safe working conditions, fair treatment and skills development is both a social responsibility and a business imperative. The Conference will highlight initiatives that strengthen labour standards while supporting efficiency and operational continuity.

*PROGRAMME HIGHLIGHTS

All sessions at **TUNA 2026 will be conducted in **English**.*

DAY 1 – INDUSTRY STRATEGY, GOVERNANCE & VALUE CHAIN ALIGNMENT

Setting the commercial and policy context for the global tuna industry, including blue economy frameworks, fisheries governance and value chain coordination.

Session 1: Global Tuna Industry Outlook & Blue Economy Integration

- Global production, supply and demand outlook
- Blue Economy strategies and implications for tuna
- Role of RFMOs, governments and industry leadership

Session 2: Strengthening Value Chain Synergies

- Fisheries–processing–trade–market alignment
- Public–private partnerships
- Regional value-addition and benefit-sharing

DAY 2 – MARKETS, TRADE & VALUE CREATION

Focused on global and regional market trends, price volatility, trade flows, investment dynamics and the role of technology, AI and data in improving competitiveness.

Session 3: Global Tuna Markets, Trade & Price Dynamics

- Key regional markets (EU, US, Asia, Middle East, Latin America)
- Pricing mechanisms and volatility
- Trade policies, tariffs and market access

Session 4: Innovation, Technology & AI across the Value Chain

- Smart fishing and monitoring
- AI in grading, quality control and forecasting
- Digital traceability, interoperability and data trust

Session 5: Investment, Finance & Blue Growth Opportunities

- Financing sustainable tuna operations
- Risk management and ESG-linked investment
- Innovation funding through R&D for scalable solutions

DAY 3 – SUSTAINABILITY, PEOPLE & THE FUTURE

Addressing certification, labour standards, climate risk, consumer expectations in terms of food safety, food fraud and long-term business resilience.

Session 6: Sustainability, Certification & Social Accountability

- Certification evolution and market relevance
- Crew welfare, labour standards and transparency
- Aligning sustainability with competitiveness

Session 7: The Future of the Global Tuna Industry

- Climate adaptation and resilience
- Consumer expectations and communication
- Strategic pathways to 2030 and beyond

WHO SHOULD ATTEND

- Tuna fishing companies and vessel operators
- Processors, traders and brand owners
- Policymakers and regulators
- RFMOs and international organisations
- Technology and service providers
- Investors and financial institutions
- NGOs, researchers and consultants

WHY ATTEND – BUSINESS VALUE

- Gain actionable insight into global tuna **price formation, volatility and margin management;**
- Understand how **policy, RFMO measures and sustainability requirements impact market access;**
- Identify technologies and AI solutions that **reduce cost, improve yield and enhance traceability;**
- Connect directly and network with leading global **buyers, suppliers, investors and service providers** across the value chain; and
- Position your business for growth within the **evolving blue economy and ESG investment landscape.**

VENUE & ACCOMMODATION

The 5-star luxury Shangri-La Hotel will again be the venue of TUNA 2026. Ideally located on the bank of the Chao Phraya River and adjacent to the sky train, it takes about 30 minutes to arrive at the hotel from the Suvarnabhumi International Airport. Rooms at reduced rates have been blocked at the Shangri-La Hotel in Bangkok.

Shangri-La Hotel, Bangkok, Thailand - www.shangri-la.com

A world-class venue offering excellent accessibility, facilities and networking environment, continuing the strong legacy of previous INFOFISH tuna conferences. The Shangri-La Hotel, Bangkok, offers a premium setting for the Conference and Exhibition, with modern facilities, excellent accessibility and a proven track record of hosting major international industry events. Reduced accommodation rates will be available for delegates.

For further hotel information or reservation arrangements, delegates may contact Ms. Farisha via email at farisha@infofish.org.

THE EXHIBITION

An exhibition will also be held concurrently at the same venue. A total of 44 booths are available for companies and organisations to display and promote their products, equipment, machineries and services related to the industry. The TUNA 2026 international exhibition will showcase:

- **Fishing and monitoring technology**
- **Processing equipment and innovation**
- **Traceability, AI and digital solutions**
- **Certification, testing and sustainability services**

The Exhibition provides exhibitors with direct access to senior decision-makers across the global tuna value chain. Exhibitors will benefit from high visibility, targeted networking opportunities and the ability to demonstrate solutions within a dedicated industry-focused environment. Space is allocated on a **first-come, first-served basis**.

SPONSORSHIP

Companies and organisations are invited to be a partner of this prestigious event by signing up for the sponsorship packages – Platinum, Gold, Silver or Bronze – which offer attractive and real benefits to sponsors (Sponsorship Packages).

For exhibition and sponsorship enquiries, please contact INFOFISH: info@infofish.org

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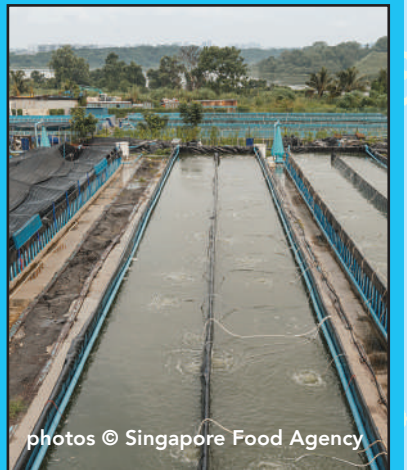

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FISHERIES MUST BECOME MORE SELECTIVE AND SUSTAINABLE

By Manfred Klinkhardt

Although there has been considerable success in efforts to make fishing more sustainable, it has not yet been possible to significantly reduce the proportion of overfished stocks worldwide. Design changes to fishing gear can help achieve this urgent objective. Sometimes even small changes to the nets are enough to make them more selective. What ideas are currently emerging?

Double the work: although set nets are deployed in the sea and hauled in, the main work takes place on land, when the fish are removed from the mesh.

Fisheries make an important contribution to humanity's protein supply, but they should be operated more sustainably. This means organising fishing pressure and catch volumes in such a way that the reproductive capacity of fish stocks is ensured, the environment is not irreparably damaged, and fishing methods are improved to reduce unwanted bycatch. Around the world, the fishing industry and the scientific community are collaborating to develop solutions that make fisheries more sustainable, as well as socially and economically equitable. A key focus of these efforts is the reduction of bycatch, pursued through two main approaches:

- Reorienting fisheries management to better preserve the reproductive potential of fish stocks, for example, by imposing restrictions on fishing effort or implementing spatial and temporal closures of certain marine areas and habitats, such as seagrass beds.
- Introducing technical improvements to fishing gear and methods to enhance their selectivity.

In some sectors of the fishing industry, such as shrimp trawling – where unwanted bycatch is often high – bycatch reduction devices (BRDs) are already widely used in fishing gear. These devices typically consist of diagonally arranged, fine-meshed barrier grids or nets positioned within the tunnel just before the codend. While allowing slender shrimp to pass through, they prevent larger bycatch species from entering and guide them out through escape hatches. BRDs come in various sizes and designs, tailored to the specific fishery and the potential bycatch species found in a given fishing area. However, such modifications are not always practical or feasible. For instance, no effective BRD has been developed for driftnets, which were commonly used in tuna fishing in the past. These nets – often stretching several dozen kilometres and drifting like impenetrable walls in the ocean – frequently became lethal traps for countless fish, seabirds, and marine mammals. Sharks, albatrosses, sea turtles, dolphins, and other species have become entangled in the nets, often dying in agony. As no solution to this problem was found, driftnets were banned for deep-sea fishing in 1992 by a United Nations (UN) resolution, which has also been enforced in European Union (EU) waters since 2002. Although violations of the ban are still occasionally reported (e.g. in the Indian Ocean), the driftnet issue has largely been resolved, contributing to a slight improvement in the sustainability of fishing.

Regional gillnets, often considered a smaller version of driftnets, are now facing similar criticisms. Unlike driftnets, which typically drift freely in the sea, gillnets are anchored in a specific location. In fact, gillnets have several positive characteristics that are quite desirable. They fall into the category of "passive" fishing gear, meaning they do not require energy to be dragged through the water, making them more climate-friendly. They

are also relatively selective, as the size range of the target species can be predetermined by the choice of the mesh size (although it remains possible to catch fish of similar size and shape). Criticism of gillnets in the Baltic Sea is primarily driven by the occasional bycatch of diving seabirds (such as auks, common scoters, long-tailed ducks, and common eiders), which forage for mussels and other organisms near the seabed or hunt for fish, as well as seals and porpoises. Their feeding grounds are also key areas for gillnet fisheries. Even dolphins and porpoises, which use acoustic signals to navigate underwater in a manner similar to bats, do not perceive the nets as an impenetrable barrier, as their thin nylon threads produce only a very weak echo. This increases the likelihood of them becoming entangled and drowning.

Solutions should be as simple as possible

One approach to better protecting the porpoise, also known as the harbour porpoise, is to improve the reflective properties of the nets so that they can be recognised as barriers. In the practical implementation of the project, researchers came up with the idea of gluing small transparent acrylic beads, about the size of a chickpea, at regular intervals onto the nets. This significantly enhances the echo of such 'pearl nets', allowing marine mammals to avoid these dangerous obstacles.

Another way to make bycatch-intensive fishing gear more visible in the water is through the use of light. A comparative study of unlit and lit gillnets over several months demonstrated that green LED lighting significantly reduces nocturnal bycatch. Lighting the nets led to a 95% reduction in shark bycatch biomass, an 81% reduction in Humboldt squid, and a 48% reduction in unwanted species. Nearly twice as many loggerhead sea turtles were caught in conventional nets compared to those with lighting. Additionally, there was another benefit: lighted nets could be collected much more quickly in the dark of night. Operational efficiency is crucial, as it may encourage fishers to switch to lighted nets. Although these nets are easy to handle, the situation is not so straightforward, as they are relatively expensive and require constant recharging during operation. Nevertheless, the study has compellingly demonstrated that green LED lighting could be a viable technology for reducing bycatch in gillnets.

Regional solutions to a global problem

Bycatch is indeed a global problem. Regardless of the fishing method, nearly every fishery has to contend with it. The Food and Agriculture Organization of the United Nations (FAO) estimates that almost 7 million tonnes of fish bycatch are caught unintentionally and discarded every year worldwide. As previously mentioned, the bycatch rate in industrial shrimp fishing in tropical waters is particularly high, accounting for more than a quarter of all discards globally. It is therefore unsurprising that research and development efforts are focused on this sector of the fishing industry, although many ideas and solutions can, of course, be applied to other fisheries. Some ideas are relatively simple and easy to implement, while others are more demanding and technically complex. For example, almost all larger Australian shrimp trawlers have water tanks on the back deck to keep the fish alive during sorting. This way, the unwanted bycatch has a better chance of surviving after being discarded into the sea.

In trawling, bycatch rates vary depending on the area of operation and the target species. They are generally higher near the seabed than in pelagic fishing.

Of course, it is even better if bycatch is already sorted in the fishing gear and does not come on board in the first place. Fishing experts have developed various devices to allow so-called 'non-target species' to escape from trawl nets. These range from larger mesh sizes, through which small fish can escape, to grid frames made of vertical bars that prevent larger fish and other protected species from entering the net, instead guiding them out through escape hatches. In this way, for example, the capture of sea turtles in trawl fisheries has been significantly reduced. All sea turtle species are considered highly threatened or endangered, with six of the seven species worldwide having been on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species since 2003.

Shrimp fishing in tropical waters is typically characterised by particularly high bycatch rates. In extreme cases, 1 kg of shrimp may be accompanied by up to 15 kg of bycatch.

The mandatory use of Turtle Excluder Devices (TEDs) in shrimp fisheries in the Gulf of Mexico and the south-west Atlantic has ensured that at least 97% of turtles are safely released from trawl nets. Similar efforts are being made in other regions of the world. For example, the Southeast Asian Fisheries Development Centre (SEAFDEC) has developed the Thai Turtle Free Device (TTFD), a specially designed escape hatch better suited to local shrimp fishing conditions. It is already in use in several Southeast Asian countries, including Thailand, Indonesia, Malaysia, and the Philippines.

