BIOLANglobal DIGITAL PLATFORM

Analytical expertise in intelligent data management

- Business intelligent
- Data download
- Traceability and integration with information systems
- Stock management
- Configurable alerts
- Connectivity and decentralisation
FORENSIC FEED SCIENCE – EXPOSING THE PROBLEMS

By Steven Goh and Victoria Dentstaporn

According to the authors, most of the feed used in Asian shrimp aquaculture are poorly processed. Forensic feed science, which was recently developed to assess the quality of processed feeds, clearly illustrates this fact. Feed quality is often overlooked as a major contributing factor to important concerns of the industry such as disease outbreaks, low survival rates and poor productivity. Instead, the blame is frequently directed at farmers for inadequate farm management. While the addition of some nutritional feed additives is beneficial, proper processing of starch and protein in compound feed formulations is of equal importance. Feed processing plays a pivotal role in the processed feed quality.

REGENERATION OF KELP FORESTS USING SEA URCHIN SHELLS IN SHAKOTAN, JAPAN

By Tomohiro Asakawa

Shakotan, a small fishing town in western Hokkaido, was faced with a problem which sea urchin harvesters all over the world will be familiar with: roes becoming smaller and more inferior in quality as the urchins over-forage on depleting kelp forests. At the same time, the industry in Shakotan had to find a way to dispose of urchin shells left behind after roe harvesting. The town developed an environmentally sustainable and unique solution to these problems. Urchin shells were used to make an underwater fertilizer which successfully regenerated kelp growth; sea urchins returned to feed on the kelp, and the roe production increased by 48% with improved quality.

PLASTIC NEUTRAL FISHERIES: FEASIBILITY AND OPPORTUNITIES THROUGHOUT THE WORLD

By Emilia Dyer, Philippine Wouters and Zacari Edwards

Plastics in the ocean, of which fisheries gear makes up a significant percentage, kill thousands of marine animals every year. In two interesting projects involving the International Pole and Line Foundation (IPNLF), and based in the Maldives and the Azores, the results show that a plastic neutral tuna fishing industry is entirely attainable, although so far for only a section of the industry: the one-by-one fishing sector. Nevertheless, the IPNLF has issued a reminder that the health of the ocean is a shared responsibility and that we should start to turn things around to clear our oceans of plastic wastes.

THE INDONESIAN SHRIMP INDUSTRY – TRENDS AND CHALLENGES

Sudari Pawiro

Indonesia is one of the leading shrimp producers and exporters in the world, with exports of 250,700 tonnes valued at USD 2.23 billion in 2021. However, its global competitiveness is eroding due to several major challenges and there are fears that the government’s export value target of USD 4.3 billion by 2024 may be unrealistic. The Ministry of Marine Affairs and Fisheries (MMAF); the United Nations Industrial Development Organization Global Quality and Standards Programme (GQSP) Indonesia; and the Seafood Processors and Exporters Association (AP5I) are among the stakeholders who are working to address the existing challenges holding back the sector.

DR TOM PICKERELL

Executive Director at the Global Tuna Alliance & Founder of Tomolamola Consulting Ltd.

6th INFOFISH World Shrimp Trade Conference and Exposition (SHRIMP 2022)

FIN News

EU 27 Organic aquaculture trends in 2020

Cover image: Whiteleg shrimp for sale at a supermarket in Kuala Lumpur, Malaysia
Credit: Firoza Buranudeen
New Digital Paradigm for Shrimp Farming in Rich Oxygenated Waters

Powered by
RYNAN Technologies
Aquaculture Solutions

RYNAN Artificial Intelligence
RYNAN Smart Water Sensors
RYNAN Smart Oxygen Generators
RYNAN Cloud Computing Platform

Advantages

- Higher Shrimp Density: >500 head/m²
- No use of antibiotics
- Lower Energy Usage
- Lower Water Consumption

www.rynantech.com
info@rynantech.com
As this edition of the INFOFISH International was being prepared for publication, we had just held the INFOFISH 6th World Shrimp Trade Conference & Exhibition on 8–10 June. This was a hybrid event, attracting 249 participants and a line-up of international experts and captains of industry who shared their valuable insights into the global shrimp industry. INFOFISH records its appreciation to the Ministry of Agriculture and Food Industries, Malaysia, which hosted the Conference and Exhibition, as well as the Fisheries Development Authority of Malaysia (LKIM) for its collaboration and input. A summary of the proceedings of SHRIMP 2022 can be found on pages 39-42.

Two of the articles contained in this July/August 2022 edition of the magazine are based on presentations given at that Conference. The first article states how Indonesia has become one of the leading shrimp producers and exporters in the world, but there are concerns that its global competitiveness is eroding due to several major challenges. Among the stakeholders working to address the challenges together with the Ministry of Affairs and Fisheries (MMAF) are the United Nations Industrial Development Organization Global Quality and Standards Programme (GQSP) Indonesia; and the Seafood Processors and Exporters Association (APSI).

The second article arising from SHRIMP 2022 asserts that feed quality is often overlooked as a major contributing factor to low survival rates and poor productivity. Furthermore, through using forensic feed science technology, it was discovered that most of the feed used in Asian shrimp aquaculture is poorly processed. The authors say that while the addition of nutritional feed additives is beneficial, proper processing of starch and protein in compound feed formulations is of equal importance.

Utilization of “wastes” and ecosystem regeneration are prominent themes in an environmentally sustainable and unique solution to under-developed sea urchin roe, discarded urchin shells and disappearing kelp forests. Shakotan, a small fishing town in Hokkaido, Japan, shows what is possible when the authorities and industry stakeholders get together to solve the problems associated with the sector. Uchinch shells were used to make an underwater fertilizer which successfully regenerated kelp growth; sea urchins returned to feed on the kelp, and the roe production increased by 48% with improved quality.

Moving on to an issue of global importance, the International Pole and Line Foundation (IPNLF) highlights the fact that plastics in the ocean, of which fisheries gear makes up a significant percentage, kill thousands of marine animals every year. Recounting results from two interesting projects in the Maldives and the Azores, the IPNLF says that a plastic neutral tuna fishing industry is entirely attainable. Although these observations are based so far only on the one-by-one fishing sector, the IPNLF reminds all stakeholders that the health of the ocean is a shared responsibility and that we should start to turn things around to clear our oceans of plastic wastes.

Continuing our well-received series of interviews of prominent persons in the industry, in this issue we are privileged to feature Dr Tom Pickerell, Executive Director of the Global Tuna Alliance (GTA). Dr Pickerell has an extensive background in sustainability and resource management, some of his previous positions having been Fisheries Policy Officer at World Wildlife Fund UK; Technical Director at Seafish; and Global Tuna Director for the Sustainable Fisheries Partnership (SFP). Among other points of discussion, he explains the GTAs “pre-competitive collaboration” approach and shares timely observations on global tuna fisheries management.

In addition to the articles and interview mentioned above, we invite you to read through the rest of the magazine, the contents of which are intended to provide a holistic view of the global fisheries industry – such as industry notes, marketing information, as well as notes on innovations and equipment.

And last but not least, we draw your attention to our upcoming well-known flagship event, the 17th INFOFISH World Tuna Trade Conference & Exhibition which will be held on 11-13 October, 2022. As this will be an in-person event, we look forward to seeing you in Bangkok this October. Details on TUNA 2022 and all the reasons why you should save the date, are contained in this edition of the magazine.

Happy reading!

Shirlene Maria Anthonysamy
Director, INFOFISH

INFOFISH International - your key to world markets: high technology applications by prime specifiers and purchasers in global fisheries - from catching and farming through processing and preservation to packaging, storage, transport and marketing. Advertising rates are available on request from the Advertisement Manager, INFOFISH International, P O Box 20889, 50728 Kuala Lumpur, Malaysia. E-mail: info@infofish.org. Web: http://www.infofish.org.
Resúmenes de los principales artículos

LA INDUSTRIA DEL CAMARÓN EN INDONESIA: TENDENCIAS Y DESAFÍOS ..........................................................................8
Sudari Pawiro

Indonesia es uno de los principales productores y exportadores de camarón del mundo, con exportaciones de 250 700 toneladas por valor de USD 2,23 millones en 2021. Sin embargo, su competitividad a nivel mundial se está erosionando debido a varios desafíos importantes, y hay temor de que la meta de exportación trazada por el gobierno (USD 4 300 millones para 2024) sea poco realista. El Ministerio de Asuntos Marinos y Pesca (MMAF), el Programa Global de Calidad y Normas (GQSP) de Indonesia de la Organización de las Naciones Unidas para el Desarrollo Industrial, y la Asociación de Exportadores y Procesadores de Productos Pesqueros (AP5I) se encuentran entre las partes interesadas que están trabajando para abordar los desafíos que frenan al sector.

REGENERACIÓN DE BOSQUES DE ALGAS UTILIZANDO CAPARAZONES DE ERIZOS DE MAR EN SHAKOTAN, JAPÓN ........................................................................................................................................44
Tomohiro Asakawa

Shakotan, un pequeño pueblo pesquero en el oeste de Hokkaido, se enfrentó a un problema con el que los recolectores de erizos de mar de todo el mundo están familiarizados: las huevas se volvían más pequeñas y de menor calidad con el sobrepastoreo de los erizos en los bosques de algas marinas (kelp). Al mismo tiempo, la industria de Shakotan tuvo que encontrar una manera de deshacerse de los caparazones de erizo que quedaban después de la cosecha de huevas. La ciudad desarrolló una solución ambientalmente sostenible y única para estos problemas: los caparazones de erizo se usaron para hacer un fertilizante bajo el agua que regeneró con éxito las algas marinas; los erizos de mar volvieron a alimentarse de las algas y la producción de huevas aumentó un 48 % y con una calidad mejorada.

CIENCIA FORENSE ALIMENTARIA: EXPONIENDO SUS PROBLEMAS ................................................................................48
Steven Goh y Victoria Dentstaporn

Según los autores, la mayoría de la ración utilizada en la acuicultura de camarón asiático está mal procesada. La ciencia forense alimentaria, desarrollada recientemente para evaluar la calidad de la ración procesada, ilustra claramente este hecho. La calidad del alimento a menudo se pasa por alto como factor importante que contribuye a las preocupaciones importantes de la industria, como los brotes de enfermedades, las bajas tasas de supervivencia y la baja productividad. En cambio, la culpa se dirige con frecuencia a los acuicultores por una gestión acuícola inadecuada. Si bien el uso de algunos aditivos nutricionales para ración es beneficioso, el procesamiento adecuado de almidón y proteína en el alimento formulado es de igual importancia. El procesamiento de alimentos juega un papel fundamental en la calidad del alimento procesado.

PESQUERÍA NEUTRA EN PLÁSTICO: VIABILIDAD Y OPORTUNIDADES EN TODO EL MUNDO ..............................................51
Emilia Dyer, Philippine Wouters y Zacari Edwards

Los plásticos en el océano, de los cuales las artes de pesca representan un porcentaje significativo, matan a miles de animales marinos cada año. En dos interesantes proyectos desarrollados por la International Pole and Line Foundation (IPNLF), y con sede en las Maldivas y las Azores, los resultados muestran que una industria pesquera atunera neutra en plásticos es completamente alcanzable, aunque hasta ahora solo para una parte de la industria: el sector de la pesca uno por uno. Sin embargo, la IPNLF recuerda a los diferentes actores que la salud del océano es una responsabilidad compartida y que debemos comenzar a cambiar las cosas para limpiar nuestros océanos de desechos plásticos.

Para obtener mayor información sobre este material, puede ponerse en contacto con la sede de INFOPESCA:
Dirección/Street address: Julio Herrera y Obes 1296, C.P. 11200, Montevideo, Uruguay
Dirección postal/Mail address: Casilla de Correo 7086
Web: http://www.infopesca.org
Tel: (598)-2-902 8701 | E-mail: infopesca@infopesca.org

Rodrigo Misa
Résumés des articles de fond

L’INDUSTRIE DE LA CREVETTE EN INDONÉSIE - TENDANCES ET DÉFIS
Par Sudari Pawiro

L'Indonésie est l'un des principaux producteurs et exportateurs de crevettes au monde, avec des exportations atteignant 250 700 tonnes évaluées à 2,23 millions de $EU en 2021. Cependant, sa compétitivité au niveau mondial s'érode en raison de plusieurs défis majeurs et l'on craint que l'objectif gouvernemental de 4,3 milliards de $EU de valeur d'exportation d'ici 2024 ne soit réalisable. Le Ministère des Affaires Maritimes et de la Pêche (MMAF), le Programme Mondial de Qualité et de la Normalisation (GQSP) de l'Organisation des Nations Unies pour le Développement Industriel (ONUDI) en Indonésie et l'Association des Transformateurs et Exportateurs de produits de la Mer (AP5I) font partie des parties prenantes qui s’efforcent de relever les défis actuels qui freinent le secteur.

RÉGÉNÉRATION DES FORÊTS DE VARECH À L'AIDE DE COQUILLES D'OURSINS À SHAKOTAN, AU JAPON
Par Tomohiro Asakawa

Shakotan, petite ville de pêcheurs située à l’ouest d’Hokkaido, a été confrontée à un problème que les pêcheurs d’oursins du monde entier connaissent bien : les œufs deviennent de plus en plus petits et de qualités inférieures à mesure que les oursins surexploient les forêts de varech qui se dégradent. Dans le même temps, l’industrie de Shakotan devait trouver un moyen d’éliminer les coquilles d’oursins laissées après la récolte des œufs. La ville a mis au point une solution unique et écologiquement durable pour résoudre ces problèmes. Les coquilles d’oursins ont été utilisées pour fabriquer un engrais sous-marin qui a permis de régénérer le développement du varech ; les oursins sont revenus s’en nourrir et la production d’œufs a augmenté de 48 % avec une meilleure qualité.

LA SCIENCE MÉDICO-LÉGALE DE L’ALIMENTATION ANIMALE - EXPOSER LES PROBLÈMES
Par Steven Goh et Victoria Dentstaporn

Selon les auteurs, la plupart des aliments utilisés dans l’aquaculture de crevette en Asie sont mal transformés. La science médico-légale des aliments, qui a été récemment développée pour évaluer la qualité des aliments transformés, illustre clairement ce fait. La qualité des aliments est souvent négligée en tant que facteur contribuant aux préoccupations importantes du secteur, telles que les épidémies, les faibles taux de survie et la faible productivité. Au lieu de prendre en compte ce problème, les crevetticulteurs sont souvent accablés de blâmes pour une gestion inadéquate de leurs exploitations. Si l’ajout de certains additifs alimentaires nutritionnels est bénéfique, le traitement adéquat de l’amidon et des protéines dans les formulations d’aliments composés sont également un facteur important. Le processus de production des aliments pour animaux joue un rôle primordial dans la qualité des aliments fabriqués.

LES PÊCHERIES SANS PLASTIQUE : FAISABILITÉ ET OPPORTUNITÉS DANS LE MONDE
Par Emilia Dyer, Philippine Wouters et Zacari Edwards

Chaque année, les plastiques présents dans l’océan, dont les engins de pêche constituent un pourcentage important, tuent des milliers d’animaux marins. Dans deux projets intéressants mis en œuvre par la Fondation (International Pole and Line Foundation (IPNLF)) basés aux Maldives et aux Açores, les résultats montrent qu’une industrie thonière sans plastique est tout à fait réalisable, bien que jusqu’à présent c’est uniquement une section de l’industrie qui obéisse à cette mesure : le secteur de la pêche à la canne. Néanmoins, l’IPNLF a rappelé que la santé de l’océan est une responsabilité partagée et que nous devons commencer à inverser la tendance pour débarrasser nos océans des déchets plastiques.
文章摘要

印尼虾业的趋势和挑战
Sudari Pawiro

印度尼西亚是世界领先的虾类生产国和出口国之一，2021年的出口量为250,700吨，出口额为223万美元。然而，由于几项重大挑战，其全球竞争力正在受到削弱，人们担心政府到2024年43亿美元的出口价值目标可能不现实。印度尼西亚海洋事务和渔业部（MMAF）、联合国工业发展组织全球质量和标准体系（GQSP）、海鲜加工和出口协会（AP5I）是致力于解决制约虾业发展现存挑战的利益相关者。

在日本积丹利用海胆壳再生海藻林
Tomohiro Asakawa

积丹是北海道西部的一个渔业小镇，它面临着世界各地的海胆捕获者都熟悉的问题：随着海胆在枯竭的海藻林中过度觅食，鱼卵变得更小、质量更差。与此同时，积丹的业界不得不想办法处理收获鱼子后留下的海胆壳。该镇针对这些问题开发了一种环境可持续且独特的解决方案。海胆壳被用来制作水下肥料，成功让海藻再生；海胆恢复以海带为食，鱼子产量增加了48%，且鱼子质量提高了。

法医饲料科学——揭示问题
Steven Goh and Victoria Dentstaporn

据作者称，亚洲虾类水产养殖中使用的大部分饲料加工不良。最近开发的用于评估加工饲料质量的法医饲料科学清楚地说明了这一事实。饲料质量常常被忽视，因为它是导致疾病爆发、成活率低和生产力低下等行业重要问题的主要因素。相反，这些责任往往归咎于渔民对渔场管理不善。虽然添加一些营养饲料添加剂是有益的，但在配合饲料配方中正确加工淀粉和蛋白质同样重要，饲料加工对加工饲料的质量起着举足轻重的作用。

塑料中性渔业：全世界的可行性和机遇
Emilia Dyer, Philippine Wouters and Zacari Edwards

海洋中的塑料（渔具占很大比例）每年杀死数千只海洋动物。国际杆线基金会（IPNLF）在马尔代夫和亚速尔群岛上开发了两个有趣的项目，结果表明金枪鱼捕捞业实现塑料中和是完全可以做到的，尽管到目前为止只占金枪鱼捕捞业的一小部分：只存在于“一根鱼竿一次钓一条鱼”的渔业。尽管如此，IPNLF 已经发出提醒，海洋的健康是一项共同的责任，我们应该开始做出改变，清除海洋中的塑料废物。

欲想获得以上文章相关内容，请与INFOYU联系

地    址：北京市朝阳区麦子店街18号全国水产技术推广总站 中国水产学会
邮政编码：100125
电    话：（86）010-59195070
传    真：（86）010-59195070
电子信箱：infoyu@agri.gov.cn
خلاصة لأهم المقالات

صناعة الروبيان الإندونيسية- التوجهات والتحديات
Suwardi Pawiro

بعد الإندونيسيا واحدة من أكبر منتجي ومصدري الروبيان في العالم، حيث بلغت صادراتها 2.25 مليار دولار أمريكي خلال سنة 2021، ومع ذلك، فإن إدارات التنظيم الدولية أخذت في التحذير بسبب العديد من التحديات الرئيسية والمخاطر من أن يكون هدف قيمة الصادرات الحكومية البالغ 4.3 مليار دولار أمريكي بحلول سنة 2024 أمراً غير واضح. وقد تم توفير عدة من صناعة الروبيان DB (MMAF) ببرامج الجودة والمعايير المهنية التابعة لمنظمة التجارة العالمية للمنظمة الأعضاء (GQSP) وجمعية مصنعي ومصري المنتجات البحرية (GQSP). من بين الفاعلين الذين يعملون على مواجهة التحديات الحالية التي تبعق القطاع.

44

تصدر غابات عشب البحر باستخدام أصداف البحر في شاكوتان، اليابان
Tomohiro Asakawa

بفضل شاكوتان، وهي بلدة صغيرة في غرب هوكايدو، مشكلة يعرفها صيادو قنفذ البحر حول العالم: مشكلة كبيرة تتراوح بين نفع وأد其次ة حيث كانت القنافذ تتغذى على غابات عشب البحر المستنفدة. وفي ذات الوقت، كان على الصناعة في شاكوتان إيجاد طريقة للتخلص من وجود القنفدين الذين خلفتهم بعد حصاد البطارخ. وقد تم تطوير حل بيئي مستدام وفريد لهذه المشكلة. وقد تم استخدام أصداف البحر لصنع سماد تحت الماء نجح في تجميع زوجي البترول، وساعدت كنافذ البحر المتغذى على عشب البحر، وارتبط النتائج المثمرة بنسبة 48% مع تحسن الجودة.

الخبرة العالمية لل تعد- عرض للمشاكل
Steven Goh وVictoria Dentstaporn

واجهت شاكوتان، وهي بلدة صغيرة في غرب هوكايدو، مشكلة يعرفها صيادو قنفذ البحر حول العالم: مشكلة كبيرة تتراوح بين نفع وأد其次ة حيث كانت القنافذ تتغذى على غابات عشب البحر المستنفدة. وفي ذات الوقت، كان على الصناعة في شاكوتان إيجاد طريقة للتخلص من وجود القنفدين الذين خلفتهم بعد حصاد البطارخ. وقد تم تطوير حل بيئي مستدام وفريد لهذه المشكلة. وقد تم استخدام أصداف البحر لصنع سماد تحت الماء نجح في تجميع زوجي البترول، وساعدت كنافذ البحر المتغذى على عشب البحر، وارتبط النتائج المثمرة بنسبة 48% مع تحسن الجودة.

51

مصادر الأسماك المحايدة للملابس: الجدوى والفرص في جميع أنحاء العالم
Emilia Dyerg وPhilippine Wouters وZacari Edwards

بالنسبة للمؤلفين، تم ملاءمة معظم الأفكار المستخدمة في استزرار الروبيان الأساسي بشكل سبي. وتوفر الخبرة العلمية لل تعد، والذي تم تطويره مؤخراً لتحديد جودة الأغذية المصنعة، هذه الحلقة مفيدة. وغالباً ما يتم التغطية عن دعم الغذاء كعامل رئيسي يساهم في مخاوف الصناعة الكبيرة مثل تقلص الأطراف، والأمراض، والمخاطر المقابلة للعنصر للهياكل والمخاطر.
Similar to the global trend, *vannamei* farming is the backbone of Indonesia’s shrimp industry as production from wild-caught shrimp has been on the decline (or at least, stagnant) while farming has been growing rapidly in the last two decades following the crash of black tiger shrimp farming in the early 90s. Official figures from the Ministry of Marine Affairs and Fisheries (MMAF) recorded that farmed shrimp production in 2020 totalled 881,600 tonnes while wild-caught shrimp was only around 218,000 tonnes. The main shrimp farming areas are Java, Sumatra, South Sulawesi, Kalimantan and West Nusa Tenggara. Around 80 percent of the total production is *vannamei* (whiteleg shrimp) while the rest is black tiger shrimp. While *vannamei* is mainly cultured in intensive and semi-intensive farms, black tiger or *monodon* shrimp is farmed in traditional ponds usually in polyculture with milkfish and/or seaweed (*Gracilaria* seaweed). The total area of shrimp farms is slightly over 300,000 ha of which about 82 percent practice traditional culture, 15 percent is semi-intensive and the rest comprise intensive farms. However, the majority of the production (83 percent) is harvested from semi-intensive (51 percent) and intensive shrimp farms (32 percent) while the contribution...
from traditional farms was only 17 percent. These figures indicate that the productivity of traditional shrimp farms is very low, reported to be ranging from only 100-300 kg/ha/ harvest.

It is important to note, however, that the accuracy of the official production figure for farmed shrimp has been questioned by shrimp associations. Based on the industry’s estimate, farmed shrimp production is only around half of the official figure or about 400-500 000 tonnes. The estimate is based on the amount of feed used as well as shrimp utilized as raw materials by the processing plants.

At downstream level, the total number of large and medium seafood processing plants based on MMAF’s figure was 773 units in 2020, while there are over 62 000 small and micro (home industry) seafood processors in Indonesia. According to the Seafood Processors and Exporters Association (APSI), there are over 100 medium and large shrimp processing plants with the total installed capacity being around 500 500 tonnes of raw materials. Currently, however, they work under their capacities due to shortage of raw materials, processing around 385 000 tons of shrimp. On average, processors work at only around 60-75 percent of their installed capacity.

Indonesian shrimp exports grew annually (CAGR) by 8.6 percent in quantity and 7.3 percent in value terms in the past five years, reaching 250 715 tonnes valued at USD 2.3 billion in 2021. The US is the main market, accounting for 72 percent of the total exports both in quantity and value; while the second export destination is Japan which absorbed around 14 percent (Q) and 16 percent (V) of the total exports in 2021. Hence some 86 percent of the shrimp exports from Indonesia went to these two markets. Other export destinations are China, as well as European and Asian markets. Unlike its neighbours such as Vietnam, Thailand, Malaysia and Singapore, Indonesia imports small amounts of shrimp of non-vannamei species as raw materials for re-processing.