Greater focus on species-specific behaviour

Optimising the selectivity of fishing gear is a key aspect of sustainable fisheries management. The main challenge is to minimise bycatch as much as possible without reducing the catch potential of the gear, i.e. without significant losses of target species. Moreover, the practical adoption of new gear depends on its ease of use, efficiency, durability, and affordability for fishers. From a fishing technology perspective, major breakthroughs are rare; often, small adjustments produce the desired effect. Therefore, technical improvements primarily focus on refining mesh sizes and shapes to better match the size and body contours of target species. Juveniles with round-oval body cross-sections can only pass through the mesh if it remains fully open and does not become compressed into narrow slits under pressure when the net is pulled. The placement of escape hatches in the trawl is also crucial. For some species, larger meshes and escape grids positioned towards the front of the net are most effective, while for others, they work better when placed closer to the codend. There is rarely a single solution that meets all requirements; instead, a series of small modifications can collectively achieve the desired outcome.

Some fishing gear innovations are based on the different behaviour of fish species. For example, cod tend to swim upwards in a trawl, whereas flatfish swim downwards. This insight has led to developments such as CODEX (COD EXcluder), where a guide net within the trawl tunnel directs cod upwards towards an escape opening in the upper section of the tunnel. Another example is the ROOFLESS net, in which the net in the upper part of the tunnel has been completely removed, creating an escape opening several metres wide. Tests have shown that nearly three-quarters of the cod escaped through the open roof of this convertible net, while flatfish, the actual target species, remained largely unaffected, with minimal loss of catch.

Innovative smart trawls that integrate artificial intelligence, stereo camera technology, and selective fishing mechanisms represent the state-of-the-art of bottom trawl fisheries. Together, these components have the potential to drastically reduce bycatch while significantly enhancing both the profitability and sustainability of fishing operations. The smart technology is positioned just before the codend of the bottom trawl, where every fish approaching is captured by the camera. Using image recognition, the AI identifies the species and determines its size. Based on this analysis, the system then decides whether to open the rotating gate of the codend or to divert unwanted species away from the net. Currently, this system can process up to 100 fish per minute. While smart trawls are not yet fully ready for large-scale practical application, the technology has the potential to revolutionise the industry. Whether it will be suitable for mass production in the future will, of course, depend on its purchase price and operating costs.

When collecting oysters, scallops and mussels, dredges are commonly used, which are towed close to the seabed.

Advantages and disadvantages combined in one fishing method

Depending on the technique used, angling can be both a sustainable fishing method and a high-risk source of bycatch. For instance, trolling and pole-and-line fishing, both of which are individually and manually controlled, are considered stock-friendly and environmentally responsible. Each fish is brought on board individually, removed from the hook immediately, and any unwanted bycatch can be quickly returned to the water. Seabirds often mistake the baited hooks for prey as the gear is deployed or hauled in, becoming entangled in the lines and drowning. Albatrosses, petrels, and several other bird species are particularly at risk. A relatively simple, effective, and inexpensive method of protecting these birds is the use of bird-scaring lines, which act as flapping deterrents. Brightly coloured streamers are deployed from the stern of the ship, creating a curtain over the area where the longline with hooks and bait is set and retrieved. The several-metres-long, wind-driven streamers deter birds and prevent them from accessing the baited line beneath. In Namibia's hake fishery, where demersal longlines are used, the introduction of these streamers –a relatively straightforward measure– has reduced seabird mortality by 73–95%.

Basket traps work according to the trap principle. The catch is taken out of the water alive so that unwanted bycatch can be released back into the sea unharmed.

Purse seines often exceed their reputation

Less successful, but still quite effective in protecting birds, is the Scarybird – a simple device that has been tested in the Portuguese artisanal purse seine fisheries. The Scarybird is a bird of prey-shaped flying object, akin to a kite that children and surfers enjoy flying in the wind. The device can be attached either to the fishing vessel itself or to a buoy, which is then placed within the purse seine. As soon as the silhouette of the supposed predator starts to hover over the fishing gear, many birds are deterred from the "dangerous" area. In practice, it has been shown that the number of gulls can be reduced by more than half, and the number of gannets approaching the vessel and equipment can be reduced by almost three-quarters. This deterrent is effective and can significantly reduce bird bycatch.

The use of purse seines requires the precise location of rewarding schools of fish, which are then encircled with the surrounding net.

Purse seines are often criticised by environmental activists, particularly in connection with fish aggregating devices (FADs), which attract many marine species. However, they are more selective than is often assumed. On the one hand, purse seines are only deployed when a sufficiently large and rewarding aggregation of animals from the target species has been located. On the other hand, there are now methods that allow accidental bycatch, such as dolphins, small cetaceans, and sea turtles, to escape from the encircling net. The backdown method, for example, is quite effective in providing these animals with a safe escape route, especially when combined with a small-meshed net liner (medina panel). In this method, the net is stopped, and the motor is switched into reverse, creating a current that reshapes the net into a long channel in the water, through which unwanted species can escape. The backdown method has contributed significantly to the reduction of bycatch mortality of small cetaceans in purse seine fisheries in the eastern tropical Pacific. For smaller target species in these fisheries, such as herring, mackerel, or anchovy, larger meshes in the upper part of the net wall allow undersized juveniles to escape as the net bag becomes more constricted when the fishing gear is hauled in.

There is, therefore, not just one solution for all problems in fisheries, but rather numerous possibilities for making fishing gear more selective and sustainable. However sensible such developments may be in theory, they can only be effective in practice if they are applied as widely as possible. This is usually best achieved through participatory approaches, where fishers are involved in the projects from the development phase. After all, the success of many good ideas ultimately depends on their willingness to abandon their usual and familiar methods in favour of new fishing gear. A great idea is only great if it is accepted and actually adopted in practice.

Dr Manfred Klinkhardt *is a marine and fisheries biologist, and has worked for many years as a scientist at the University of Rostock, Germany. Since 1997, he has been a seafood journalist, and has authored or co-authored numerous books and reports on the industry.*

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EDIBLE SEAWEEDS IN CHINA SUPPORT DIETARY DIVERSIFICATION

By W Shi, K Li, X Wang, X Jiang, Y He, Y Yuan, A Lovatelli and X Yuan

This article puts together selected excerpts from the FAO manual "Edible Seaweed Food Guide" which was compiled and published to promote the expanded use of seaweed-based foods, support dietary diversification and contribute to food security and nutrition. While it focuses primarily on the consumption and utilization of each commercially important species relevant to China, other details such as the nutrient content of selected seaweed species and the key processing techniques involved in manufacturing these products as well as the preparation methods for popular dishes are outlined in the publication[1].

Seaweeds, taxonomically classified as algae, play a vital role in marine ecosystems and have long been utilized as a food source in many coastal cultures. Rich in carbohydrates, vitamins, minerals and trace elements such as iodine (Paul et al., 2007), seaweeds typically grow in shallow coastal waters below the low tide line, where wave action is moderate. Their distribution is influenced by environmental factors such as light quality, mineral content and tidal zone.

Globally, over 30 000 species of seaweed have been identified, with more than 70 species considered commercially valuable. These are broadly categorized into four groups: red algae (including *Porphyra, Gelidium amansii, Gracilaria, Chondrus ocellatus, Eucheuma* and *Bangia atropurpurea),* brown algae (including *Laminaria japonica, Undaria pinnatifida, Sargassum fusiforme* and *Durvillaea antarctica),* green algae (including *Ulva prolifera, Caulerpa lentillifera, Monostroma nitidum, Enteromorpha Prolifera* and *Chlorella Vulgaris)* and other algae (including *Spirulina).* Each group tends to inhabit distinct tidal zones, with green algae typically found in upper intertidal areas, brown algae in the mid-intertidal zone, and red algae near the low tide line.

China is the world's largest producer of cultivated seaweed, mainly producing large quantities of *Laminaria japonica, Pyropia* and *Undaria pinnatifida,* with small-scale production of *Sargassum fusiforme, Eucheuma, Ulva lactuca, Monostroma nitidum* and *Enteromorpha prolifera* (Liu, Niu and Sui, 2020). The seaweeds produced in China are widely distributed in domestic and international markets.

China's abundant seaweed resources present significant opportunities for further utilization in the food, pharmaceutical, industrial and agricultural sectors (Li and Fu, 2015). Currently, the food industry represents the largest market for seaweed, particularly in the production of processed products from *Laminaria japonica, Pyropia* and *Undaria pinnatifida.* Seaweed offers an efficient source of nutrition, especially in areas facing resource constraints. However, public awareness of seaweed's dietary benefits remains limited, and its unique taste and nutritional advantages are often underappreciated.

Brown algae *Durvillaea antarctica* (cochayuyo)

Durvillaea antarctica is a genus of brown algae regarded as a rare and premium marine resource, often referred to as a "blue noble food". It is globally classified as a resource under restricted exploitation due to its limited natural availability (Zhang *et al.,* 2024). *Durvillaea antarctica* is primarily distributed in the cold waters of the Southern Hemisphere, particularly around the Antarctic region. It thrives in deep-sea

[1] *Shi, W., Li, K., Wang, X., Jiang, X., He, Y., Yuan, Y., Lovatelli, A. & Yuan, X., eds. 2025. Edible seaweed food guide. FAO Fisheries and Aquaculture Circular, No. 1298. Rome, FAO.* https://doi.org/10.4060/cd7461en

environments and requires precise conditions of light, temperature and salinity.

The nutritional and functional properties of *Durvillaea antarctica* can be significantly influenced by processing conditions. High-temperature treatments, for instance, may alter its physical characteristics, such as swelling capacity, water-holding capacity and oil retention (Guerrero-Wyss *et al.,* 2023). Therefore, in practical applications, it is crucial to optimize both the incorporation rate and the processing method of *Durvillaea antarctica,* depending on the specific requirements of food processing conditions and the intended product attributes.

Credit: Shanghai Ocean University

Cochayuyo can be made into a salad that is spicy and appetizing, with a crispy texture.

Sargassum fusiforme (hijiki)

Sargassum fusiforme belongs to the Phaeophyceae class, Fucales order and Sargassaceae family and is considered an economically important seaweed (Zou *et al.,* 2012). In China, *Sargassum fusiforme* is primarily distributed along the coast, from the northern provinces of Liaoning and Shandong to the southern provinces of Fujian, Guangdong and Zhejiang. Large-scale farming of *Sargassum fusiforme* is concentrated in the east and south China Sea regions, particularly in the Zhejiang Province.

Sargassum fusiforme has diverse industrial applications, serving as a raw material in the textile, dyeing, food and pharmaceutical industries. Its high fucoidan content makes it especially valuable in the production of colloids and various chemical products. For processing *Sargassum fusiforme,* drying is an essential pretreatment that ensures long-term storage and facilitates transportation. Once dried, this seaweed can be soaked, washed and further processed into ready-to-eat food items or used in the development of innovative products such as health jellies and composite vegetable papers.

Credit: Dalian Ocean University

Credit: Shanghai Ocean University

Credit: Shanghai Ocean University

Credit: Shanghai Ocean University

Top to bottom: Hijiki can be prepared as a salad, jelly, composite vegetable paper and yoghurt

Laminaria japonica (kelp, sea tangle)

Laminaria japonica belongs to the Phaeophyceae class, Laminariales order and Laminariaceae family (Hu *et al.,* 2021). *Laminaria japonica* are primarily found along the Pacific coast of the Americas, from Alaska through the coasts of Canada and California to Mexico, as well as in Australia, Chile, New Zealand and Peru (Matsson, Christie and Fieler, 2019). In China, *Laminaria japonica* was introduced from Mexico in 1978 and has become established in Changdao County, Shandong Province.

Currently, *Laminaria japonica* foods include dried slices, shredded strips and knots. These dried forms are typically soaked and washed before being used in further food preparations.