**Raw material supplies are a major stumbling block**

Shrimp processors and exporters in Indonesia often complain that the domestic raw material prices are more expensive than the prices of raw materials in Ecuador, India, and Vietnam. As a result, the unit price of exported shrimp products from Indonesia is said to be higher by USD 1-1.5/kg compared with its competitors. On the other hand, farmers also complain that their profit margins are declining due to the increasing production costs which are not being compensated equally by the selling prices.

The Indonesian shrimp farming business, in particular vannamei shrimp farming, is import-dependent, where production inputs are mainly imported. These include feed raw materials, drugs, broodstocks and sometimes paddlewheel aerators and other machinery used in the farms. In some cases, the shrimp expert may also be a foreigner. Jokingly or cynically, some people say that the country only has land, water and workers. Therefore, any economic or financial disruption in the country and in the world such as fluctuation in the prices of fish meal, fish oil, and soybean oil as well as the Rupiah exchange rate against major currencies, will significantly affect shrimp farmers. In the last few months, feed prices have increased by 5-10 percent to IDR 14 500-15 100/kg for feed with a protein content of 36-38 percent. In June 2022, the ex-farm price weakened by 10-20 percent compared with prices in February this year due to weakening demand in major markets.

**Average ex-farm price trends for vannamei in IDR/kg (February and June, 2022)**

<table>
<thead>
<tr>
<th>Sizes (pieces/kg)</th>
<th>Feb 2022</th>
<th>June 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>83 000</td>
<td>65 000</td>
</tr>
<tr>
<td>50</td>
<td>69 000</td>
<td>58 000</td>
</tr>
<tr>
<td>60</td>
<td>64 000</td>
<td>54 000</td>
</tr>
<tr>
<td>70</td>
<td>61 000</td>
<td>51 000</td>
</tr>
</tbody>
</table>

*Source: Personal communication with the industry*

Generally, shrimp processors have no direct access to farmers in sourcing raw materials; instead many of them depend on middlemen who have strong financial and social connections with the farmers. These middlemen have the ability to organize and pool raw materials from different sources and procure the required shrimp sizes to cater to the needs of the processing plants. In some cases, the middlemen have a better bargaining position against the processors who are in desperate need of raw materials to fulfill their commitment with buyers. As indicated above, most processors work under their installed capacities due to shortage of raw materials. With no direct access to farmers, processors to some extent, also have no control over the quality of the raw materials. If they are fussy about quality, there is a chance they may not get any raw materials from the middlemen.

Of course, there are some exceptional cases such as in the case of integrated shrimp companies or processing companies/exporters who patiently work with farmers by providing them with technical assistance, guarantees and
good prices and some other benefits. They usually work with local and international NGOs who provide technical assistance for improvement programmes and links with their buyers overseas. World Wide Fund for Nature (WWF), The Nature Conservancy (TNC), Wetlands, Ti, Sustainable Fisheries Partnership (SFP), and Asian Seafood Improvement Collaborative (ASIC) are among the international NGOs actively working on improvement in shrimp farming in Indonesia.

Logistics problems, which are a global phenomenon since the advent of COVID-19, have also badly affected the Indonesian shrimp export sector. Limited availability of containers to major markets coupled with increasing freight costs have become a huge headache for them. In addition, domestic logistics particularly inter-island transportation in Indonesia, are also not so efficient; hence higher costs are generated which add to the problems for shrimp processors and exporters. As most of the shrimp processors are concentrated in Java Island and other big cities in Indonesia which are usually far away from major shrimp farms, logistics-related costs significantly contribute to overall production costs.

Another major challenge is disease, similar to the situation in other shrimp-producing countries. Lately, acute hepatopancreatic necrosis disease (AHPND) has spread to major producing regions, causing increased risks and costs. To avoid further losses, many farmers have abandoned their farms and gone back to low-investment traditional farming with low stocking density, minimum maintenance and limited use of feed.

Challenges in achieving the export target by 2024

Indonesia has an ambitious target to increase its shrimp export by 250 percent in five years (2019-2024) to reach USD 4.3 billion by 2024. A special shrimp task force consisting of representatives from various stakeholders (government agencies, academia, private sector and NGOs) has been established by the government with the main mandate being to find ways to increase shrimp production; simplify regulations and business licences to encourage investment; and improve productivity. To increase production and productivity, MMAF launched the “nucleus estate scheme” involving shrimp clusters in various locations, as well as millennial shrimp farming programmes for young entrepreneurs. This programme is expected to improve supplies of raw materials for processing plants to enable them to work at full capacity; hence exports are likely to increase.

Is the export target realistic and achievable? If it is based on the average annual export growth for the past five years (2016-2021) which was “only” 7.3 percent, by 2024, exports would reach USD 2.84 billion (based on the export value of USD 2.3 billion in 2021). To achieve the target, the annual growth needs to be around 25 percent for the next three years which is unlikely to happen considering the current scenarios in the global shrimp markets. There is even a concern that Indonesia is under serious threat from its competitors and losing its share in its traditional markets.

In the US market, Indonesian shrimp is under serious threat from Ecuador as well as India and Vietnam. It would be hard for Indonesia to maintain its position as the second largest supplier to the US due to the increasing supplies of cheaper shrimp from Ecuador. Meanwhile in its second largest market, Japan, shrimp imports into the country have been stagnant or even in a declining trend for the past five years. Hence, there is limited room to increase exports to Japan, especially as at the same time there have been increasing imports of wild-caught Argentinian shrimp.

In the EU markets, sadly, Indonesian shrimp is slowly disappearing and currently it has become one of the minor suppliers with its position being far below its main competitors from Asia and Latin America. Indonesia is also missing big opportunities to exploit the fastest-growing shrimp market, China, which has become the second largest shrimp importer behind the US. In 2021, Indonesia supplied just over 6 000 tonnes to China or less than 1 percent of the total imports into the market, far below supplies from Ecuador, India, Vietnam, Thailand and even from Malaysia and Argentina.
With this scenario, the export target of USD 4.3 billion seems to be too ambitious and hard to achieve.

**Multi-stakeholder collaboration**

In efforts to increase production, there is a general consensus among stakeholders that a strategic move would be to improve the production and productivity of traditional shrimp farms. The Indonesian Shrimp Forum (FUI), with its members consisting of representatives from various stakeholders, has been advocating and promoting the need to focus on the improvement of traditional farms. FUI argues that if the productivity of 250 000 ha traditional farms can be increased to, say, 1 tonne/ha from the current around 100-300 kg/ha, it would significantly increase national shrimp production and supplies to processing plants.

To support this goal, the United Nations Industrial Development Organization’s (UNIDO’s) Global Quality and Standards Programme (GQSP) Indonesia, in collaboration with FUI, has published practical guidelines called “Traditional Plus” standard operational practices (SOPs) for traditional shrimp farmers to help them to improve their farming productivity with minimum investment and/or technology intervention. Traditional shrimp farming could also be promoted as eco-friendly and sustainable, and the product could potentially be marketed as organic shrimp. Locations for traditional shrimp farming revitalization will be in East Java, South Sulawesi, as well as the northern, western and eastern parts of Kalimantan, mainly for black tiger shrimp. An agreement between GQSP Indonesia, FUI and the Department of Marine and Fisheries of East Java Province (DKP) was recently signed to jointly support the development of sustainable traditional shrimp farming in the province.

GQSP Indonesia, together with other shrimp stakeholders, has also come up with SOPs for semi-intensive *vannamei* shrimp farming to guide farmers to improve their productivity and at the same to enable them to meet national good aquaculture standards (IndoGAP). Piloting of the SOPs in South Lampung province has proven to be positive, with productivity of piloted farms having increased by 25-28 percent.

A generic Indonesian shrimp brand has also been established as a tool for promotion and to build a good brand image of Indonesian shrimp in the global market. The brand, jointly established by GQSP Indonesia, MMAF, AP5I (Seafood Processors and Exporters Association) and other stakeholders, was launched last year (www.indonesiashrimp.com) and the brand is now owned and managed by AP5I.

**SOPs for semi-intensive *vannamei* shrimp farming to guide farmers to improve their productivity**

It is also encouraging to see the rising use of IoT and AI particularly in semi-intensive and intensive farming facilities. The adoption of these new technologies is spearheaded by many start-up companies, both local and international. JALA, e-fishery, EasyAqua, Aqua Pharma are some of the start-up companies which have been actively offering their services for shrimp farmers in Indonesia.

**Keeping an eye on the target**

As the government has expressed its commitment to go all out to increase production, and with full support from other stakeholders, the country’s shrimp production is expected to significantly increase in the next few years. With the expected increase in supplies of raw materials, it is hoped that exports will also rise, particularly to non-traditional and neighbouring markets in Asia and Europe. Nevertheless, whether the higher exports will meet the targeted value by 2024 is a big question. Fortunately, Indonesia has a big population (270 million) and seafood consumption is relatively high, including for shrimp; hence, the increased production can be easily channelled towards both domestic and export markets.

**The generic Indonesian shrimp brand**

_Sudari Pawiro_ is the Chief Technical Advisor of the UNIDO GQSP Indonesia, a programme which is in operation from 2019-2022 and funded by the Swiss government (SECO). For more info on the programme: www.gqspindonesia.org
Market Trends

**SHRIMP**

**India:** Whilst current supply from India is steady and good harvest forecasts are expected for Gujarat, Odisha and West Bengal from May, raw material prices are at the lowest at this time, pushing farmers to seek assistance from the government. Meetings will be scheduled between the government, farmers, feed owners and packers to discuss possible solutions for the prevailing problems. Because of high freight and energy costs, packers are reducing the buying prices. At the same time, farmers are pushing feed players to decrease the feed price while feed players have their own issues with the high cost of wheat and soy meal along with electricity and fuel costs. If this trend continues, farmers will halt seeding until such time that the raw material prices increase. At present, raw materials are available across sizes and in large quantities this season. The season in Orissa is in full swing and landings in Gujarat have also started.

**Indonesia/Europe:** During January – February 2022, cumulative shrimp exports increased by 13.08% at 42 772 MT compared to the same period in 2021. In the month of February, following reduction of small-sized products and larger sizes were sold out, there was an increase in the price of small-sized shrimp.

Meanwhile, Indonesia exported increased volumes to its main markets in Europe during the two-month period, particularly in Netherlands (148%), UK (40%) and Belgium (278%).

**Vietnam:** Shrimp exports were valued at USD 1.4 billion during the January-April period. This is an increase by 45% year-over-year, which was the highest value for the period since 2018. In the month of April, export value increased by 47% year-on-year at USD 442 million. Main markets: US, Japan, the EU and China recorded increases between 15-91% year-on-year during the first four months. Exports to US (Vietnam’s top destination) were up by 47% at USD 291 million. With regard to China, Vietnam exported shrimp worth USD 81 million in April, a growth of 128% year-over-year, making the country the fourth-largest buyer of Vietnamese shrimp. The value of Chinese imports of Vietnamese shrimp during January to April was USD 187 million, up by 91% from the same period in 2021. In the month of February, following reduction of small-sized products and larger sizes were sold out, there was an increase in the price of small-sized shrimp.

**China:** China continues to strictly apply Rule 103 published in 2020, which sets out a rigorous checking, testing, and disinfection regime for cold-chain food imports into China. Bans have been recently imposed on companies from Japan, Myanmar, Pakistan and Peru, due to detection of COVID-19 on the packaging of batches of vannamei shrimp. This is despite efforts from the Head of the World Health Organization releasing a statement that China’s zero-COVID policy is not sustainable given how rapidly the virus is morphing into new variants.

**Japan:** A strong season of shrimp consumption is expected in Japan during the second quarter of the year. Further increased economic activities are expected with the borders now open from June for inbound travellers. This should boost general demand for seafood and push the sales of shrimp, especially in the food service sector. Higher prices are also expected as supply chain costs continue to increase.

**USA** According to the National Fisheries Institute’s (NFI) recently-released top 10 list of most consumed seafood species, shrimp consumption in the US maintained its top spot, reaching 5 lbs per capita.

With the easing of restrictions in the food service sector (restaurants and convenience stores) throughout the US, the preference for product type and the demand for shrimp remain strong. The number of walk-ins and reservations in restaurants is increasing especially as the summer holidays are fast approaching. The demand for value-added and “convenient” shrimp products is strong not only in the retail sector for home cooking but in restaurants as well for easy cooking. Online retail and pre-packed convenient items are still in demand as a result. However, due to inflation, retail and restaurant prices have increased.

According to market analysts, US imports of shrimp will decline over the coming months due to excess inventories. The surge of raw materials from other countries is likely to push import prices down. This high inventory, with a downward trend of prices, will make importers more conservative in buying bulk purchases. The next US big purchase will be around the beginning of Q3 in preparation for the Thanksgiving celebrations.

Meanwhile, domestic catches in the US are being hit by rising costs, especially for fuel, and could cripple the industry.

**Ecuador/Thailand:** Ecuadorian shrimp will re-enter the Thai market after formalization of safety and biosafety protocols that are in compliance with the regulations of this destination, the Ministry of Production, Foreign Trade, Investments and Fisheries of Ecuador (MPCEIP) announced. Following discussions between the two countries, the Thai Department of Fisheries is lifting the March 2021 suspension of imports of marine shrimp from Ecuador. This will allow the entry of shrimp from 36 Ecuadorian farms that had exported to that market in recent years.

**Argentina/Europe:** During the first quarter of 2022, shrimp exports from Argentina to Europe decreased by 11.7% at 26 030 MT compared to the same period in 2021. The main markets in Europe for Argentinean shrimp – Spain and Italy – recorded decreases by 8.02% and 28.1% respectively, while France’s imports increased by 131%. After the land processing of shrimp came to an end in April, lower production has been recorded against previous years. However, the inventories of shrimp processed on-board arriving in the European market are enough to keep prices steady for now.

**Europe:** According to market analyst Mr. Willem van der Pijl in his presentation on the European shrimp market during the 6th INFOFISH World Shrimp Trade Conference and Exposition (SHRIMP 2022), the rise of overall demand for shrimp is yet to be seen in Europe. There is uncertainty as to whether the increase of supplies from South America is at the cost of supplies from Asia as producers from Ecuador and Venezuela already outcompete Asian producers on price and perception of risk, quality and reliability. The right combination of product specifications can make or break a competitive position in the EU market, he added. Meanwhile, at present, while the inventories are still good in the region following declining demand after a strong Easter trade, conditions might lead to slightly lower shrimp prices.

**TUNA**

**Indonesia:** According to the Directorate General of Marine and Fishery Products Competitiveness Marketing Director, the average growth rate for Indonesian tuna production has reached 3.66%,
higher than the world’s average rate of 3.42%. It is reported that the country’s tuna production now accounts for around 15% of global output, making it the largest producer of tuna in the world. The other top tuna-producing nations globally are the Philippines, with a production share of 7.3%, Vietnam (6.6%), and Ecuador (6.1%).

However, despite being the largest producer, Indonesia only ranked sixth in the list of largest global tuna exporters, with a market share of 5.3% as of 2020. Thailand was the largest tuna exporter with a global market share of 17.73% followed by China (8.45%), Spain (8.20%), Ecuador (7.98%), and Taiwan (5.57%). The top destinations for Indonesian tuna in 2021 were the EU (28.8%), Southeast Asia region (24.7%), Japan (17.9%), and the US (8.7%).

Thailand/Western Pacific: Bunker fuel prices and operating costs remain high whilst raw material prices are expected to rise during the month of June as demand increases. The delivery price of frozen skipjack to Thailand (CIF) in late May has declined from USD 1 600 – USD 1 650 per MT to around USD 1 550 per MT. The ex-vessel price in Manta from the beginning of June has also dropped from USD 1 850- 1 900 per MT to USD 1 800 per MT. Further price impacts are expected for the 3-month FAD-closure, which starts in July.

Japan: The landings of sashimi tuna and prices at the daily auction trade at the Toyosu market increased with the high demand for seafood during the Golden Week holiday period through to May. After the Golden Week holidays, both landings and prices dropped. This trend is expected to continue through to July with the rainy season forecasted to begin in June. Due to the general increase in the cost of goods and services, prices of chilled and frozen tuna are expected to rise in the coming months. Sushi prices, in particular, are expected to increase by 10-30% from October.

USA: Total imports of fresh/chilled tilapia fillets during 2021 were up by 3.2% at 22 786 MT, continuing its recovery trend from the low levels in 2016 (23 604 MT) and 19 863 MT in 2019 before increasing in 2020. The decline during those years was due to the preference for frozen fillets of other species coming from Asian countries, such as pangasius, which costs less compared with tilapia.

CANNED TUNA

USA: Imports of canned and processed tuna into the US market declined both in quantity (4%) and value (3%) for the first quarter of 2022 compared to the same period in 2021. Thailand remains the US’s main supplier with a 42% market share, despite a 19% decrease in imports during this period. According to market analysts, the US is ranked as a top seafood consuming nation, with statistics from 2020 ranking canned tuna as the third most consumed seafood product (1.18 kg per capita) behind salmon (1.3kg per capita) and shrimp at the top (2.3 kg per capita).

Thailand: Exports of canned and processed tuna in the first quarter of 2022 have slightly decreased by 0.01% (127 547 MT) as compared to the same period in 2021. Given that the Thailand (CIF) prices have been very competitive during the first quarter of 2022, the value however, has recorded an increase of 4.53% (USD 23 million) from the same period in the previous year. The total value of canned and processed tuna exports (USD 526m) for Q1 has been the highest recorded over the past two years for the same period. Of Thailand’s major markets, the USA continues to maintain its dominant market share of 21.3%, followed by Egypt (16.0%), Australia (8.2%), Libya (7.8%) and Japan (7.1%).

FROZEN AND FRESH FISH

Tilapia

USA: During the first quarter of the year, fresh/chilled tilapia fillet imports increased marginally by 1% in volume and 10% in value at 6 208 MT and USD 40.237 million respectively compared to the same period in 2021. The 35% increase in supply from Colombia did not compensate for the significant decrease of 67% from Mexico. The demand for fresh/chilled tilapia is weakening as the preference for cheaper pangasius frozen fillets from Asian countries is growing. In addition, suppliers like Mexico and Ecuador are giving less priority to tilapia production for export.

Frozen tilapia imports during January – March 2022 have increased by 25% in volume and 49% in value at 42 862 MT and USD 152.992 million respectively compared to the same period in 2021. For both frozen fillets and whole tilapia imports, the growth in volume was by 16% and 50% respectively as exports from the main suppliers China, Indonesia and Taiwan increased. In addition, Latin American countries like Colombia and Brazil increased its supply of both frozen whole (623%) and fillet (348%) to the US. It was observed that while there is an increase in demand for frozen tilapia, particularly whole frozen, the preference for fresh/chilled fillet is slowly declining.

Pangasius

Vietnam: US importers are paying an average of USD 4.5/kg in the first quarter of 2022 for frozen pangasius, its highest-ever levels. The average prices of frozen fillets exported from Vietnam to China surged to between USD 2.40 and USD 3.25/kg, from USD 1.90- 2.70/kg in the same period in 2021. The EU also experienced a rise to about USD 2.90 - 3.45/kg. A shortage of raw material for processing has driven up farm-gate prices, according to the Vietnam Association of Seafood Exporters and Producers (VASEP). The lack of material is expected to continue at least through the end of the second quarter of the year.

Salmon

Norway: In the month of April 2022, fisheries and aquaculture products exports posted the highest value for that month in the history of the industry, amounting to USD 1.2 billion. The Norway Seafood Council (NSC) reported that in April, Norway exported 82 500 MT of farmed Atlantic salmon, valued at USD 870.9 million, an increase of 43% against 2021. For fresh cod, a total of 7 700 MT was exported in April, earning about USD 38.8 million, with Denmark, the Netherlands and Portugal as the top three markets.

The NSC cited several reasons for the high prices, including the sharp rise of food prices globally and the depleted supply of popular seafood products and species in the market. The reopening of hotels and restaurants has brought increased demand from buyers who are willing to pay high prices; also, more people have learned how to cook seafood at home, it added.

Thailand: During January to April 2022, the country was the third major importer of Norwegian seafood, after China and South Korea. Norway’s export to Thailand includes fresh salmon and trout totalling 8 385 MT and valued at THB 2.8 billion (USD 81 million), said the Southeast Asia regional director of the Norwegian
Seafood Council (NSC). These exports represented a 23% increase in volume from a year earlier while the value increased by 81% from the same period last year, he added.

According to a survey by the NSC, 21% of Thai respondents said they bought salmon online through e-commerce websites or mobile apps “quite often” or “very often”. And 59% of those surveyed said it was “very important” for stores to have quality fish and seafood brands.

**Mackerel**

**Japan:** Frozen mackerel exports during the first quarter of 2022 decreased by 39.7% at 30 711 MT compared to the same period in 2021 as top importing countries – Vietnam, Thailand, Nigeria, Ghana and Egypt – bought smaller amounts. A significant drop was seen in the imports from African countries, especially Nigeria which showed no imports of mackerel in Q1 as compared to 5 900 MT in Q1 of 2021 (it is worth noting that the overall growth of exports in 2021 was mainly due to the huge purchases by Nigeria at +60%). Meanwhile, Vietnam still emerged as the leading export market in Q1 although the volume had dropped in comparison to the same period in the previous year.

Domestically, the consumption of fishery products in Japan began to improve at the end of March, especially following the late-March lifting of government restrictions on restaurants and catering outlets due to the pandemic. The market continues to import more frozen fish products due to their longer shelf life. Annual imports of ultra-frozen tuna fillets (-60°C) for sashimi or sushi usage increased by 23.3%, reaching 60 265 MT in 2021. This increase in local demand was basically associated with seasonal sales during the Gregorian and Lunar New Year, as well as the spring holiday months of April and May. During the same period, imports of processed shrimp also increased by 16% at 29 000 MT. The foodservice sector is Japan’s leading buyer of frozen processed seafood.

*Source: GLOBEFISH Highlights Issue 4/2022*
Price Trends • Cold storage holdings • import trends

FROZEN WHITEFISH

JAPAN COLD STORAGE HOLDING: SELECTED PRODUCTS (MT)

FISHMEAL/FISHOIL (US$/MT)

JAPAN COLD STORAGE HOLDINGS TUNAS (MT)

JAPAN: MONTHLY IMPORTS OF SHRIMP & TUNA (MT)

USA: Monthly SHRIMP Imports
PANGASIUS

Pangasius trade takes a hit from renewed restrictions in Viet Nam

The volume of pangasius trade has dipped considerably, as restrictions on people’s movements and factory capacity have been introduced in Viet Nam, by far the world’s largest producer and exporter of pangasius. The overall value of trade has not been as heavily impacted, largely due to increased prices, especially in the United States of America. The disruptions being experienced are likely to have a knock-on effect on supply next year, with the overall situation remaining difficult for farmers and processors alike.

Production

Viet Nam, by far the main global producer of pangasius, has seen production and processing severely restricted by COVID-19 regulations. Cases of COVID-19 in the country began rising in July 2021, prompting the government to enforce strict measures. Individuals have been largely prevented from travelling between provinces since the end of May 2021, restricting labour force flows. Around half of the pangasius processing factories in the country are expected to remain closed in the second half of the year. Those that are operating are doing so at far below normal capacity, and with difficult conditions for workers, which include requirements for them to remain within the premises at all times.

Hatchery activity in Viet Nam was also hampered by the government-imposed restrictions, leaving a gap of several months in fry production. As such, the negative production outlook is unlikely to improve in the near future, as there will not be sufficient fingerlings available for restocking at least until early 2022.

Global production of pangasius and catfish is expected to fall by 8 percent between 2020 and 2021. This is largely due to lower Vietnamese production which is expected to amount to 1 200 000 tonnes in 2021, down from 1 600 000 tonnes in 2020. Production in other countries is generally destined for domestic consumption and is unlikely to see significant changes between 2020 and 2021. All three of the main producers in this category are expected to see increases in volume, with Indian production rising to 600 000 tonnes (+4 percent), Bangladesh to 490 000 tonnes (+2 percent) and Indonesia to 450 000 tonnes (+6 percent).