Laminaria japonica holds considerable market value for industrial applications, particularly in the extraction of fucoidan. Fucoidan is a hydrophilic macromolecule with excellent adhesion, gelation and film-forming properties (Zhang *et al.,* 2014). Fucoidan has antimicrobial activity and can be used as a preservative in food products (Poveda-Castillo *et al.,* 2018).

There are many ways of incorporating kelp into nutritious dishes for human consumption such as in salads, floss, sauces, soups, sausages, meat rolls, bread, noodles, ice cream, tofu, tea, candy, snacks and others.

Undaria pinnatifida (wakame)

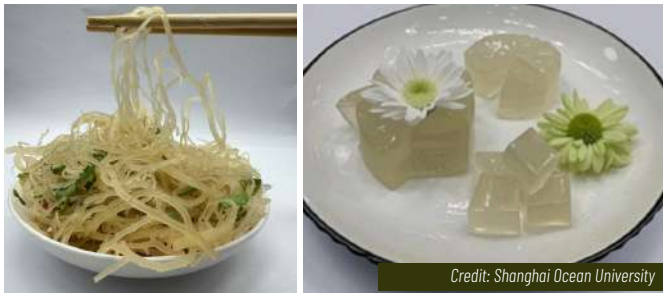
Undaria pinnatifida belongs to the Phaeophyceae class, Laminariales order and Alariaceae family and is an economically important seaweed species. It is distributed in temperate waters around the world, especially in the coastal waters of East Asia, including China, Japan and the surrounding waters of the Republic of Korea (Lee *et al.,* 2004). In China, the Liaodong and Shandong Peninsulas are the primary production areas. Large-scale cultivation is typically carried out using methods such as rope culture and net box culture.

Like most seaweeds, wakame can be used in salads and soups, bread, snacks, sauces, drinks (wine) and others.

Gelidium amansii (Agar weed)

Gelidium amansii is a species of red algae that belongs to the Florideophyceae class, Gelidiales order, and Gelidiaceae family (Pei *et al.,* 2022). It is primarily distributed along the coastal areas of China, particularly in the Shandong Peninsula and in Fujian and Zhejiang provinces. This warm-temperate, perennial seaweed typically grows on rocky seabeds at depths of 6–10 m.

Agar derived from this species is widely used in food processing, pharmaceuticals, textiles and the paper industry. Furthermore, the polysaccharides extracted from *Gelidium amansii* have demonstrated multiple biological activities, including anti-inflammatory, anticoagulant, antitumor and antiviral effects, which underscore its high research and application potential (Lee *et al.,* 2011). Its alcoholic extract is particularly rich in secondary metabolites, especially sterols. These sterols may neutralize free radicals through direct interaction, thereby reducing cellular damage caused by oxidative stress (Li *et al.,* 2014).



Agar weed is consumed in the form of salads and jellies, among other uses.

Bangia atropurpurea

Bangia atropurpurea is a species of red algae that belongs to the Bangiophyceae class, Bangiales order, and Bangiaceae family. It has a broad geographic distribution, occurring across subfrigid to subtropical regions, including coastal areas of Asia, the east coast of Africa, both coasts of the Americas and parts of Oceania. In terms of pigment content, this red alga is especially notable for its high levels of carotenoids and phycobiliproteins (including phycocyanin), which are 4–5 times higher than those in *Porphyra.*

Once dried, this species can be easily rehydrated to regain its original elasticity and fresh taste. Its soft, slightly sweet texture and oceanic flavour make it suitable for cold dishes like gazpacho, as well as soups and seafood-based recipes, where it enhances the depth of flavour. In industrial applications, *Bangia atropurpurea* serves as a valuable raw material for extracting carrageenan and agarose. These compounds are widely used in the food, cosmetics and biotechnology sectors as thickeners, stabilizers and culture media.

Eucheuma

Eucheuma is a genus of red algae that belongs to the Florideophyceae class, Gigartinales order, and Solieriaceae family. It is a type of tropical seaweed commonly found growing on coral reefs. It is widely distributed in warm-temperate and tropical waters, typically from the low-tide line to coastal zones at depths of 1–2 m. In China, *Eucheuma* is primarily found in southern regions such as Hainan Island and the Xisha Islands.

It is well-suited for use in cold dishes, soups and stews, and it is also used in innovative food products such as seaweed noodles. Industrially, *Eucheuma* is a raw material for the extraction of carrageenan (Porse and Rudolph, 2017), a natural hydrophilic colloid widely used in the food, cosmetic and pharmaceutical industries for its gelling, thickening and stabilizing properties.

Gracilaria

Gracilaria is a genus of red algae that belongs to the Florideophyceae class, Gracilariales order, and Gracilariaceae family. It is considered one of the most economically important large seaweeds (Craigie and Wen, 1984). It is widely distributed across the world's coastal regions, particularly along the southeastern coast of China, including the Fujian and Guangdong provinces. Multiple species of *Gracilaria* are cultivated and utilized, such as *Gracilaria blodgettii, Gracilaria bailinae* and *Gracilaria tenuistipitata.* This seaweed typically grows in intertidal zones or near the low-tide line, preferring sunny environments and demonstrating strong adaptability to variations in seawater salinity. It is a fast-growing species and can be cultivated year-round, particularly in the coastal regions of southern China.

In terms of nutritional value, *Gracilaria* is a desirable ingredient for health foods and has been shown to offer several health-promoting functions, including immunomodulatory, antioxidant, hypoglycemic and antiviral effects, as well as benefits for environmental purification. Its high dietary fibre content supports digestive health, helps lower cholesterol levels and assists in blood sugar regulation. In addition to its role in the food industry, *Gracilaria* has significant applications in cosmetics and pharmaceuticals. Its extracts are valued for their bioactive properties and are used to develop products with specific functionalities such as moisturizing, anti-inflammatory and antibacterial effects (Thomas and Kim, 2013).

Chondrus ocellatus (Irish moss)

Chondrus ocellatus, commonly known as Irish moss, belongs to the Florideophyceae class, Gigartinales order, and Gigartinaceae family. It is distinguished by its elongated, flexible branches and is mainly distributed along both sides of the North Atlantic – from Norway to Maine in the United States of America, including Newfoundland in Canada, and as far south as Brittany in France and northwestern Spain.

Porphyra (laver)

Porphyra is a genus of red algae that belongs to the Bangiophyceae class, Bangiales order, and Bangiaceae family. It is naturally distributed along temperate coastal areas in the Northern Hemisphere, particularly in East Asia, including the coastal waters of China, Japan and the Republic of Korea. In China, the southeastern coastal provinces such as Fujian, Guangdong, Jiangsu and Zhejiang serve as the main cultivation bases.

Clockwise: Laver meat floss, laver biscuits, meat/fish balls and fish cakes

Chlorella vulgaris

Chlorella vulgaris is a unicellular, spherical green microalga that belongs to the Trebouxiophyceae class, Chlorellales order, and Chlorellaceae family. It is considered one of the earliest life forms on Earth and was the first microalga to be artificially cultured.

Chlorella vulgaris is a common raw material in animal feed production; it also serves as a natural food source for zooplankton such as rotifers, branchiopods and copepods (which makes it useful in aquaculture). In addition to its high nutritional value, it produces various bioactive compounds, including polysaccharides, flavonoids and polyphenols. These substances exhibit anti-inflammatory, antimicrobial and antioxidant properties and are used in the development of functional foods and nutraceutical products (Lauritano *et al.,* 2016). From an environmental perspective, *Chlorella vulgaris* is highly adaptable and tolerant to pollution. Its ability to absorb and sequester heavy metals makes it an effective agent for environmental remediation and water quality improvement.

Ulva prolifera (green laver)

Ulva prolifera is widely distributed in shallow coastal waters, especially in the intertidal and subtidal zones, where it grows on rocks, sandy beaches and other hard substrates. Due to its strong adaptability and rapid growth rate, it is cultivated in several countries, including China (notably in Fujian, Liaoning, Shandong and Zhejiang provinces), Japan, the Republic of Korea and other coastal nations. Common cultivation methods include raft culture, pond culture and shallow-sea farming.

Green laver soup

Monostroma nitidum

Monostroma nitidum is a large, economically important green seaweed that belongs to the Ulvophyceae class, Ulvales order, and Monostromataceae family. *Monostroma nitidum* typically grows attached to rocks in the mid- and high-tide zones of calm inner bays or on rocky reefs partially covered by mud or sand. Globally, there are 55 known species in the *Monostroma* genus, five of which are found in China. These are distributed along the coasts of provinces such as Fujian, Liaoning (Dalian), Taiwan and Zhejiang. Alongside *Enteromorpha prolifera* and *Ulva prolifera, Monostroma nitidum* is regarded as one of the world's three major economic green algae, accounting for over 90 percent of total green algae aquaculture production (Kaur *et al.,* 2023).

Monostroma nitidum is rich in dietary requirements and is also known for its bioactive compounds, possessing biological functions such as anticoagulant and antiviral activities. In food processing, *Monostroma nitidum* flour is used to enhance the fibre content of noodles; and its polysaccharides can also serve as natural thickeners and stabilizers in food products.

Monostroma nitidum boiled into doughball soup

Caulerpa lentillifera (sea grape)

Caulerpa lentillifera is a large marine algae belonging to the Ulvophyceae class, Bryopsidales order, and Caulerpaceae family. It is primarily distributed in tropical and subtropical coastal zones. *Caulerpa lentillifera* is native to the intertidal regions of the Pacific Ocean and is cultivated in several countries, including China (notably in Fujian, Guangdong and Hainan provinces), Japan, Thailand and Vietnam. It has a long history of artificial cultivation in the Okinawa region of Japan (Chen *et al.,* 2019).

Nutritionally rich, this species offers substantial dietary value; compared to other edible seaweeds, *Caulerpa lentillifera* has relatively higher concentrations of essential trace elements such as iron, zinc, and selenium. It also contains various bioactive compounds such as polysaccharides and polyphenols, which are recognized for their immunomodulatory, antitumor, antioxidant, antidiabetic and antifatigue properties (Da Silva Barbosa *et al.,* 2021; Sommer *et al.,* 2022; Yu *et al.,* 2018). Additionally, it contains unique active compounds like fern sesquiterpenes, which have been explored in pharmaceutical applications for treating skin injuries, gout and diabetes (Yu *et al.,* 2017).

Ecologically, Caulerpa *lentillifera* has demonstrated potential as a biological purifier in wastewater treatment.

Enteromorpha prolifera (sea grass)

Enteromorpha prolifera is a green alga that belongs to the Ulvophyceae class, Ulvales order, and Ulvaceae family. It is typically dark green or bright green in colour, composed of a single layer of cells, and grows in

tubular or band-like forms. The base of *Enteromorpha prolifera* attaches to rocks via a holdfast and commonly grows on mudflats and gravel in mid-tidal zones. It is widely distributed in intertidal areas and occurs along the coastlines of most marine countries worldwide. In China, it is primarily found in the offshore waters of Fujian, Jiangsu, Liaoning and Shandong provinces, with particularly dense natural distributions in Fenghua (Zhejiang Province) and Xiangshan Harbor.

Seagrass can be used in shortbread and biscuit recipes, or fried with fish and shrimp, among other uses.

Spirulina

Spirulina belongs to the Cyanobacteria class, Oscillatoriales order, and Oscillatoriaceae family. Its name derives from its distinctive spiral-shaped structure observed under the microscope.

Spirulina thrives in high-temperature, saline environments and is primarily found in tropical and subtropical freshwater and alkaline lakes. Natural habitats include Chenghai Lake in the Yunnan Province of China, Lake Chad in Central Africa and Lake Texcoco in Mexico. Currently, two main methods are used for commercial *Spirulina* cultivation: open pond systems and closed photobioreactors.

Nutritionally, *Spirulina* is considered a superfood, as its protein content ranges from 50–70 percent by dry weight. One of its key bioactive components is phycocyanin, a pigment-protein complex with strong antioxidant and immune-enhancing properties (Eriksen, 2008). Additionally, *Spirulina* is rich in EAAs such as lysine, methionine, threonine and cystine, nutrients often lacking in cereal-based diets. Beyond proteins, *Spirulina* also contains a broad spectrum of vitamins, minerals (e.g. calcium, iron, zinc, sodium) and other bioactive compounds, earning it the designation as one of the most nutrient-dense foods of the 21st century (Soni, Sudhakar and Rana, 2017).

In food processing, *Spirulina* serves multiple functions: it can enhance colour, flavour and protein content, as well as improve the antioxidant capacity of the final product (Batista *et al.,* 2019). Its addition to dairy products has also been shown to influence microbial activity and the fermentation process (Winarni Agustini *et al.,* 2016). Moreover, *Spirulina* contains bioactive substances such as polysaccharides, polyphenols and phycocyanin, which exhibit antioxidant, anti-aging, anti-diabetic and free radical-scavenging properties (El-Desouki *et al.,* 2015). Owing to these benefits, *Spirulina* is widely used across multiple sectors, including pharmaceuticals, functional foods, dietary supplements and cosmetics.

Spirulina is available in powder, tablet and liquid forms. It is also used in the making of noodles, biscuits and bread.

Summary

Seaweed is abundant across global marine ecosystems and has been consumed by humans for thousands of years. Increasingly recognized as a nutritious and sustainable food source, seaweed is rich in proteins, vitamins, unsaturated fatty acids, polysaccharides, dietary fibre and essential minerals.

In addition to their nutritional benefits, edible seaweeds offer distinctive sensory attributes, such as an umami taste and a pleasant crunchy texture, which have made them integral to culinary traditions in many coastal communities, particularly in China. The growing interest in sustainable, plant-based and health-promoting foods underscores seaweed's potential to contribute to global food and nutrition security.

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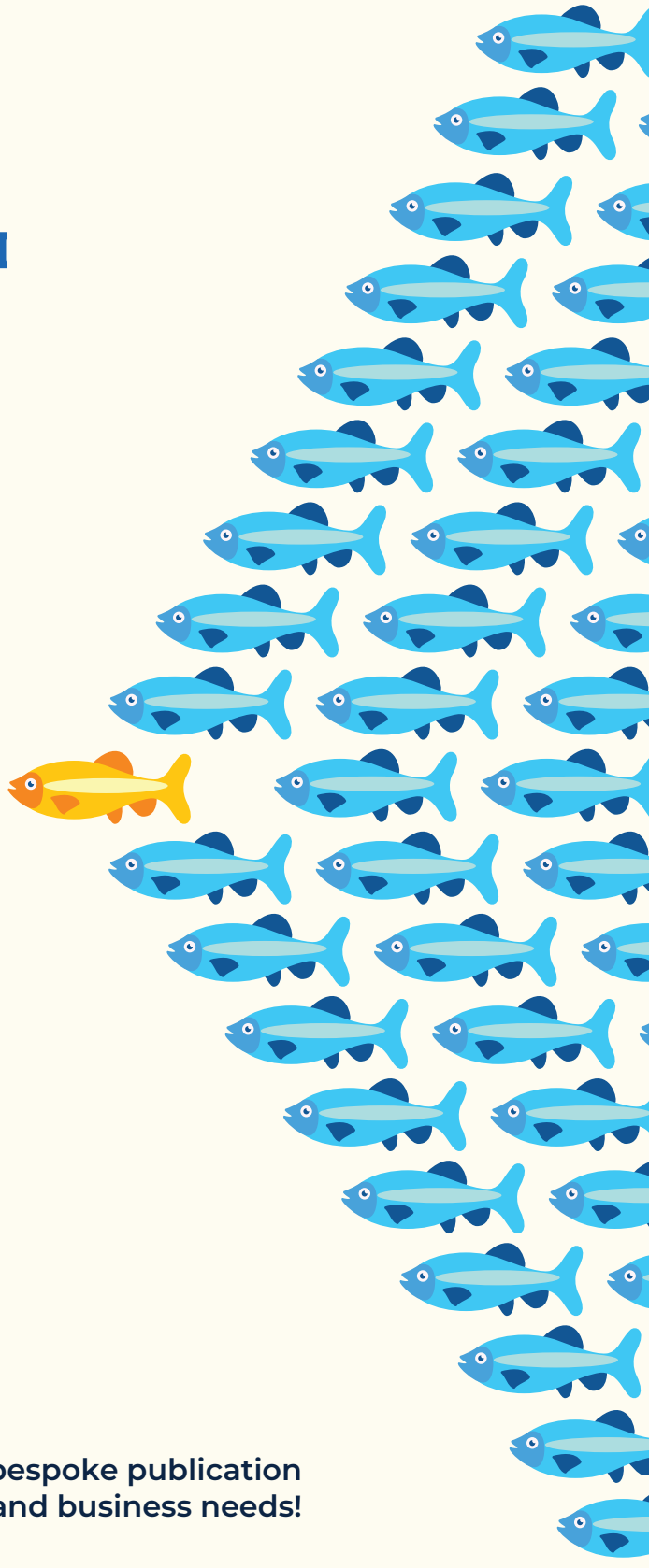

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BREAKING THE PLASTIC WAVE

By The Pew Charitable Trusts

In 2020, The Pew Charitable Trusts and Systemiq published a groundbreaking report, "Breaking the Plastic Wave" to identify a credible roadmap for addressing plastic pollution in the world's oceans. In an update, "Breaking the Plastic Wave 2025"[1], improved information is used to provide a deeper understanding of the environmental, economic, health and social impacts of plastic. The new report also explores the global plastic system's influence on efforts to address some of the world's greatest challenges. The overall aim is to support and encourage decision-makers as they respond to critical global issues, evaluate trade-offs and implement solutions.

Credit: The Pew Charitable Trusts

In 2020, amid rising concerns over the scale and impacts of plastic pollution, The Pew Charitable Trusts, Systemiq and their partners published "Breaking the Plastic Wave" (BPW1), which found that the amount of plastic that would enter the ocean each year from municipal solid waste would nearly triple by 2040, increasing from 11 million metric tons (Mt) in 2016 to 29 Mt, unless the global community undertook the ambitious actions identified in the report.

Despite that urgent call, progress towards that study's vision of coordinated measures across the entire plastic system to reduce pollution has yet to be realized, and in the intervening five years, 570 Mt of plastic pollution has entered the land, air and water worldwide.

To help illuminate the consequences and implications of that slow progress, we conducted a new, more comprehensive analysis of plastic pollution in Earth's waters, land and air.

This resulting report is an update to and expansion of BPW1 that builds on the better data that has become available over the past five years to examine all major sectors of the global plastic system.

Our analysis also finds that plastic is interconnected with other global challenges, and that solving the plastic pollution problem will have broad implications for improving the health of people, the planet and the global economy. (See Figure 1). With the added urgency created by five more years of growing plastic pollution, we renew and amplify the call for ambitious action and transformative strategies to address not only plastic pollution but also the far-reaching consequences of the plastic system.

[1] *Read the full report at: https://www.pew.org/en/research-and-analysis/reports/2025/12/breaking-the-plastic-wave-2025*

Figure 1

Fast Facts 2025–2040

Plastic's impacts on people and the planet, without and with ambitious action

Our assessment of the global plastic problem yielded the following nine key findings:

1. **Plastic pollution will more than double over 15 years.** As of 2025, 130 Mt of plastic pollutes the environment – land, air and water – each year. Without ambitious global action, that figure will rise to 280 Mt by 2040 – equivalent to dumping nearly a garbage truck worth of plastic waste every second. This increase will be primarily driven by rapidly growing production and use of plastic – particularly in packaging and textiles – that will further overwhelm already inadequate waste management systems.

2. **Growth in plastic production will outpace waste management capacity.** Absent urgent international efforts, annual primary plastic production will rise 52% from 450 Mt in 2025 to 680 Mt in 2040, growing twice as fast as waste management, which, even with considerable investment, will expand by only 26%. By 2040, annual costs to collect and dispose of plastic would increase by 30% to US$140 billion, requiring additional public funds and posing a financial risk to businesses. Despite this increased spending, the share of plastic waste that is uncollected will nearly double by 2040 from 19% to 34%.

3. **Plastic can harm human health at every stage of its life cycle.** Barring robust global action, health impacts from plastic production, waste and pollution, before accounting for use, will increase by 75% over the next 15 years, primarily because of new polymer production and open burning, with the most vulnerable communities bearing the brunt. A growing number of studies have linked plastic pollution and chemicals used in plastic products to health problems, including cancer, cardiovascular disease, asthma, decreased fertility and cognitive and developmental issues.Research has conservatively estimated the annual costs of health effects from plastic chemicals alone to be as high as US$1.5 trillion globally. That figure will only grow as plastic production, use and pollution increase, and as understanding of the health impacts expands.

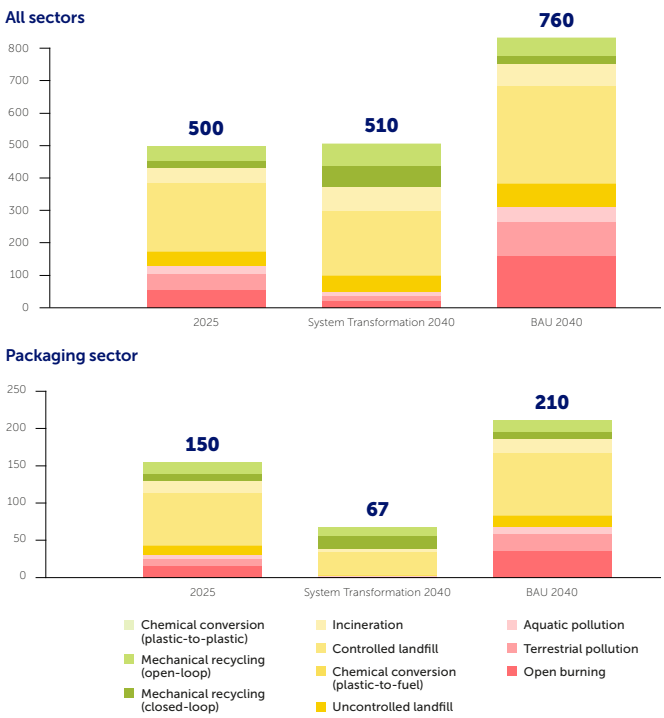
   Because of data gaps, we did not include the health impacts of plastic use or microplastics in our analysis, but those effects are likely to be significant, as are the potential human health benefits of reducing plastic use. To date, more than a quarter of the more than 16,000 chemicals used in plastic products have been identified as possible sources of harm to human health. Among the topics of growing concern are endocrine-disrupting chemicals – which affect the hormones that regulate human health and are widely used in food packaging, cookware, toys and cosmetics – and microplastics, which are increasingly being found throughout people's bodies and have been linked to potential risks to digestive, reproductive and cognitive function.

4. **Greenhouse gas emissions will surge.** Unless the plastic system is transformed, by 2040, annual greenhouse gas (GHG) emissions from the global plastic system will increase by 58% to 4.2 gigatons of carbon dioxide equivalents (GtCO2e) – a metric used to standardize the measurement of emissions of different GHGs – equivalent to the emissions from one billion gasoline-powered cars. Achieving the commitments made by the global community under the Paris Agreement – the legally binding international treaty adopted in 2015, which pledges to keep global temperature rise below 2°C and ideally under 1.5°C – will require rapid declines in annual emissions, especially from plastic production, which accounts for 86% of plastic-associated emissions in 2025.

5. **Ambitious global action can dramatically reduce pollution.** Our "System Transformation" scenario reflects ambitious, complementary actions using existing solutions across the plastic system to cut production and use and improve waste management, which together could reduce annual plastic pollution by 83% by 2040. The myriad benefits of this scenario include lower GHG emissions, reduced harm to human health, as well as more efficient use of public funds and the creation of new business markets and opportunities. This report shows that an integrated approach to plastic that touches all the modelled economic sectors is crucial, with actions needed before, during and after plastic product use. (See Figure 2).