Trade and markets

The overall volume of trade has fallen significantly in the second half of the year due to disruptions to the Vietnamese industry. The volume of Viet Nam’s exports halved from 70 000 tonnes in June 2021 to 35 000 tonnes in September 2021. The continued high costs of freight are inevitably disrupting exporters’ margins, with 40-foot containers from East Asia to Northern Europe averaging 14 400 USD. A year ago, prices were closer to 2 000 USD. Similarly, the average freight cost between East Asia and North America (west coast) has increased more than four-fold, from 4 000 USD in October 2020 to 18 000 USD in October 2021.

There is still strong demand for pangasius in the US market, as reflected by the rapidly rising prices that were seen as supply was reduced. Importers experienced challenges with securing new orders, as processors and exporters attempt to cover existing backlogs with available supplies. The US Department of Commerce (DOC) recently announced the preliminary results of the 17th period of review of ‘antidumping’ duties applied to Vietnamese pangasius. There are a few proposed changes, with the majority of the 35 companies examined expected to continue paying 2.39 USD per kg on exports. Certain individual companies have been given rates varying between 1.94 USD per kg and 3.87 USD per kg. The revised tariffs, which are subject to appeal, are due to come into effect in January 2022, but are almost identical to previous years.

China has seen a significant fall in imports of pangasius, with volumes falling by 4 500 tonnes (-30 percent) month on month between June and July 2021. While it was previously the destination for 40 percent of global imports by volume, this now stands at 30 percent. There have been tighter controls on fish and fish products imported at a time of increased mistrust due to the authorities’ testing of COVID-19 on packaging.

Prices

By October 2021, Vietnamese farmgate prices had risen very slightly to around 22 500 VND (USD 0.96) per kg for fish between 1-1.2kg. This equates to very little margin for farmers, who are also faced with reduced volume of demand from processors and increased feeding costs.

On the export side, falling volumes have been accompanied by rising prices across the board for whatever supply is available. While export prices to the United States of America for Vietnamese frozen fillets were around 2.90 USD per kg in the first quarter of 2021, this figure rose to 3.70 USD per kg in September. Similarly, exports to China saw prices rise from 1.90 USD per kg in the first quarter of 2021 to 2.00 USD per kg in September. Relatively new markets, such as Brazil, Mexico and the United Kingdom of Great Britain and Northern Ireland
all saw similar increases, with export prices ranging from 2.40 USD per kg to 3.40 USD per kg.

Outlook

The ripple effect of restrictions in Viet Nam will likely continue to keep global supply of pangasius low in the first quarter of 2022. The rising prices for pangasius in major markets are a direct result of continuous strong demand in final markets as well as reduced supply and increased costs, especially the cost of freight. Currently, farm supply exceeds processing demand, and so the higher export prices have yet to bring any price increase for farmers, who are also facing rising costs due to higher biomass in their ponds. However, if processing capacity returns in early 2022 at a time when ponds were largely emptied of harvest size fish, we could see higher prices incentivising increased stocking. This would lead the industry to enter the boom phase of the boom-and-bust cycle that was seen a number of times in recent years.
INFOFISH speaks to ...

DR TOM PICKERELL

Executive Director at the Global Tuna Alliance & Founder of Tomolamola Consulting Ltd.

Director at the Shellfish Association of Great Britain; Fisheries Policy Officer at World Wildlife Fund UK; Technical Director at Seafish; Global Tuna Director for the Sustainable Fisheries Partnership (SFP); and now Executive Director of the Global Tuna Alliance (GTA) - these are only some of the positions you have held over the decades. What got you interested in seafood sustainability and social responsibility, two themes which seem to feature strongly in your professional life?

I grew up by a beach in Scotland, and moved to Gibraltar when I was five; the sea has always been a significant part of my life. When I was six, I found an ocean sunfish, or Mola mola, washed up on the beach – this catalysed my fascination with the marine environment and from then on, I wanted to be a marine biologist.

After working in academia, and realising that I was learning more and more about less and less, I wanted to make a move into policy-making to try and ‘make a difference’. This began my career in fisheries and aquaculture and it’s gone from there!

For the benefit of our readers, could you provide some background on the GTA?

What’s unique about the GTA is that it’s a “pre-competitive collaboration”; you have retailers and suppliers who are usually competitors battling it out for consumers’ attention, but as GTA Partners, they come together to work towards more sustainable tuna for everyone. The surprising thing about our advocacy is that it’s not NGOs or governments calling to address sustainability challenges, but the market; the ones making the money from tuna sales! When the global marketplace for seafood is the boldest advocate for sustainable tuna fishing, it really makes you stand up and take note.

At last count we had 49 Partners, spanning every continent and accounting for around 20% of the global tuna trade.

In January 2021 we launched our first 5-year strategy which sets out our priorities and goals from 2021-2025.

In March 2021, the GTA, Friends of Ocean Action, and the World Economic Forum introduced the 2025 Pledge towards Sustainable Tuna (25PST), calling for signatories to commit to working towards a global tuna sector that meets the highest standards of environmental performance and social responsibility. The 25PST replaced the Tuna 2020 Traceability Declaration which had been endorsed in 2017 by 67 leaders of the world’s retailers, tuna processors, marketers, traders, and harvesters, with the support of 21 influential civil society organizations and six governments. In the intervening years between the Traceability Declaration and 25PST, what progress was achieved in the tuna sector?

To maximise the impact of the 25PST, it was aligned to the GTA 5-Year Strategy which in itself was informed by the Tuna 2020 Traceability Declaration commitments. As with the Tuna 2020 Traceability Declaration, the 25PST has been registered as a ‘Voluntary Commitment for implementation of the UN SDGs’. This information is shown on the UN Ocean Conference commitment site as Ocean Action 37968.

However, in February of this year, the GTA, Friends of Ocean Action, and the World Economic Forum agreed that we should cease 25PST as a stand-alone endeavour and instead brand our 5-year strategy as 25PST. This was for a number of reasons: firstly, the GTA Partnership was increasing; secondly,
there was confusion with having two very similar initiatives (25PST and our strategy) and thirdly, the monitoring and reporting was well-defined for the GTA 5-year strategy and merging prevented reporting duplication.

Ultimately, by becoming a GTA Partner, businesses are committing to make improvements in their own supply chains and advocacy efforts so that globally, tuna meets the highest standards of environmental performance and social responsibility.

**Similarly, what have been the achievements of 25PST since March 2021 until now?**

A real point of difference for the GTA is our comprehensive annual tracking of Partners’ progress. We know that in business, facts and figures matter, so GTA Partners take part in extensive and thorough tracking allowing us to analyse effectiveness and performance year on year. In our first progress report from our 5-year strategy (the 2025 Pledge Towards Sustainable Tuna), we determined that GTA Partners had collectively already achieved 37% of KPIs. Individual progress varied considerably from zero to 78% of KPIs met.

Most progress was recorded on our Environmental Sustainability strategic priority (43% of KPIs collectively achieved) and least progress on Transparency & Traceability strategic priority (30% of KPIs collectively achieved).

Our engagement with RFMOs contributed to some notable successes in 2021, including the adoption of an interim rebuilding plan for overfished yellowfin in the Indian Ocean; a long-awaited agreement on establishing a science-managers dialogue meeting in the WCPFC; and a conservation measure for tropical tunas at IATTC. In addition to the conservation measure, IATTC adopted a Port State Measure, another of the GTA’s asks. The central elements of this measure are establishing a minimum percentage of inspection for foreign vessels (5%); the designation of ports by port States; a compulsory prior notification for port access; and the reporting of possible infringements detected in the inspection. Finally, respectable progress was made at ICCAT including a new measure prohibiting retention of North Atlantic shortfin mako, and the adoption of their first fully specified management procedure (or harvest strategy) for North Atlantic albacore.

Of course, there were also disappointments; despite advocacy campaigns and pleas from the market, tuna fisheries in the Western Central Pacific Ocean are still at risk of losing their MSC certification. Over in the Indian Ocean, six countries objected to the yellowfin rebuilding plan, effectively derailing the positive efforts made by other Member States and putting the sustainability of the stock at risk.

We will continue to press each tuna RFMO to strive for sustainable management.

**As we all know, tuna is a commercially valuable species. It accounts for at least USD 42 billion of the annual global seafood trade, and directly employs more than six million people in coastal communities. Sustainability is therefore a key issue and RFMOs have been brought to task regarding their slowness to act on scientifically-based resource management. Taking the Western and Central Pacific Fisheries Commission (WCPFC) as an example, do you foresee a time when some of the region’s fisheries which have been certified by the Marine Stewardship Council might lose that accreditation? What would you like to see happen at the next WCPFC meeting?**

Yes absolutely – in fact the GTA’s last WCPFC campaign was based around the message ‘Don’t Lose the Label’ and literally showed the MSC label, a seal of approval consumers know and trust, being peeled away. Tuna fisheries in the Western Central Pacific Ocean engaged in the MSC programme face a serious situation in order to fulfil existing conditions of certification. They need the WCPFC to complete their current workplan and adopt robust harvest strategies for skipjack and South Pacific albacore by December 2022. For yellowfin and bigeye fisheries, the WCPFC must advance its current workplan to also finish by this date.

Without timely action, these certified fisheries could face the risk of suspension from using their MSC certificate soon after June 2023. Accordingly, the GTA ask of WCPFC includes:

*Accelerate action on comprehensive, precautionary harvest strategies across all tuna stocks to avoid the risk of suspension of MSC-certified tuna fisheries in the Western and Central Pacific Ocean. Specifically:*

- Adopt Target Reference Points for bigeye and yellowfin
- Adopt a list of candidate management procedures for skipjack and albacore

In advance of the 18th session of the WCPFC, in December 2021, the GTA coordinated a collaborative sign-on letter (similar to the IOTC market letter where 61 companies signed-on). The NGO Tuna Forum adopted this and worked with Forum members to seek additional signatories. The resulting WCPFC sign-on letter was sent to the WCPFC Secretariat and all delegates with 112 tuna supply chain companies calling for urgent action on harvest strategies.

We also wrote to the EU Fisheries Commissioner urging the EU to support a science-manager dialogue meeting (one of our asks) to be held in August alongside the WCPFC Scientific Meeting. Despite agreeing terms of reference
for this meeting four years ago, the EU were holding up progress by insisting the meeting takes place in December alongside the Commission meeting. To further advocate for this, we produced a blog, which was published on harveststrategies.org, provocatively titled “It’s Good to Talk – Unless It Clashes with Summer Holidays”.

The WCPFC Commission meeting itself was disappointing. The majority of the time was spent on debating a new two-year tropical tuna management measure, that ultimately only marginally differs from the old one. Despite five days of negotiations, delegates were unable to establish work plans for significant tuna stocks, instead opting to delay and extend the timelines for key decisions. The pushback of work plans for yellowfin and bigeye tuna means that it is almost guaranteed that the requirements for certification cannot be met by the 2022 deadline. As a result, the MSC tuna fisheries in the WCPO with yellowfin and bigeye components are at serious risk of suspension in summer 2023 – with serious consequences for the market.

While we were pleased to see that agreement was finally reached on establishing a scientific-dialogue meeting, considerable work will be required in August to finalise the harvest strategies for skipjack and albacore – and thus maintain their certifications.

What about tuna stocks in regional waters covered by other RFMOs?

We have just had the IOTC meeting and it was extremely disappointing, despite a few good outcomes. The Commission did agree a management procedure for bigeye, but they failed to agree a rebuilding plan for overfished yellowfin despite the Scientific Committee recommending a significantly large cut, and being the GTA’s main ask and pillar of our ‘Rebuild the Yellowfin Road’ campaign. They also failed to agree to stop exceeding the skipjack harvest control rule TAC, putting the three MSC-certified skipjack fisheries in the region at risk of suspension if not addressed by 2026.

On the topic of eliminating harmful fishing subsidies that drive IUU fishing and impact upon global tuna supply chains, the World Trade Organization (WTO) will hold a ministerial meeting on 15 July to review an advanced negotiating text with the aim to reach an agreement on this issue. Bearing in mind previous unsuccessful attempts to reach consensus, is the GTA hopeful of significant progress this time, and why?

Yes, we are optimistic that agreement will be reached. We understand that the areas of disagreement are narrowing and Peter Thomson (UN Oceans Ambassador) noted “We are as close as we have ever been to reaching a deal, with just a handful of elements pending consensus.”.

Among the remaining issues requiring resolution is that of whether and for how long special and differential treatment for developing countries should apply. But, the chair of the negotiations, Ambassador Santiago Wills of Colombia, has tabled a proposal that can resolve the key issues.