Figure 2: Existing Strategies, Implemented at Scale, Can Substantially Reduce Plastic Pollution

System Transformation outcomes for all economic sectors and for packaging only in Mt per year, 2025 and by scenario 2040



A key finding from this scenario is the importance of reducing production levels of "primary plastic" – plastic made from raw materials for the first time – to decrease plastic pollution and the impacts of production on human health and climate. The recommended actions could cut annual production of new plastic by 44% by 2040, compared with current projections, achieving a 14% reduction from 2025 levels, all while maintaining the same level of service for consumers and businesses. Reaching these reductions

could also unlock new opportunities for sustainable solutions, a market already valued in the trillions of dollars.

Although implementing and rapidly scaling policies across the plastic life cycle worldwide will require unprecedented global collaboration and commitment, doing so would have substantial benefits, including a 38% reduction in annual GHG emissions from plastic, a 54% reduction in modelled annual health impacts, and a US$19 billion decrease in yearly government spending on plastic collection and disposal by 2040.

6. **Packaging pollution can be virtually eliminated.** Pollution from plastic packaging, the largest source of plastic waste, can be nearly eradicated by 2040, decreasing 97% from 66 Mt under BAU to less than 1.7 Mt by 2040. System Transformation could reduce primary plastic production for packaging by 76% compared with BAU and by 66% relative to 2025. Reuse accounts for two-thirds of the total decrease by 2040, demonstrating the central role that reuse will play in transforming how products are delivered and used.

   In particular, the scale of reuse required for these reductions will entail shifting nearly US$570 billion in annual private sector spending away from single-use and towards reuse, which highlights the many new economic opportunities that System Transformation presents, especially for early adopters and innovators. These investments would also support other substantial benefits, including 48% lower GHG emissions from packaging production and hundreds of thousands of new jobs.

7. **Solving microplastic pollution will require innovative solutions.** Microplastics make up 13% of global plastic pollution in 2025, with the largest sources being tyre wear and paint (10 Mt each), agriculture (3 Mt) and recycling (2 Mt). Under BAU, microplastic pollution will grow from 17 to 26 Mt annually by 2040. In high-income economies, microplastic pollution will make up 79% of overall plastic pollution by 2040.

   By contrast, under System Transformation, the annual flow of microplastics entering the environment could be cut by 41% by 2040 through a suite of actions to reduce production and use, improve product design and scale solutions for capture and treatment of microplastics. Although these targeted policy actions can achieve meaningful reductions in microplastic pollution, more than half of it remains unaddressed. This limitation highlights the need for other innovative solutions to deliver more substantial decreases in microplastic pollution.

8. **System Transformation offers opportunities for workers and communities.** Reimagining the plastic system would support 8.6 million additional jobs and create new business opportunities. But in the near term, it would also have consequences for millions of people worldwide whose livelihoods will require dedicated attention as the new plastic economy takes shape. Effective policies to tackle plastic pollution can create jobs, help alleviate poverty and safeguard the well-being of the world's most vulnerable people.

   More than three-quarters of all plastic that is recycled globally is collected and sorted by waste pickers, most of whom are from marginalized parts of society. Our analysis shows that waste pickers could make up nearly two-thirds of the plastic workforce by 2040. Despite providing an important service, these workers are not paid fairly or properly recognized for their contributions and are often exposed to hazardous conditions. Participatory approaches to waste management and governance that provide waste pickers with safe working conditions and economic opportunities and fully integrate them into broader waste management improvement strategies will be key to ensuring that the plastic system's transition is equitable and aligned with efforts to address global poverty.

   Furthermore, a shift away from linear economic models, based on production, use and disposal, and towards circular models that prioritize reusable and repairable products will shift the landscape of jobs across the plastic system. Under System Transformation, production accounts for 19% of plastic sector jobs by 2040, down from 30% under BAU, recycling jobs increase by 39% from 2025 to 2040 and expanded reuse systems create nearly 620,000 new jobs by 2040. Additional opportunities may also arise from thoughtful integration of waste pickers – who already play a substantial role in the recycling economy – as part of future waste management and reuse systems. Applying waste pickers' knowledge and expertise could facilitate a successful and socially responsible transition.

9. **Delay is costly.** Waiting just five years to initiate System Transformation would result in 1,100 Mt more primary plastic being produced, 540 Mt more plastic entering the environment and 5.3 GtCO2e more GHG emissions between 2025 and 2040. A five-year delay would increase governments' annual costs for plastic collection and disposal by an estimated 23% annually (US$27 billion) and add US$6.1 billion in annual capital expenditures by 2040 for open-loop mechanical recycling and incineration capacity for plastic alone. But these technologies also would be at growing risk of obsolescence as the economy becomes more circular. So this same five-year delay could lead to overinvestment in solutions that do not align with the future plastic system and, in turn, sizeable financial losses for companies and inefficient use of the limited public funding available for addressing the global plastic problem.

Opportunities for policymakers, researchers and businesses

The global community can make significant strides towards eradicating plastic pollution by 2040, despite the slow progress to date, by using existing solutions to transform the global plastic system, making ongoing investments in innovation and adopting a renewed sense of urgency. Although this is a sizeable challenge, the opportunities are substantial. Transforming the global plastic system will provide workers with better jobs and working conditions and build the business models of the future – ones that are built on sustainability and fostering innovation to provide better-designed materials and products.

This amount of system-level change will require coordinated action by policymakers, businesses and researchers to tackle the foundational challenges that hinder progress – rebalancing manufacturing, design, governance and consumer decisions to prioritize people and the environment. This report outlines four strategic pillars with associated opportunities for government, the research community and business to achieve this lofty goal:

1. Establish measures to reduce plastic production and use.

- Implement policy measures to ensure that market prices reflect the true costs of plastic and other materials.
- Complement pricing measures with targeted policies to reduce plastic production and use to sustainable levels, such as eliminating subsidies, enacting reduction targets and restricting new production facilities.
- Phase out low-utility, avoidable plastic through bans, product design standards and voluntary corporate actions to reform supply chains.

2. Rethink chemical, plastic product and system design.

- Adopt pre-market policies that assess the safety of chemical additives used in plastic, to safeguard human health and the environment.
- Establish and enforce a list of comparatively safer chemicals to promote material innovation and product safety.
- Implement policies that support the shift from single-use to reusable products, such as targets, standards, investment in shared infrastructure and financial incentives for consumers and businesses.
- Establish consistent product design requirements and standards for safe reuse and recycling and to reduce microplastic emissions.
- Simplify polymers and polymer compositions, such as by restricting problematic polymers – those that are difficult to recycle or pose health risks.
- Adopt measures to reduce microplastic shedding across key sectors, including plastic production, recycling, agriculture, marine, textile, transport and construction.
- Promote innovation in sustainable materials development, promising recycling technologies and reusable products.
- Establish public-private partnerships and provide incentives for open and transparent collaborations across industries to accelerate development of innovative solutions.

3. Expand participatory waste management systems.

- Implement policies to scale waste collection, including collection and recycling targets, deposit return schemes, design and labelling standards and, where appropriate, increased separate collection.
- Expand environmentally sound waste management systems by integrating waste pickers and other informal workers into waste management planning and extended producer responsibility (EPR) schemes to finance waste collection and management.
- Incorporate informal workers into census protocols to improve understanding of their contributions to existing waste management and improve long-term strategies.
- Develop targeted funding for groups that lack access to traditional financing to create cooperatives, offer training opportunities and support participation in governance.
- Establish enhanced filtration at recycling and wastewater facilities to minimize microplastic leakage to the environment and identify long-term, safe disposal options for contaminated waste sludge.

4. Unlock transparency of the plastic supply chain and its impacts.

- Invest in research into and monitoring of the impacts of the global plastic system, particularly on human health.
- Develop targeted research into impacts of exposure to plastic on vulnerable populations, including communities adjacent to production and waste management facilities, waste pickers and workers across the plastic supply chain.
- Disclose data on plastic-related commerce, impacts, risks and opportunities through reporting platforms, such as CDP.
- Establish a global chemical reporting and disclosure framework to help improve supply chain transparency, evaluate chemical risks and assess progress towards global targets.
- Increase interdisciplinary research and monitoring to provide a fuller picture of the extent of the plastic system's environmental and health impacts.

Urgent action is needed to transform the global plastic system and curb the worst effects of plastic pollution on the environment and human health, and to ensure efficient use of financial resources. A coordinated, ambitious effort by the global community can substantially reduce plastic pollution overall and virtually eliminate pollution from plastic packaging in the next 15 years, while reducing costs, supporting millions of jobs and bolstering efforts to protect human health, address climate change and alleviate poverty.

Pew

Founded in 1948, The Pew Charitable Trusts uses data to make a difference. Pew addresses the challenges of a changing world by illuminating issues, creating common ground, and advancing ambitious projects that lead to tangible progress.

Locally led adaptation strengthens resilience and livelihoods of fishers and fish farmers in Timor-Leste

Credit: WorldFish/Thijs Schut

In the Small Island Developing State of Timor-Leste where 42 percent of the population live below the national poverty line, communities that rely on aquatic resources face a harsh reality. Droughts, water shortages, and extreme weather, exacerbated by climate change, threaten their aquatic resources, putting livelihoods and food security at growing risk.

In response, the project ***"Strengthening the Adaptive Capacity, Resilience and Biodiversity Conservation Ability of Fisheries and Aquaculture-Dependent Livelihoods in Timor-Leste" (IkanAdapt)*** is helping communities dependent on fisheries and aquaculture strengthen adaptive capacity, build resilience and conserve aquatic ecosystems. The GEF-funded project is executed by WorldFish, with technical guidance, support and oversight by the Food and Agriculture Organization of the United Nations (FAO), in close collaboration with national partners.

The IkanAdapt project has worked closely with officials and local communities to develop climate change adaptation plans for aquatic food systems. The initiative helps fishers and fish farmers innovate to cope with climate challenges.

"It isn't just about scoping for vulnerabilities, but trying to address them concretely," said Thijs Schut, a scientist at WorldFish working on the project. "We help communities find ways to adapt to climate change through co-creation, so our work is guided by a set of best practices, including that of locally led adaptation."

Recurring priorities have emerged across 21 participating communities, leading to initiatives in aquaculture development, seaweed farming and water catching and management.

Building more robust aquatic food systems

Many communities are turning to aquatic food production to diversify their livelihoods and boost resilience to climate shocks.

"People's resilience to climate change increases when aquatic foods or aquatic-related livelihoods are added to their lives," Schut said. "What we try to do is to strengthen these aquatic food production systems as a key pathway to climate adaptation."

However, many existing aquaculture operations face water shortages and inadequate knowledge of best farming practices.

IkanAdapt addresses these by empowering communities through capacity-building including training on climate-adaptive aquaculture, pond clearing to improve water quality, and ensuring a reliable supply of fingerlings and feed.

FAO is helping ensure growth is underpinned by the Guidelines for Sustainable Aquaculture (GSA) so that fish farming delivers food security, equitable livelihoods, restored ecosystems, and climate resilience.

Local fish farmers are already feeling the benefits. Angela Mesquita, a villager from Aileu, has strengthened her skills. "Now I know how to take better care of my fish – checking the water quality, giving the right amount of feed for their size, preparing the pond properly, and managing all the other things that matter," she said.

Meanwhile, in coastal areas where fisher safety has become a pressing concern, the project has introduced FAO and WorldFish safety-at-sea training materials and improved weather reporting services.

Diversifying livelihoods

Livelihood diversification is a central part of the project's approach to climate adaptation.

One key area of support is seaweed farming, an underdeveloped sector. Limited technical capacity and the growing impacts of climate change have made it difficult to expand production. To address these, the project has trained 300 farmers, introduced improved cultivation techniques and supported the procurement of seedlings for farmers who have lost harvests to disease.