And finally, a question which is still closely related to the issue of IUU fishing. Traceability and transparency have implications for the sustainable management of resources, compliance with social standards, and respect for human rights. As someone who has worked in this field for a long time, would you say that the global tuna industry has indeed achieved greater traceability, transparency and social responsibility?

I certainly believe that components of the global tuna industry have achieved greater traceability, transparency and social responsibility.

For example, most industrial purse seine vessels carry a high-level of observer coverage, either human observers or electronic monitoring systems collecting data on fishing activities while onboard a vessel. Whereas, longline vessels, which make up roughly 10-15% of the world’s tuna provide little information on what they are doing and catching, and where they’re doing it.

In addition, many operators are working towards achieving this. For example, the Technology for Tuna Transparency Challenge, led by the Federated States of Micronesia, is an initiative of historic proportions. For the first time ever, developing countries have committed to 100% transparency in their entire tuna fisheries by 2023 through on-board observers and state-of-the-art electronic monitoring.

Certainly, the aim is to continue to improve this; by having a pre-competitive collaboration such as the GTA, the hope is that businesses can team together and amplify the collective voice of the market, to achieve not only greater traceability, transparency and social responsibility, but environmental sustainability as well.
Track tuna price movements with Undercurrent News

1. Stay on top of the category with our breaking news and weekly tuna round-up.
2. Get in-depth behind the story with our extensive archive.
3. Manage your business with our up-to-date pricing info.

For everything you need on tuna and the global seafood industry, UCN has it covered.

Find out more go to www.undercurrentnews.com/species/tuna
Join us onsite in Bangkok, Thailand, at the prestigious Shangri La Hotel from the 11th-13th of October 2022 as we bring you the much-awaited and anticipated biggest global tuna gathering in the world – THE 17th INFOFISH WORLD TUNA TRADE CONFERENCE AND EXHIBITION.

In presenting and announcing the TUNA 2022 tentative programme, we are privileged to bring to you a stellar line-up of world tuna leaders and professionals who will be speaking on the resilience, adaptability and sustainable growth of the Global Tuna Industry in a rapidly-changing and disruptive environment. These presentations will be enriched by invaluable insights from high-level spokespersons representing the relevant Ministries in Ecuador, Maldives and Thailand; as well as priceless expertise from world experts on the challenges and opportunities of managing global tuna resources, trade and markets and sustainability.

JOIN US at this flagship Tuna Trade Conference and Exhibition to be updated on all the latest industry trends; listen to how the industry has been agile, responsive and innovative in the face of unprecedented challenges; share your thoughts; and add to the constructive dialogue and transformational fora that constitutes the global Tuna Industry. Visit http://tuna.infofish.org for the list of speakers at TUNA 2022.

Dr. Channin Chalisarapong, President of the Thai Tuna Industry Association (TTIA) and co-chair of TUNA 2022 expressed his excitement at finally having the event reconvene in Bangkok on a hybrid modality following the last physical hosting of the INFOFISH TUNA Conference and Exhibition in 2018. He further reiterated that with travel restrictions eased throughout Thailand beginning of February 2022, and with the return of Test & Go for fully vaccinated travelers, Bangkok remains the most suitable of venues to accommodate this large tuna industry event, being home to many major global tuna industry players in addition to its excellent meeting facilities and good services.

Be Informed & Be Inspired. Register early to reserve your space. Closing date for early bird registration has been extended to the 29th of July 2022.
17th INFOFISH WORLD TUNA TRADE CONFERENCE & EXHIBITION

11–13 October 2022
Bangkok, Thailand
TUNA 2022 reconvenes in Bangkok, the Global Tuna Capital!

**REGISTRATION FEE ***

<table>
<thead>
<tr>
<th>Category</th>
<th>Before 29 July 2022</th>
<th>After 29 July 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFOFISH Member Countries*</td>
<td>US$ 900</td>
<td>US$ 1 100</td>
</tr>
<tr>
<td>Other Countries</td>
<td>US$ 1 150</td>
<td>US$ 1 350</td>
</tr>
<tr>
<td>Accompanying Spouse**</td>
<td>US$ 300</td>
<td>US$ 350</td>
</tr>
<tr>
<td>Virtual Conference</td>
<td>US$ 800</td>
<td></td>
</tr>
</tbody>
</table>

Total US$:

* Bangladesh, Cambodia, Fiji, Iran, Malaysia, Maldives, Pakistan, Papua New Guinea, Philippines, Solomon Islands, Sri Lanka and Thailand.
** Accompanying spouse is entitled to coffee breaks, lunches and reception only.
*** Includes cost (3 days) of COVID-19 test for the physical conference.

**THE CONFERENCE**

TUNA 2022, the premier convention of the world tuna industry is back this year and will be held from 11 – 13 October 2022 in Bangkok, Thailand, the "global tuna capital". The 17th INFOFISH World Tuna Trade Conference and Exhibition is set to take shape at the prestigious Shangri-La Hotel, Bangkok. The theme of this year’s conference is ‘Strengthening Resilience, Adaptability and Sustainable Growth in the Global Tuna Industry’.

The biennial INFOFISH World Tuna Trade Conference and Exhibition has over the years been an event looked forward to by the global tuna industry, serving as a platform to discuss present and unfolding challenges and opportunities in maintaining and further encouraging a socially, economically and environmentally sustainable global tuna market, as well as to connect and network with all segments of the sector. This year’s event, aside from its unique setting/configuration offers a two and a half days’ interactive and insightful programme that is very relevant to our current disruptive and ever-changing global market dynamics.

Over the years, this event has been able to attract a global audience of almost 600 delegates from nearly 70 countries comprising distinguished representatives from prominent fishing companies, exporters, importers, canned tuna packers, agents, brokers, retailers, equipment suppliers, researchers and analysts, consultants, financiers, international spokespersons, and governmental as well as non-governmental organizations. The TUNA 2022 event offers an even greater opportunity that serves a unique purpose in expanding audience connectivity and its networking scope with the major tuna industry players and stakeholders as well as building a dynamic experience for our attendees. It also creates differentiated sponsorship opportunities for all.

With travel restrictions eased throughout Thailand beginning of February 2022, Bangkok remains the most suitable of venues to tuna, falling retail demand for canned tuna and improved sales opportunities in the hotel, restaurant and catering (HORECA) sector, particularly in the Western markets. On the supply side, tuna catches were low worldwide during the third quarter of 2021, balancing slow demand for frozen raw material from tuna canners; however, prices continue to be under pressure due to lack of demand for end products.

As the premier event in the industry’s calendar year, TUNA 2022 is anticipated to bring together a large number of key stakeholders and broad representation globally to discuss a wide range of issues, challenges and opportunities in support of the sector’s continuing vitality, viability and sustainable growth in what has been and continues to be a disruptive operating environment for all industry players. Following on from TUNA 2021 (The Global Tuna Industry: Trailblazing through tough times), this meeting of the industry will continue to provide a very opportune moment for further reflections and conversations on high level developments and practical approaches to ‘Strengthening Resilience, Adaptability and Sustainable Growth in the Global Tuna Industry’.

As an industry, tuna producers and suppliers have had to, and continue to be resilient actors and players in the supply chain and market in responding to industry risks and sustainability issues. This includes resilience and adaptation through innovation, science and technology, greater efficiency in production and product diversification, value adding, creative marketing strategies and leveraging e-markets to maintain and grow new markets.

TUNA 2022 is also an opportunity to raise further industry-wide issues and initiatives to the fore, such as Illegal, Unreported and Unregulated Fishing (IIU), trade and market access issues, social accountability, eco-labeling and certification, Fishery Improvement Projects and sustainability efforts, the implications of COP22 and a future with tuna farming, amongst a range of other industry matters.
While the industry has been greatly challenged, it has also been a great example of resilience, adaptation and endeavour in a constantly changing business environment. The emergence of rapidly changing technologies has also provided alternatives in terms of business approaches, market behaviour, health, safety and sustainability, and there are many lessons and reflections to be shared that will provide very stimulating and exciting exchanges for all participants over the course of TUNA 2022.

**THE VENUE & ACCOMMODATION**

The 5-star luxury Shangri-La Hotel will again be the venue of TUNA 2022. 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 and at several other satellite hotels nearby.

Shangri-La Hotel, Bangkok  
Tel: 662-2367777, Fax: 662-2368566/79  
E-mail: reservations.slbk@shangri-la.com, Web: www.shangri-la.com  
For hotel reservations, delegates are requested to submit the hotel registration form provided, directly to Shangri-La Hotel or to the satellite hotels. Hotel registration forms are available from our website: http://tuna.infofish.org/

**SAFETY MEASURES**

Shangri-La Bangkok is a Thailand Safety and Health Administration (SHA) Plus+ certified hotel and has been awarded the SafeGuard Hygiene Excellence and Safety Label by Bureau Veritas. Shangri-La has embraced a series of enhanced safety standards and has a highly vaccinated workforce.

**TRAVEL ADVISORY**

Delegates attending the conference are advised to refer to the Thailand Pass website (https://tp.consular.go.th/) for the latest travel advice and updates to enter Thailand.

**THE EXHIBITION**

An exhibition will also be held concurrently at the same venue. A total of 40 booths are available for companies and organisations to display and promote their products, equipment, machineries and services related to the industry. Reservation of booths is on a first-come, first-served basis.

**SPONSORSHIP & PROMOTIONAL PACKAGES**

INFOFISH is inviting companies and organisations 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. Promotional packages are available for companies who are interested to effectively advertise and promote their products or services for better impact and greater visibility during TUNA 2022, all at reasonable charges.

**SIMULTANEOUS INTERPRETATION**

Simultaneous interpretation of presentations from English to Spanish will be provided throughout the two and a half days for the benefit of Spanish speaking delegates.

“When you are looking into organizing small meetings during TUNA 2022, please do not hesitate to contact us for assistance.”

**PROGRAMME HIGHLIGHTS**

- Global trends and sustainability initiatives
- Overview of global tuna resources and supply
- Global tuna markets, trade and marketing: Embracing changes
- Impact of raw material prices on global tuna trade
- Market adaptability and technological innovations
- Adapting to the new global trade reality
- Revisiting sustainability through the pandemic
- Supply chain/logistics challenges
- Technology and innovations for a safer, secure and sustainable tuna industry
- Blue Food revolution: Balancing demand, supply and sustainable tuna stocks
RESERVATION INFORMATION:
A total of 40 booths are available and allotted on a first come - first served basis. Make your booking by 22 AUGUST 2022 and enjoy an early booking rate of US$ 3,500 under PLAN A or US$ 2,900 under PLAN B.

Once booking is made, an application form will be forwarded with the general information to be endorsed and signed for booking confirmation.

INFOFISH as the organiser, reserves the right to make amends and changes as it considers fit in the overall interest of the TUNA 2022 exhibition. Terms and conditions apply within.

For enquiries, please contact: Mr Mohd Syahir, Tel: (603)80668112, E-mail: syahir@infofish.org / info@infofish.org
# SPONSORSHIP PACKAGES

## PLATINUM SPONSOR: US$ 20 000
- Send up to 5 complimentary delegates to the conference
- Company logo on the conference kit
- Company logo on delegate badges
- Display of company banner (poster panel: 3’ width x 8” height) at conference site
- A full page advertisement in the conference programme booklet
- A full page advertisement for 3 issues in INFOFISH International
- Insertion of company brochure in the conference kit
- On-screen advertisement at conference site
- Free INFOFISH Associate Membership for 1 year
- Free banner advertisement (web-link) for 1 year on INFOFISH website
- One complimentary stand at TUNA 2022 exhibition

## GOLD SPONSOR: US$ 15 000
- Send up to 3 complimentary delegates to the conference
- Company logo on the conference kit
- Display of company banner (poster panel: 3’ width x 8” height) at conference site
- A full page advertisement in the conference programme booklet
- A full page advertisement for 2 issues in INFOFISH International
- Insertion of company brochure in the conference kit
- Free INFOFISH Associate Membership for 1 year
- Free banner advertisement (web-link) for 1 year on INFOFISH website

## SILVER SPONSOR: US$ 10 000
- Send up to 2 complimentary delegates to the conference
- Company logo on the conference kit
- Display of company banner (poster panel: 3’ width x 8” height) at conference site
- A full page advertisement in the conference programme booklet
- A full page advertisement in INFOFISH International
- Insertion of company brochure in the conference kit
- Free INFOFISH Associate Membership for 1 year
- Free banner advertisement (web-link) for 1 year on INFOFISH website

## BRONZE SPONSOR: US$ 7 500
- Send up to 2 complimentary delegates to the conference
- Company logo on the conference kit
- A full page advertisement in the conference programme booklet
- Half page advertisement in INFOFISH International
- Free banner advertisement (web-link) for 1 year on INFOFISH website

I wish to reserve the following sponsorship:  

- □ Platinum  
- □ Gold  
- □ Silver  
- □ Bronze

Name: ....................................................................................................................................................................................................
Company: ...............................................................................................................................................................................................
Address: ........................................................................................................................................................................................................
Fax: .....................................................................Email: ........................................................................................................................
Date: ...................................................................Signature: ............................................................................................................

Please e-mail completed form to: INFOFISH -TUNA 2022

1st Floor, Wisma LKIM, Jalan Desaria, Pulau Meranti, 47120 Puchong, Selangor DE, Malaysia  
Tel: (603)80668112 | Fax: (603)80603697 | E-mail: info@infofish.org
PROMOTIONAL PACKAGES

PRO 1
INSERT YOUR PROMOTIONAL MATERIAL IN CONFERENCE KIT

Size of insert ............................................................. limit 8 pages
Cost .............................................................................. US$ 600
Deadline for receipt of material......................... 5 September 2022
(Materials to be sent directly to conference site)

PRO 2
ADVERTISE IN CONFERENCE PROGRAMME BOOKLET

Full page, colour .......................................................... US$ 800
Dimension ............................................................. 180mm [W] x 250mm [H]
Half page, colour .......................................................... US$ 500
Dimension ............................................................. 180mm [W] x 120mm [H]
Deadline for receipt of Ad copy.......................... 5 September 2022

PRO 3
ADVERTISE IN INFOFISH International SEP/OCT - CONFERENCE ISSUE
SPECIAL OFFER!
Advertise Full or Half Page in INFOFISH International and receive PRO 1 and PRO 2 FREE!

As the sponsoring magazine, INFOFISH International will be distributed to all conference delegates, exhibitors and visitors. This is in addition to the normal worldwide distribution.

Full page, colour .......................................................... US$1,600
Dimension ............................................................. 180mm [W] x 250mm [H]
Half page, colour .......................................................... US$ 1,200
Dimension ............................................................. 180mm [W] x 120mm [H]
Deadline for receipt of Ad copy.......................... 12 August 2022

Please reserve PRO 1 for my company.

Please reserve PRO 2 for my company.
Ad size:  c Full Page  c Half Page

Please reserve PRO 3 for my company. I understand that PRO 1 and PRO 2 are provided to us FREE.
Ad size:  c Full Page  c Half Page

Advertisement for Conference Programme Booklet and INFOFISH International should be sent via e-mail as an attachment saved as a JPEG, TIFF, EPS or PDF files (resolution at least 300 dpi or higher).

Name: .................................................................................................................................

Company: ..............................................................................................................................

Address: ..................................................................................................................................

Fax: .............................................. Email: ...................................................... Date: ....................... Signature: ................................

Please e-mail completed form to:

INFOFISH - TUNA 2022
1st Floor, Wisma LKIM, Jalan Desaria, Pulau Meranti, 47120 Puchong, Selangor DE, Malaysia
Tel: (603)80668112 | Fax: (603)80603697 | E-mail: info@infofish.org
First commercial harvest from offshore farm

China – The first commercial harvest of 15,000 fish from Shenlan 1 (Deep Blue Number-1), China’s first offshore Atlantic deepsea salmon farm, took place in early June. The facility, based in the Yellow Sea off Qingdao, Shandong Province, houses approximately 100,000 Atlantic salmon.

“Unlike the netting operation in a traditional fisher, this particular salmon processing vessel uses a special pump to catch the fish,” said Li Hong, vice chairwoman of Shandong Farsea Aquaculture Company. The fish underwent initial processing on the vessel and were packed into insulated boxes to keep them fresh. According to Li, the entire process took 45 minutes. The salmon was transported to urban centres like Guangzhou, Beijing and Shanghai using both cold chain routes and airfreight, reaching primary distributors within 36 hours at the most.

At present, domestic demand for Atlantic salmon is mainly met through imports.

An investment of 115 million yuan (USD 17.7 million) was made for the cylindrical apparatus which is equal to 40 standard swimming pools and weighing 1,500 metric tons. Shenlan 1, which started as a pilot facility in 2018, is the world’s largest intelligent

NEW Jonsson System Peels Shrimp in All These Styles:

• Tail on round style
• Tail on 2 to 4 style
• Tail on 2 to 5 style
• Tail on peeled, not deveined style

Get the facts. Contact us today.

13822 W. LAUREL DRIVE
LAKE FOREST, IL 60045 U.S.A.
TELEPHONE 847.247.4200
FAX 847.247.4272
WEB www.jonsson.com
EMAIL sales@jonsson.com

NEW

Tail-on round

Tail-on 2 to 4 or 2 to 5

Tail-on, peeled not deveined

Credit: Sea Green

Shenlan 1 has a diameter of 60m and can hold up to 300,000 fish.
submersible aquaculture facility. It uses remotely managed systems to monitor fish biomass, breeding and relay of information in real time so that feeds can be adjusted according to circumstances. It is also raised or lowered to ensure that the salmon are reared in an optimal water temperature.

Farmers switch to black tiger due to disease

China – An outbreak of disease in southern China has resulted in farmers switching to *monodon*. In Taishan, Guangdong province, 9 out of 10 *vannamei* farms have been affected by the disease, resulting in nearly 60% of ponds being abandoned. In Zhanjiang district, the “capital” of China’s shrimp farming, farmers stocked 1 million seed, but only 30 000-50 000 shrimp survived, causing farmers to suffer heavy losses.

The disease appeared soon after farmers started stocking in late March and April. In April, in Xinhui, Guangdong, 30% of tested samples were infected with Vibrio disease while 8% of samples were infected with EMS possibly due to poor quality seed. Farmers have switched from whiteleg shrimp to black tiger shrimp; for example, in Hainan Province, up to 80% of shrimp farmers switched to black tiger shrimp farming and reported higher survival rates. This year’s annual growth rate of Hainan province is expected to reach 70-80 percent. Farmers in Guangxi and Fujian provinces also switched to black tiger shrimp farming. In Fujian, about 60% of shrimp farmers are engaged in black tiger shrimp farming. However, the future is uncertain as black tiger shrimp are also susceptible to Vibrio disease.

MOWI receives Compassion Award

Norway - Compassion in World Farming held a ceremony in London on 14 June to recognise its Good Farm Animal Welfare Awards. The awards aim to showcase the work of food businesses around the world that make genuine and meaningful improvements to the lives of farmed animals, and the sustainability of their supply chains. MOWI, the world’s largest producer of Atlantic salmon, received a Special Recognition Award after becoming the first producer to make global welfare commitments on the rearing and slaughter of the fish. The company uses a stun-kill percussive system, in accordance with Compassion’s recommendation, for all the salmon from all their farm sites and across all countries, to ensure they are humanely killed.

Compassion recommends a stocking density volume of an average of 10kg/m³ or less. MOWI is the first producer to commit to a global ‘free from confinement’ stocking density policy for Atlantic salmon, in line with these recommendations. They track stocking densities across all sites and countries at all times and their stocking densities, across their seawater sites have an average monthly standing stocking density of approximately 8kg/m³ in the MOWI Group—significantly lower than the maximum permitted stocking density of 25kg/m³ allowed in sea pens, thus providing the fish with more space to swim.

Trial farming of *vannamei* begins

Bangladesh - After a long wait, the experimental farming of *Penaeus vannamei*, also known as whiteleg shrimp, is set to begin in Chattogram. Shrimp exports rose by 34.63 percent year-on-year to USD 352.24 million in the first 10 months of the current fiscal year, according to the Export Promotion Bureau (EPB). It was USD 328.84 million in the last fiscal year, USD 333 million in 2019-2020 and USD 550 million in 2013-2014.

Planned adoption of CODEX AMR standards

Cambodia - Cambodia is one of six countries to join the AMR Codex Texts (ACT) project and intends to adopt CODEX AMR standards to support the containment and reduction of foodborne antimicrobial resistance. A range of stakeholders, including representatives from the government, farmers, academia and the private sector, convened a workshop in Siem Reap from 16 to 18 May 2022 to review the existing national efforts to contain AMR. The workshop was jointly organized by the Ministry of Agriculture Forestry and Fisheries and the Food and Agriculture Organization of the United Nations (FAO), as part of the AMR Codex Texts (ACT) project, which is supported by the Republic of Korea.
Fishing

FAO-NORAD collaboration in fisheries sector

Sri Lanka - FAO, with financial assistance from the Norwegian Agency for Development Cooperation (Norad), is providing technical support to develop capacities to implement robust Port State Measures to combat IUU fishing; increase resilience of the fisheries and aquaculture sector to climate change; and reduce food loss and waste along the fisheries value chain in Sri Lanka.

Secretary to the State Ministry of Fisheries Jayantha Chandrasoma noted that Sri Lanka’s fisheries industry is undergoing many difficulties due to the increase in fuel prices, production costs and the increase in prices of fish. “More than 50 percent of animal protein requirements of Sri Lankans are obtained through fish consumption and the increase in fish prices have impacted negatively on the affordability of fish and fisheries-related products, particularly for low-income groups”, he added.

Sri Lanka and the Maldives FAO Representative Vimlendra Sharan, highlighted that fishers who were struggling to keep their livelihoods afloat amidst numerous challenges such as climate variabilities, and most recently the COVID-19 pandemic, now see their profession rocked by the impacts of the economic crisis.

First all-female crew

Pacific Islands – On 13 June 2022, the world’s first all-female deck crew set off on their first fishing trip on a tuna longliner. This is the result of the cooperation between SeaQuest Fiji and the Pacific Islands Forum Fisheries Agency which seeks to begin addressing some of the issues creating the sizable gender imbalance in the Pacific tuna industry.

The fishing vessel has two experienced, male, deck crew trainers present to provide direction on safe procedures and handling of fish, and help run safety drills. The women will be out to sea for a two-week fishing trip.
This female crewing initiative is the first phase of a project that is planned to be progressively rolled out in other Pacific countries by the Pacific Islands Forum Fisheries Agency with local partners.

### Rising fuel crisis affecting tuna industry

**The Philippines** - Tuna fishermen from Mindanao have reported that the search for tuna has taken them and their crews to many areas in the Philippine Sea and even the Sulu Sea. Tuna production in the country has gone down over the past two years from 532,000 tonnes in 2019 to 462,400 tonnes in 2021. The Bureau of Fisheries and Aquatic Resources (BFAR) blames the decline in catches to the pandemic and climate change with erratic weather patterns forcing fishermen to venture further out in the ocean to catch tuna.

The Soccskargen Federation of Fishing and Allied Industries says that it has not been business as usual for the tuna industry although travel restrictions have been eased. The group says producers cannot cope with the higher operating costs due to the continued rise in fuel prices. The government is helping the tuna sector to recover by giving fishermen a fuel subsidy worth 3,000 pesos. The Agriculture Department is also stepping up the distribution of devices that will help fishermen to catch more fishes.

**Vietnam** - The Vietnam Association of Seafood Exporters and Producers (VASEP) reported that in Q1/2022, clams accounted for 66 percent of the volume of molluscs exported to the EU. The value was nearly USD 21 million, up 36 percent over the same period in 2021. Other leading destinations were the US, South Korea, Singapore, the UK, and Japan. Clam exports to Japan decreased, while exports to the remaining markets grew positively, particularly South Korea (+182 percent).

Vietnam’s largest markets in the EU were Italy, Spain, Portugal, the Netherlands, and Belgium. In the first quarter of this year, clam exports to Portugal fell slightly by 9 percent while exports to the remaining markets all grew by double digits from 33 percent-45 percent. In Q1/2022, Italy was Vietnam’s largest single clam import market, with USD 6.4 million, up 45 percent over the same period last year. Inflation and high food prices in the EU have made Vietnamese clams more attractive to customers and importers in the EU. This growth trend is expected to continue due to tax incentives from the EVFTA Agreement.