IkanAdapt is also helping communities build 10 mobile rafts designed for use by groups of three to five farmers. These allow cultivators to relocate production to optimize growing conditions, avoid storms and seek better water quality or cooler temperatures, reducing the risk of bacterial infections linked to rising sea temperatures.

"The training has made me realize that to have a good harvest, daily maintenance of the seaweed is very important to prevent it from suffering from diseases," said Rosita Gomes from Atauro Island.

Credit: WorldFish Timor-Leste

Tackling water challenges

Water emerged as a consistent priority across all communities: while shortages threaten crop production, livestock, aquaculture, and household water supplies, heavy rains cause landslides and flash floods.

Although large-scale infrastructure is beyond its scope, IkanAdapt is supporting community-led solutions, such as the rehabilitation of water storage facilities and the revitalization of *tara bandu*, a customary law that regulates resource management, including the protection of water sources.

Residents of Oecusse joined forces to maintain a local water source by moving heavy rocks and sand. "Now we are very happy, especially the women, because we no longer have to walk long distances or use wheelbarrows to fetch water," said Modesta Colo, a community member.

By prioritizing local voices and encouraging collaborative decision-making, the project ensures that adaptation plans are community-specific, culturally relevant and sustainable.

"As Timor-Leste continues to face the far-reaching impacts of climate change, initiatives like IkanAdapt offer a model for resilience-building that balances ecological preservation with livelihood diversification," Schut said.

When it ends in 2027, IkanAdapt is expected to leave behind a practical framework for locally led adaptation, strengthened institutions, and improved infrastructure for long-term adaptive capacity and climate resilience.

Source: https://www.fao.org/fishery/en/news/41515. Published by the Food and Agriculture Organization of the United Nations (FAO), 2025.

Credit: WorldFish Timor-Leste

Rosita Gomes working off the coast of Atauro, an island where much of Timor-Leste's seaweed farming takes place. The project is targeting seaweed farming as a way to diversify livelihoods.

Scan here:

promotional price

US$50

This manual is meant to give the seafood industry in the Asia-Pacific region, particularly in the developing countries of South and South East Asia, some basic guidelines on production, packaging and presentation of fifteen selected value added fishery products of potential economic importance to them. The publication specially caters to the needs of the upcoming entrepreneurs in these countries who lack direct access to technical know-how and expertise on the processing steps related to the products.

www.infofish.org

High-value snack from salmon pulp

A Chilean company called Blumar has developed a new product for human consumption by repurposing salmon pulp (a byproduct previously used for fishmeal) into tempura-style strips. The product was recently recognized at the Seafood Innovation Show in Brazil for combining flavour, practicality, and environmental responsibility.

Blumar says that the product features a light, crispy tempura coating that enhances the natural flavour of the salmon, making it a tasty and versatile option for meals or snacks. The strips are packaged in recyclable, low-density polyethylene (LDPE) monomaterial.

Chitosan from crab shells used to clean water

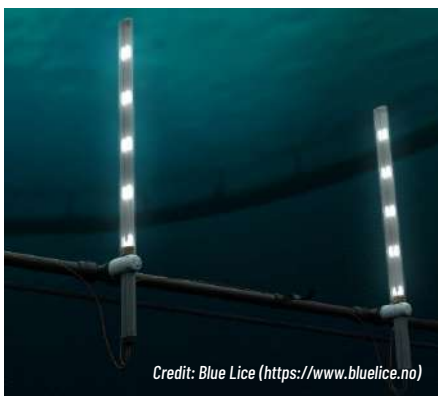
Treatment plants in the United States process about 34 billion gallons of wastewater every day, according to the Environmental Protection Agency. But as pointed out by a US-based company Tidal Vision, conventional treatment products contain metals like aluminum and iron.

Liquid chitosan from crab shells

To solve this, Tidal Vision upcycles discarded crab shells into ready-to-use liquid chitosan. As the company explains, chitosan has a net-positive charge that binds to suspended solids, heavy metals and minerals, hydrocarbons and other pollutants. When used to treat wastewater, only clarified water remains. "Generally, the most consumed products (by volume) in wastewater treatment facilities are the coagulants and flocculants," said Craig Kasberg, CEO and founder of Tidal Vision.

"The traditional coagulants are non-biodegradable, metal-based chemicals ... all non-biodegradable aluminum metals that end up in the wastewater sludge generated at the treatment sites. They are used because they are cationic, or positively charged, so they bind to the anionic or negatively charged contaminants in the water. Chitosan, on the other hand, is the only naturally occurring biopolymer in the world with a positive charge", he added.

Catching sea lice before infestation



The technology consists flight signals and an odorant to attract sea lice

Norwegian company Blue Lice announced that it has developed technology that captures up to 80 000 sea lice parasites a day before they reach fish in a net pen. It works in the following ways:

- Attraction and capture: The system uses specific light signals and an odorant that mimics salmon mucus to lure free-swimming sea lice larvae away from the farmed fish. The larvae are attracted to the light, similar to a "fly trap" effect.
- Suction mechanism: Once the larvae are drawn to the trap, a pump creates a water flow that sucks the planktonic-stage lice into a collection filter, effectively removing them from the water.
- Installation: The traps are discreetly mounted on a farm's existing mooring network, away from the fish pens. This design prevents disruption to daily operations and avoids stressing the fish.
- Data collection: The traps also serve as monitoring devices. The collected data can provide insights into lice populations, ocean currents, and infection sources, allowing for more strategic management of sea lice and other disease

In field trials, farms using the Blue Lice system reported that they could extend their production cycles by an average of 22 extra weeks before needing their first sea lice treatment. Some sites have reportedly reduced their treatment needs by 40–100%.

Traceability tool launched

The Institute of Food Technologists (IFT) Global Food Traceability Center (www.ift.org/gftc) has launched an open-source tool called Traceability Driver to help food companies streamline data sharing and regulatory compliance. This tool converts existing traceability data into standardised formats, improving interoperability across the food supply chain and helping companies meet global data standards without needing to rebuild their systems. The software is deployed locally, allowing organisations to maintain control over their data while also gaining the benefits of seamless data exchange.

As an open-source module, the Traceability Driver can be installed within existing software to share traceability data in a standardized way. "By designing traceability regulations around common global standards, governments can unlock the use of scalable, open-source tools like the Traceability Driver," said Blake Harris, managing director of IFT's Global Food Traceability Center, in a press release. He added that The Traceability Driver's potential extends far beyond the seafood industry, as it is designed to be adaptable and scalable for other commodities that follow EPCIS-based standards, making it a versatile solution for diverse traceability challenges across multiple supply chains.

Seaweed and salmon IMTA

Integrated multi-trophic aquaculture (IMTA) with several species from different trophic levels where one species can utilize waste from another and provide ecosystem services that contribute to positive synergies (IMTA effects) for the species as a whole, is a little-tested form of operation in Norway. Norwegian company Folla Alger AS (https://www.follaalger.no/), in collaboration with Cermaq Norway and an R&D group consisting of Sintef Ocean, NTNU and Nord University, will develop and test the world's first fully integrated plant for the production of salmon and kelp. It aims to explore bioactive compounds from sugar kelp as novel feed additives to boost salmon health and resilience.

The central R&D challenges are related to developing a production process for integrated cultivation of salmon and kelp.

Blueprint for better broodstock

New Australian-led research delivers a validated SNP array for black tiger shrimp and precisely localises the sex-determining locus. Backed by contributions from CSIRO and Genics, a leader in aquatic pathogen detection and genomic analysis, this peer-reviewed work unveils practical genomic tools to fast-track domestication and selective breeding in black tiger shrimp (*Penaeus monodon).* The findings provide a clear path for producers to strengthen broodstock management, accelerate genetic gain, and support reliable production for the species across the Indo-Pacific.

P monodon sex determination

After analysing genomes across farmed and wild stocks, Australian researchers designed a dense, evenly spaced panel of informative DNA markers (SNPs) tailored to *Penaeus monodon.* Performance testing showed strong results and consistency across stocks, demonstrating that the panel is fit for routine use in both commercial farming and research. In practical terms, this gives breeding programs a clear view of how animals are related and how much genetic variety they have. The panel allows breeding programs to track genetic diversity, control inbreeding, and make data-driven selections for growth, survivability, and resilience, which are cornerstones of reliable domestication and production.

Researchers also mapped the genetic marker of sex to a discrete interval on one chromosome, clarifying long-standing uncertainty around inheritance patterns in black tiger shrimp. This result provides a practical handle for breeding programs: the ability to know genetic sex, reduce unintended inbreeding, and inform strategies where sex-linked performance differences may be relevant to production. Combined with the new SNP array, this research gives producers more precise levers to align broodstock planning with commercial goals.

For producers, the immediate applications are clear. Hatcheries can deploy genotyping to inform mating plans that maintain diversity while pushing targeted improvement. Grow-out operations can begin linking performance data to genomic profiles, preparing the ground for selection on traits that matter at farm scale. Importantly for Indo-Pacific supply chains, these capabilities support a gradual transition away from reliance on wild capture broodstock and toward predictable, biosecure production.

This new resource dovetails with Genics' existing applied genomics services for the *P. vannamei* (Pacific white shrimp) industry. ShrimpID is used by breeding programs globally and supports parentage verification, relatedness analysis, and informed mate allocation: capabilities that complement the research advances and help translate them into day-to-day decisions. As datasets accumulate, producers focus down to cost-effective marker subsets for routine screening while retaining accuracy in relatedness estimates and selection indices.

Genics' ShrimpID P. monodon service leverages this high-density SNP marker panel to accurately assess genetic diversity and trace lineage, providing shrimp farmers with vital insights to inform breeding programs and optimise stock performance, further supporting Genics' mission to advance biosecurity and food security globally. Dr Melony Sellars, founder and CEO of Genics said "When you can see the genetics clearly, you can plan clearly. That's how the sector moves from potential to performance, with stronger broodstock management, faster improvement, and more consistent results on farm."

Cutting-edge AI-powered tool for aquaculture

Credit: Sightline Systems

Sightline Systems has launched its 2.0 version of AQUA Sightline, which among other attributes, allows the farmer to access the following features:

- Data intelligence & analysis to better understand factors contributing to production and quality
- Realtime monitoring with historical context across multiple facilities
- Analysis to identify potential changes, increasing yields and overall aquaculture conditions
- New processes allow for fine-tuning of the growth strategy based on actual biomass trends and feeding behaviour.
- Dynamic thresholds and machine learning to identify possible bottlenecks, labour inefficiencies & opportunities for increased production
- Advanced forecasting & reports, "what-if" conditional forecasting, and historical context
- Analysis & intelligence of processes and production

Further information: Sightline Systems, USA (https://www.sightline.com/aquaculture/)

Underwater camera

The A-BIOMASS® is an advanced underwater camera designed to bring more efficiency and precision to biomass measurement and distributions of a range of fish species, according to the manufacturer.

Credit: Ace Aquatec

The system contains two stereoscopic cameras calibrated to take images synchronously. Through machine learning, Artificial Intelligence (AI) identifies fish and critical points, such as tail and fins, to measure fish height, weight, and length accurately. it tracks multiple fish simultaneously, day or night, collecting significant amounts of data in a short period. It also helps the farmer to identify possible threats due to disease and pollution.

Further information: Ace Aquatec, UK (https://aceaquatec.com/)

Processing and packaging solutions

The processing and packaging of seafood often involves several steps: preparation, marination, forming, coating, heat treatment, loading, packaging and chilling & freezing. One company, GEA North America, has developed a range of equipment for each of these stages.

Packaging using the Smart Packer CX400 with Smart Sealing System

For marination, the GEA MultiJector ensures precise brine distribution, enhancing product consistency and yield while reducing waste. The GEA CutMaster delivers high-performance mixing and emulsifying, enabling efficient processing of a wide range of seafood products. When it comes to packaging, GEA offers two standout systems: the GEA PowerPak thermoformer and the GEA SmartPacker CX400 vertical bagger. These machines are designed for hygiene, speed, and flexibility, helping processors maintain freshness, reduce material use, and improve shelf appeal.

Further information: GEA North America (https://www.gea.com/en/food/seafood/)

Environmentally responsible packaging

The KoolPak, manufactured by Australia-based TomKat, is an environmentally responsible, light weight, durable, stackable thermally insulated container. Designed with reuse in mind, the company says it has significant environmental and economic benefits; efficient thermal performance to protect product, keeping it safer and fresher for longer; and the antimicrobial, food-grade liner provides additional protection from contamination. KoolPaks are flat packable for efficient transportation and storage and 100% recyclable.

The KoolPak App uses block chain technology to track each KoolPak through its entire lifecycle, including battery-free temperature monitoring, so clients can prove the provenance of their product, and be confident in the safety and freshness of their consignment. This data also helps business validate their goals on sustainable packaging.

Recently, TomKat Global Solutions entered into an exclusive supply agreement with Sekisui Foam International and Sekisui Foam Australia to supply advanced foam materials for TomKat's KoolPak reusable and recyclable coldchain packaging system. The agreement designates Sekisui as the exclusive materials supplier for KoolPak in Southeast Asia.

Credit: TomKat Global Solutions

The partnership is positioned to support TomKat's expansion into regional markets and to accelerate deployment of KoolPak across agrifood, seafood, supermarket, and pharmaceutical coldchain applications by leveraging Sekisui's manufacturing capabilities and distribution network in the region. TomKat leaders and Sekisui representatives framed the deal as advancing circulareconomy objectives and emissions reductions in the cold chain.

Further information: TomKat KoolPak, Australia (https://koolpakbox.com/)

EDIBLE SEAWEED FOOD GUIDE

Shi, W., Li, K., Wang, X., Jiang, X., He, Y., Yuan, Y., Lovatelli, A. & Yuan, X., eds. 2025. Edible seaweed food guide. FAO Fisheries and Aquaculture Circular, No. 1298. Rome, FAO.

This manual provides a practical guide for preparing seaweed-based foods in China, and it aims to raise global awareness of the nutritional and culinary potential of edible seaweeds. It begins with an overview of the development of the seaweed industry in China and a discussion of the nutritional composition of various edible species. It then provides detailed guidance on the preparation of foods using 16 common seaweed species from the red algae (including *Porphyra, Gelidium amansii, Gracilaria, Chondrus ocellatus, Eucheuma* and *Bangia atropurpurea),* brown algae (including *Laminaria japonica, Undaria pinnatifida, Sargassum fusiforme* and *Durvillaea antarctica),* green algae (including *Ulva prolifera, Caulerpa lentillifera, Monostroma nitidum, Enteromorpha prolifera* and *Chlorella vulgaris)* and other algae (including *Spirulina).*

Both industrial and household processing methods are described, and each recipe includes information on ingredients, nutritional content and preparation steps. This manual also categorizes seaweed-based products into types such as intermediate products, ready-to-eat items, home-cooked dishes and functional foods. By documenting innovative applications and sharing practical knowledge, this manual seeks to promote the broader use of seaweed in diverse dietary contexts and to support efforts toward healthy, sustainable and inclusive food systems.

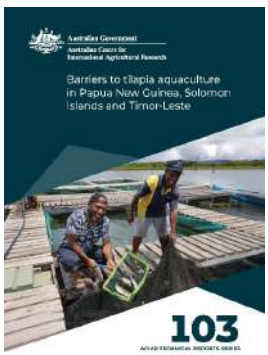
This publication can be accessed at: https://doi.org/10.4060/cd7461en

SOLAR ENERGY AND THE COLD CHAIN

Rincon, L., Ward, A., Vaskalis, I., Milani, M., Gallego, J. & Morese, M.M. 2025. Solar energy and the cold chain – A guide for small-scale fisheries interventions. Environment and Natural Resources Management Working Paper, No. 104. Rome, FAO.

The publication provides a layman's guide to the use of solar energy for cold chain purposes in small-scale fisheries. It provides general guidance for field-level operatives and decision-makers on the choices, benefits and challenges related to solar energy use and uptake in small-scale fisheries. It provides technical specifications to aid procurement of equipment. The publication contributes to the implementation of the FAO Code of Conduct for Responsible Fisheries and the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication.

This publication can be accessed at: https://doi.org/10.4060/cd5864en



BARRIERS TO TILAPIA AQUACULTURE

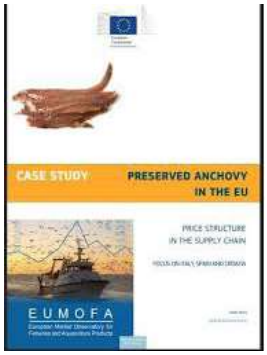
Leo Nankervis, Michael John Phillips, Timothy Pickering, Jesmond Sammut, Joshua Noiney, Jharendu Pant, Daykin Harohau, Chinthaka Hewavitharane, Salote Waqairatu and Geoff Allan. Published by the Australian Centre for International Agricultural Research (ACIAR), Australia, May 2025.

The development of aquaculture in the Indo-Pacific region is seen as an opportunity to enhance food security and provide livelihood options for rural communities. In parts of Asia and South America, tilapia aquaculture has become a critical source of protein for local populations and has been shown to be an avenue of growth for smallholder enterprises. However, there has been limited growth in tilapia aquaculture in Timor-Leste and Pacific Island countries.

While the literature on tilapia aquaculture is extensive, it does not provide accessible solutions to address the specific challenges of tilapia aquaculture in Timor-Leste and Pacific Island countries. To understand and guide future research investment, ACIAR commissioned a review of the major challenges to tilapia aquaculture in Papua New Guinea, Solomon Islands and Timor-Leste.

The results of the review, published in this technical report, provide insight into important areas of focus for future research and capacity development. The report also interprets the information available in the context of contemporary challenges, such as climate change, market-oriented value chains, and social and cultural attitudes towards tilapia and tilapia farming.

This publication can be accessed at: https://www.aciar.gov.au/publication/technical-publications/barriers-tilapia-aquaculture



PRESERVED ANCHOVY IN THE EU

Published by the European Market Observatory for Fisheries and Aquaculture Products (EUMOFA), June 2025.

European anchovy production in 2023 reached 98 237 tonnes, 11% of the world's anchovy catches. The main producer was Türkiye (46 171 tonnes), followed by the EU fleet (16 700 tonnes) and Georgia (12 771 tonnes).

The present report focuses on Italy, Spain and Croatia:

Spain is the top EU producer and importer of anchovy. The report looks at Spanish anchovy preserves: (i) canned anchovy in vinegar (ex-factory price at 14.6 EUR/kg and final price at 30.30 EUR/kg); and (ii) canned anchovy in olive oil (ex-factory price at 21.80 EUR/kg and final price at 44.9 EUR/kg).

Italy is characterised by a high apparent consumption at national level and a pride in its preserve-making tradition. The price structure analysis covers glass jars of salted anchovy fillets in olive oil. Anchovy in oil is sold at an ex-factory price of 12.4 EUR/kg and a final price of 40 EUR/kg.

Croatia is the third biggest EU producer for anchovy, but second exporter which explains its low apparent consumption. The preserve industry produces small volumes of salted anchovies in oil.

TINY TREASURES, BIG IMPACT

WorldFish HQ. (22/5/2025). Tiny Treasures, Big Impact: The Vital Role of Small Indigenous Fish Species in Nutrition and Livelihoods. Bayan Lepas, Malaysia: WorldFish (WF).

By integrating small fish into nutrition-sensitive aquaculture systems, particularly alongside Carp in polyculture models, the dual goals of boosting productivity and improving nutrition can be achieved. This approach has shown promising results, but significant barriers remain. A lack of scalable techniques for the mass production and distribution of SIS seed inhibits broader adoption, despite their tremendous promise. Recently, the WorldFish India team along with its partners successfully developed innovative protocols for mass seed production of key small fish species under the project "Taking Nutrition-Sensitive Carp–SIS Polyculture Technology to Scale", funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) through GIZ.

This photographic anthology *Tiny Treasures, Big Impact: The Vital Role of Small Indigenous Fish Species in Nutrition and Livelihoods* shines a spotlight on these nutritional powerhouses and the transformative role they can play in tackling undernutrition. It delves into the challenges of induced breeding, innovations in seed production, and emerging partnerships that are reshaping the future of small fish aquaculture. It is also a call to action—a plea for collaborative efforts among stakeholders, scientists, policymakers, and communities to promote scalable, sustainable aquaculture practices.

This publication can be accessed at: https://hdl.handle.net/20.500.12348/6498

A PRACTITIONERS' GUIDE TO ASSESSING AND REDUCING POST-HARVEST FOOD LOSS IN SMALL-SCALE AQUATIC FOOD SYSTEMS

Frankfort, A., J. Baines, C. Giordano, O. Peñarubia, A. Ward, and A. Parmar. 2025. "A practitioners' guide to assessing and reducing post-harvest food loss in small-scale aquatic food systems." Guidebook. Washington, DC: World Resources Institute.

Small-scale fisheries and aquaculture (SSFA) support the livelihoods of nearly half a billion people worldwide, either directly through employment or indirectly as part of fishing households. Despite their relatively small scale, SSFA are vital to global food security and livelihoods, producing 37 million tonnes of aquatic food annually, or around 40 percent of the world total, and providing essential nutrients to over 2.3 billion people. With over 90 percent of global aquatic food at risk from environmental change, the industry must adapt to ensure long-term food and economic security, particularly in the small-scale context where reliance on fisheries and aquaculture is highest.

However, there is a lack of effective strategies in SSFA to address critical challenges such as food loss, where valuable aquatic foods are lost along the value chain due to inefficient handling, and poor infrastructure and stakeholder coordination. Loss in SSFA not only reduces income and food availability but also contributes to environmental harm. Addressing this issue requires understanding where and why losses occur, which is difficult due to the informal, dispersed, and diverse nature of SSFA systems. On top of that, SSFA have historically been overlooked in research and policy circles and have lower economic visibility compared with large-scale commercial fisheries. This has led to significant knowledge gaps, limited investment, and exclusion from decision-making processes.

This guidebook responds to the needs identified by practitioners for a practical, adaptable resource that supports those working to reduce loss in SSFA. It offers a structured approach for developing a project that assesses loss, identifies root causes, or facilitates systems change in local contexts. By helping practitioners gather meaningful information and engage stakeholders, the guidebook contributes to more effective, sustainable solutions that strengthen food systems and livelihoods.

This publication can be accessed at: https://doi.org/10.46830/wrigb.24.00133

EUROFISH

EUROFISH GOVERNING COUNCIL TO BE HELD AT THE END OF JANUARY 2026

The Eurofish Governing Council is an annual event to discuss the organisation's activities in the past year as well as those planned for the next (archive photo).

Eurofish will hold the 25th session of the Governing Council on 29 and 30 January 2026. This is the annual event when representatives from the respective ministries in the Eurofish member countries convene to discuss the annual report from the preceding year (2025) and the programme of work for the year to come (2026). The latter document is based on meetings held during the year between the director and the representatives, where they express their priorities. The discussion at the Governing Council then gives them an opportunity to fine-tune their requests or propose new activities. Finally, the programme of work is approved by the council. Representatives will also go through the organisation's financial statement for 2024, the interim financial report for 2025, and the budget for 2026 on the second day of the event.

The meeting will not all be work—presentations will also be made by Eurofish staff and by experts from outside the organisation on topics considered interesting for the representatives and for the region they represent, and in the evening of the first day there will be a formal dinner. In addition to the member country representatives, Eurofish expects several embassies from both member and non-member countries to send staff to attend the proceedings. The event is an occasion for them to learn about Eurofish activities, particularly those carried out for the benefit of the members.

INFOPESCA

INFOPESCA PARTICIPATED IN THE 5TH WORLD TILAPIA TRADE CONFERENCE IN BANGKOK

From 5 to 7 November 2025, the 5th INFOFISH World Tilapia Trade and Technical Conference and Exhibition (TILAPIA 2025) was held in Bangkok, Thailand. The event brought together representatives from governments, international organizations, technical institutions, companies, academia, and experts from around the world to discuss the latest developments and challenges in the sector.

In this context, INFOPESCA participated as a keynote speaker in the Latin America and the Caribbean regional session. The presentation, titled "Latin America and the Caribbean: The Next Global Epicentre for Sustainable Tilapia Fillet Production and Export," addressed the recent evolution of tilapia production and trade in the region, with special emphasis on Brazil and Colombia, the two main producers and exporters.

The presentation highlighted Latin America's growing role as a global reference in the sustainable production of fresh tilapia fillets, driven by favourable environmental conditions, sustained investment, technological innovation, and the increasing adoption of international certification schemes. It also examined export trends to the United States, opportunities for diversification into other markets, and challenges related to logistics costs, feed, and recent tariff measures.

The session also featured panellists from Brazil, Colombia, and Mexico, who shared business experiences and perspectives on the development of the tilapia sector in the region. Through its participation in TILAPIA 2025, INFOPESCA reaffirms its commitment to promoting sustainable aquaculture development and strengthening fish trade in Latin America and the Caribbean.

INFOFISH

INFOFISH GOVERNING COUNCIL CONCLUDES ITS 39TH REGULAR SESSION IN MALAYSIA

The **39th Regular Session of the INFOFISH Governing Council (GC)** was successfully convened in **Malaysia** from **24** to **27 November 2025**, bringing together representatives of INFOFISH Member States to review governance matters, organisational performance and strategic priorities for the year ahead.

The session was attended by Council representatives and delegates from **Bangladesh, Cambodia, Fiji, Kiribati, Malaysia, the Republic of the Maldives, Papua New Guinea, the Philippines** and **Thailand,** with participation taking place both in person and virtually.

Governance and strategic decisions

Over the four-day meeting, the Governing Council deliberated on a comprehensive agenda covering institutional, financial and programme-related issues. Key outcomes included the completion of the recruitment process for the position of Director of INFOFISH, following extensive deliberations held in closed session.

The meeting concluded with the election of the Chairperson for the Fortieth Session of the Governing Council (2026), confirmation of the venue and dates of the next meeting, and the adoption of the 39th Governing Council Session Report and resolutions. Cambodia and Fiji were elected the Chair and Vice-Chair, respectively, for the 40th Governing Council Session, while Cambodia was also confirmed as host of the next Governing Council meeting in 2027.

Appointment of the Director of INFOFISH

A major milestone of the 39th Regular Session was the appointment of **Gemma Meermans Matainaho** as **Director of INFOFISH**. The Governing Council confirmed her selection following the established recruitment process, recognising her longstanding service, institutional knowledge and leadership within the organisation.

She brings over 18 years of experience in the fisheries sector, combining corporate governance, administration and technical expertise in trade, marketing and international business. As the former Acting Director of INFOFISH, she has been closely involved in advancing sustainable aquaculture, responsible fisheries management and international seafood trade. She holds a Master's degree in International Business from Monash University, Australia, and a Bachelor of Economics (Business Studies) from the University of Papua New Guinea.

The appointment was formally communicated by the Vice Chairperson of the Governing Council, represented by Cambodia, who conveyed the Council's confidence that her leadership would further strengthen INFOFISH's mandate in fisheries market intelligence, trade facilitation and technical advisory services. Ms Matainaho formally accepted the appointment, reaffirming her commitment to advancing regional cooperation, strengthening governance, enhancing service delivery to Member States, and fostering a professional and high-performing Secretariat.

Field visits supporting Member Country priorities

In conjunction with the Governing Council session, field visits were organised at the request of Member Countries, underscoring INFOFISH's demand-driven approach to technical exchange and capacity development.

At the request of Papua New Guinea, and facilitated through the interest of a Papua New Guinean national residing in Malaysia who is exploring fisheries investment opportunities in PNG, a technical visit to the Sepang Aquaculture Centre was arranged on 28 November 2025 for officers of the National Fisheries Authority (NFA). The programme included briefings on Malaysia's indoor aquaculture development, guided technical walkthroughs of facilities, as well as discussions on collaboration opportunities and next steps, providing exposure to innovative aquaculture systems relevant to Papua New Guinea's national development priorities.

Similarly, at the request of Cambodia, INFOFISH coordinated a site visit to Hadiran Sinar Sdn Bhd (DAMIA products) in Tanjong Karang, Selangor. The Cambodian delegation observed seafood processing operations and facilities, gaining practical insights into processing standards, value addition and post-harvest workflows.

Moving forward

The 39th Regular Session reaffirmed INFOFISH's role as a key regional platform for cooperation, combining high-level governance oversight with practical, country-driven capacity-building initiatives. Through strengthened leadership, clear strategic direction and continued engagement with Member Countries, INFOFISH remains committed to supporting sustainable fisheries and aquaculture development across the Asia-Pacific region.

INFOFISH wishes all our partners in the FISHINFONetwork – INFOPESCA, INFOPECHE, EUROFISH, INFOSAMAK & INFOYU – all the very best wishes for 2026. We look forward to another amazing year of collaboration in providing and sharing valuable information on fisheries and aquaculture.

GLOBEFISH

FAO GLOBEFISH CONVENES INTERNATIONAL EXPERTS ON WORLD FISHERIES DAY BY HOSTING THE WEBINAR "BEYOND THE CATCH: ADVANCING TOWARDS DIGNITY AND DECENT WORK FOR FISHERS AND FISH WORKERS IN THE SECTOR"

Credit: FAO/Joachim dos Santos

FAO GLOBEFISH organized the virtual event *"Beyond the Catch: Advancing towards Dignity and Decent Work for Fishers and Fish Workers in the Sector"* on World Fisheries Day on 21 November, offering a timely opportunity to recall the important role of fishers and fish workers all over the world. The event brought together representatives from international organizations, industry, workers' representatives, and civil society to discuss concrete ways to improve labour conditions in the fisheries and aquaculture sector.

More than 100 participants from across the world joined the event, demonstrating a growing international commitment to safeguarding human and labour rights of fishers and fish workers. Speakers underscored the urgent need to ensure fair, safe and dignified working conditions, noting that promoting decent work is both a fundamental responsibility and a key pillar for the long-term sustainability and resilience of the sector.

ILO Keynote: Strengthening global labour standards in fisheries

The International Labour Organization (ILO), represented by Christine Bader, Maritime Specialist in the Sectoral Policies Department, presented ongoing efforts to strengthen global labour standards, including the Work in Fishing Convention, 2007 (C188). This is the only international legally binding instrument that establishes minimum requirements for work on board fishing vessels, covering issues such as occupational safety and health, written work agreements, medical care, rest hours, and social security.

ILO also shared recent initiatives such as capacity-development programmes to detect and respond to forced labour in commercial fishing operation; and tools to support countries in implementing C188, including the new *"Guidelines to promote fair labour market services for migrant fishers"* which was designed to be practical and user-friendly. The Guidelines aim to support governments and social partners in fostering fair, effective and sustainable labour market services for migrant fishers.

Roundtable insights: Collaboration for fair, inclusive and transparent value chains

The Roundtable featured insightful perspectives from **Kirill Buketov,** International Policy Officer in the Seafood Workers Division at IUF (International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations); **Claudia Uribe**, Delegate at CEIPA (Ecuadorian Chamber of Tuna Industrialists and Processors); **Tim Hill,** CEO/National Director at Stella Maris UK; and **Audun Lem,** President of the Technical Scientific Committee at Assoittica Italia.

Panellists emphasized that meaningful progress requires strong cooperation and partnerships between governments, industry actors, workers' organizations and civil society. They highlighted that effective social dialogue mechanisms are essential for identifying challenges at national and local levels, strengthening the application of international instruments, and building more transparent, fair and inclusive fisheries and aquaculture value chains. Panellists also shared concrete efforts to enhance the working conditions, safety, and wellbeing of fishers and fish workers. The importance of addressing the specific needs of women, young people, migrant workers, and other vulnerable groups to ensure equal opportunities and social inclusion was also stressed.

The video recording of the event is available on the FAO GLOBEFISH YouTube channel, in English.

2026

JANUARY

26-28
Saudi International Marine Exhibition
Riyadh, Saudi Arabia
https://www.simec-expo.com/en

FEBRUARY

9-11
World Seafood Congress (WSC)
Chennai, India
https://www.wsc2026.com/

22-24
Fish International 2026
Bremen, Germany
https://fishinternational.de/en/

MARCH

18-20
VIETSHRIMP Asia & Aquaculture
Vietnam
Ho Chi Minh, Vietnam
https://www.aquafisheriesexpo.com/en/

15-17
Seafood Expo North America
Boston, USA
https://www.seafoodexpo.com/north-america/

APRIL

21-23
Seafood Expo Global
Barcelona, Spain
https://www.seafoodexpo.com/global/

MAY

6-8
Aquaculture Taiwan
Tainan, Taiwan
https://www.aquaculturetaiwan.com/

19-21
Seagriculture World 2026
Bangkok, Thailand
https://www.eaba-association.org/en/events/seagriculture-world-2026

JUNE

2-5
World Aquaculture Singapore (WAS)
Singapore
https://www.was.org/Meeting/Code/WA2026

EDITORIAL PLAN 2026

INFOFISH

ISSUE	FISHERIES & AQUACULTURE	PROCESSING & MARKETING	EQUIPMENT & TECHNOLOGY	SUSTAINABLE DEVELOPMENT GOALS
1/2026 (Jan/Feb) **Deadline: 15 November 2025**	• Fisheries must become more selective and sustainable	• The next global epicentre for sustainable tilapia fillet production and export • Edible seaweed food guide: focus on China	• Innovative seaweed product developments in India	• Empowering women through innovative dry fish processing in Cambodia
2/2026 (Mar/Apr) **Deadline: 15 January 2026**	• Aquaculture in desert and arid regions • Soft shell crab farming in Bangladesh: Prospects and challenges	• Women's role in dry fish processing and marketing in Bangladesh, India and Myanmar	• Transforming tilapia stocks through breeding technologies	• Collaborating for impact in aquaculture: Partnerships in innovation and investment • Regulations on the High Seas and EEZ in South Asia
3/2026 (May/June) **Deadline: 15 March 2026**	• Strengthening farmed fish welfare initiatives in Asia • Mariculture development in the Maldives	• Utilisation and processing of tilapia by-products and co-products	• Alternative feeds for sustainable aquaculture	• Nutrition-sensitive national policies and inclusion of aquatic foods: Lessons from the Philippines to the world • Institutional and economic perspectives on distant-water fisheries access arrangements
4/2026 (July/Aug) **Deadline: 15 May 2026**	• Regenerative aquaculture: Restoration and sustainable use of marine ecosystems	• Fish utilisation: working towards a "mouth to tail" approach • Processing tuna in the Pacific for domestic and international markets	• Satellite technology for sustainable and safe oceans	• Women in fisheries and aquaculture: Empowered women, resilient communities • Financing the future of aquaculture in emerging markets
5/2026 (Sep/Oct) **Deadline: 15 July 2026**	• Land-based salmon farming in Saudi Arabia • Zero waste and super intensive shrimp farming in a RAS facility	• The rising demand for value-added tuna products in Asian markets • Socio-economic importance of aquatic food value chains in Asia	• Technologies for sustainable seafood traceability	• International management of tuna fisheries – progress and challenges
6/2026 (Nov/Dec) **Deadline: 15 September 2026**	• A future for inland fisheries • FlipFarm oyster farming in New Zealand	• Evolving tariff policies and their impact on global production and trade • PNG's evidence-based insights for sandfish market growth in the Pacific • Seafood products targeting the domestic market in Thailand	• Valorisation of byproducts using 4.0 technologies • The F3 Challenge: Accelerating industry solutions	• Women in fisheries and aquaculture: Designing gender-transformative programmes for the small-scale sector

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19th INFOFISH WORLD TUNA TRADE CONFERENCE & EXHIBITION

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