### Third biggest market for Norwegian seafood

**Thailand** - According to the Norwegian Seafood Council (NSC), from January to April 2022, Norway exported 8,385 tonnes of fresh salmon and fjord trout to Thailand valued at THB 2.8 billion. This represented an 81 percent increase in value from the same period in 2021. The numbers show promising market growth in Thailand and the country is now one of Norway’s top three markets after China and South Korea.

The NSC says that 21 percent of Thai respondents said that they bought salmon online through e-commerce websites or mobile apps “quite often” or “very often”. Some 59 percent of the respondents said that it was “very important” for stores to have quality fish and seafood brands. “Thai consumers remain very trendy and open to explore new options while quality is not to be compromised when it comes to food,” an official from the NSC said.

**Vietnam** - The Vietnam Association of Seafood Exporters and Producers (VASEP) reported shrimp exports worth more than USD 442 million in April 2022, up 47 percent over the same period last year. Over the first four months of this year, shrimp export turnover reached a record high of USD 1.4 billion, up 45 percent over the same period.

The top five markets were the US, Japan, EU, China and the Republic of Korea. The demand in the US is expected to remain strong this year, with VASEP projecting that shrimp purchases could increase by 10-12 percent with an export turnover of more than USD 4 billion. VASEP also forecasts that shrimp exports in the second quarter will reach about USD 1.2 billion, up 12 percent over the same period in 2021.
Vietnam: Shrimp exports in January-April (in million USD)

Source: VASEP

Online trade conference with RCEP markets

Vietnam - According to the Vietnam Times, on May 30 and 31, dozens of businesses from Vietnam, China, and the Regional Comprehensive Economic Partnership (RCEP) member countries participated in online exchange and trade sessions, which achieved positive results. The Consulate General of Vietnam in Shanghai coordinated with the Vietnam Trade Promotion Agency under the Ministry of Industry and Trade to organize the “Online trade conference between Vietnamese seafood enterprises and RCEP markets in 2022.” The conference was held with the participation of many businesses from Vietnam and Shanghai, China.

The event aimed to support localities and businesses in the field of seafood supply in Vietnam to strengthen their search for partners, business connections, and export market expansion.

In his remark, Le Hoang Tai, Deputy Director of the Vietnam Trade Promotion Agency said Vietnam was exporting seafood to more than 160 markets around the world, of which RCEP member countries account for over 63% of the market share. Exports to important markets, such as ASEAN countries, China, Japan, and South Korea, all have seen positive growth.

Particularly, in the first five months of 2022, Vietnam’s seafood export turnover reached around USD 4.5 billion, witnessing a more than 44.5% increase over the same period last year. Pangasius and shrimp alone reached roughly USD 2.8 billion. Chu Vinh Hung, Chairman of the Board of Directors of Shanghai Huashen Group, an agricultural, aquatic products and related services importer, emphasized the importance of cooperation and trade between...
China and Vietnam, as the two countries account for 50% of global aquaculture and make up a huge market of 1.5 billion people. Vietnam’s seafood exports to China in the first four months of 2022 reached USD 578 million, 94% higher than the same period last year.

Black tiger regarded as niche product in Europe

Europe - A report by CBI (updated March 2022; https://www.cbi.eu) entitled “The European market potential for black tiger shrimp” states that it used to be a mainstream product in the retail and food service industry, but now its markets have shifted, making it a niche product due to its distinctive colour, taste, texture and bigger size than whiteleg shrimp. Specific to the European market, black tiger shrimp, mainly produced in Asia and in Madagascar, is mainly consumed in Northwestern Europe and France.

The Netherlands, Belgium, Germany, France and the United Kingdom are the biggest markets, and more recently joined by Portugal. In 2020, these countries combined imported USD 262 million worth of black tiger shrimp, accounting for 94% of total European imports of black tiger shrimp. The total volume between these countries reached approximately 27 442 tonnes, of which 19 213 tonnes came from Bangladesh. Most black tiger shrimp is now imported into the Netherlands, where it sells mainly into the Asian wholesale market or is distributed onward into Europe.

In Europe’s ethnic Asian wholesale markets, black tiger shrimp has a stronger position than in the broadline wholesale market. Asian restaurants often favour the species and are less willing to shift to cheaper Pacific white shrimp. Especially the larger sizes of HOSO black tiger shrimp still have and are expected to maintain a strong position in Asian wholesale markets in the Netherlands, Germany and Belgium. Other black tiger shrimp products, like headless shell-on blocks and peeled products also still have good penetration in these countries.

The report also makes the point that at present, ASC-certified black tiger shrimp is almost only available from Vietnam. European importers await the opportunity to source from other ASC-certified origins, so that they become less dependent on Vietnam.

Thai Union invests in microalgae company

Thailand/Canada - Thai Union is investing CAD10 million in Canadian company Mara Renewables Corporation, as part of the latter’s CAD 39.5 million growth funding round. Mara is one of the world’s leading producers of sustainably grown algae-based bio-products. Since its inception in 2012, Mara has successfully built a portfolio of micro-algal strains, some of which are processed using a clean, environmentally-friendly extraction method into high quality algal oil. The plant-based oil offers a non-GMO vegan option for DHA-rich omega-3 fatty acids for human nutrition.

The investment creates opportunities for both companies to accelerate growth through cooperation in go-to-market, research and development and operations. Mara is exploring, for example, refining its crude algal oil at Thai Union’s state-of-the-art oil refinery in Rostock, northern Germany. Thai Union has also already been cooperating with Mara in Thai Union’s Omega-3 Center of Excellence at their headquarters in Samut Sakhon by performing successful trials using Mara’s crude algal oil.

Global seafood trade flows

A new edition of Rabobank’s World Seafood Map revealed a number of surprising changes from the previous map, which was published in 2019. “China remains the top exporter, which came as a surprise for us, as we’ve been predicting for a while that it would export less of its seafood – it has a huge, seafood-loving population and its people are getting richer. At the same time it has relatively small food production areas, so is not a natural exporter of seafood,” notes Gorjan Nikolik, Rabobank’s seafood analyst. “Even though their exports declined slightly in 2020, they rebounded again in 2021, to reach USD 21 billion – twice the value of seafood exports from the EU and four times more than was exported by the US,” he explains.
According to Nikolik, the main farmed species driving this export value from China were crustaceans such as shrimp and crayfish, while in wild capture, much of the value was accounted for by reprocessed whitefish, such as Alaskan pollock. Meanwhile Norway came in second place in seafood export value terms, registering exports worth USD 13.5 billion in 2021 – up from USD 9 billion in 2015 – largely due to the increasing prices being fetched by farmed Atlantic salmon in the 2016-2018 period.

Although the EU-27+UK remains the largest seafood buyer by value, importing seafood worth over USD 34 billion in 2021, since 2013, it has grown at a CAGR of only two percent, while in the last five years, the US and China exhibited CAGRs of 6 percent and 10 percent, respectively, each roughly doubling the total value of their imports. Nikolik notes that in both cases premium seafoods have helped to drive the increased import values.

**FAO launches tools to help in management of stocks**

The release of two tools were announced by FAO recently: AquaGRIS and the FIRMS Global Tuna Atlas, both intended to help users to gather information on fish stocks and aid in sustainability efforts.

AquaGRIS is a global information system which collects, organizes and shares global information on genetic resources from farmed types and wild stocks of farmed species. It has great potential in producing more effective global responses to emerging challenges in fisheries and aquaculture, such as the need to ensure effective management of biodiversity. It provides the user with access to a database of primary and secondary farmed types for over 600 aquaculture species. The current release of AquaGRIS is a prototype containing information on a subset of species. It will need government support to be populated with national data in order to become a comprehensive database serving researchers, the public and private sector, policy makers, and international organizations in their efforts to support biodiversity and promote more effective resource management in fisheries and aquaculture.

The Atlas is produced by FAO’s Fisheries and Aquaculture division, drawing from the FIRMS Partnership (Fisheries and Resources Monitoring System) under which the five Tuna Regional Fisheries Management Organizations collaborate.
to share their data. The objective of FIRMS is to provide quality public information on the global monitoring and management of marine fishery resources. The Atlas offers a comprehensive overview of the catches of tuna and tuna-like species dating back as far as 100 years in some areas. It includes data on 50 common species with information on up to 150 species in total. It aims to support the monitoring of activities and production of industrial and, increasingly, artisanal fisheries targeting tuna and tuna-like species.

**FAO looks at new ways to develop seaweed aquaculture**

As aquaculture continues to expand globally, FAO is looking at new opportunities and mechanisms to support seaweed aquaculture development and recently held its first-ever forum to identify opportunities and challenges for the sector.

Improving seed supply, developing licensing regulations, value-added product development and better market access were among the issues discussed at the first Seaweed Aquaculture Policy Dialogue hosted by FAO’s Aquaculture Technology and Production team (NFIAT) in May. During the dialogue, participants noted that seaweed aquaculture should be further developed by:

- Improving seed supply to increase production and resilience;
- Developing market access and consumer demand;
- Supporting appropriate regulations to enable licensing;
- Training farmers and strengthening technical expertise;
- Supporting evidence and developing options for seaweed as a nature-based solution;
- Promoting international collaboration to share knowledge and lessons learnt; and
- Recognizing FAO’s important function as a facilitator of international collaboration.

Twenty countries from Asia and Africa were invited to nominate delegates from government, academia and industry to attend the dialogue.

**ASC announces new Shrimp Standard**

**World** - The Aquaculture Stewardship Council (ASC) has published two new updates to its Shrimp Standard, as well as new requirements specifically for recirculating aquaculture system (RAS) farms.

Four new genera (*Cherax*, *Procambarus*, *Astacus* and *Macrobrachium*) have been added to the Standard, which effectively means that 99 percent of globally farmed shrimp are now covered by its scope. Other updates to the Standard ensure that current best practices are reflected. In a press release, the ASC said that “The Shrimp Standard revisions mean that freshwater crayfish and freshwater shrimp farmers can now work towards ASC’s stringent requirements for responsible farming, with the addition of new species to the Standard. The requirements for RAS operations will ensure that ASC certification takes into account the unique impacts of this method of farming, which is growing in popularity around the world.”

The Shrimp Standard is a certification process that encourages seafood producers to minimize key environmental and social impacts of shrimp aquaculture, include challenges to biodiversity, full traceability in wild fish in feed, measurement of pollution, minimization of disease outbreaks, restricted use of antibiotics, and prohibition of forced labour or child labour.

With regard to RAS farms, ASC has developed a module that includes new requirements that apply specifically to these farms. These requirements include monitoring of energy use, developing strategies to reduce emissions, and minimizing negative impacts on water resources. To achieve ASC certification, RAS farms will have to meet the requirements of the RAS module, as well as the ASC Standard covering the species they are farming.

**WTO talks end with unprecedented agreement on fisheries subsidies**

The World Trade Organization’s 12th Ministerial Conference (MC12) ended on 17 June, securing multilaterally negotiated outcomes on a series of key trade initiatives including decisions on fisheries subsidies, WTO response to emergencies, food safety and agriculture, and WTO reform.

A 9-page “Agreement on Fisheries Subsidies: Draft Ministerial Decision of 17 June 2022” was a major outcome
of the Conference. Among the salient points are:

- Article 3.1: No Member shall grant or maintain any subsidy to a vessel or operator engaged in illegal, unreported and unregulated (IUU) fishing or fishing related activities in support of IUU fishing;

- Article 4.1: No Member shall grant or maintain subsidies for fishing or fishing related activities regarding an overfished stock;

- Article 4.4: For a period of 2 years from the date of entry into force of this Agreement, subsidies granted or maintained by developing country Members, including LDC Members, up to and within the EEZ shall be exempt from actions based on Article 4.1;

- Article 5.1: No Member shall grant or maintain subsidies provided to fishing or fishing related activities outside of the jurisdiction of a coastal Member or a coastal non-Member and outside the competence of a relevant RFMO/A;

- Article 7: Targeted technical assistance and capacity building assistance to developing country Members, including LDC Members, shall be provided for the purpose of implementation of the disciplines under this Agreement. In support of this assistance, a voluntary WTO funding mechanism shall be established in cooperation with relevant international organizations such as the Food and Agriculture Organization of the United Nations (FAO) and International Fund for Agricultural Development. The contributions of WTO Members to the mechanism shall be exclusively on a voluntary basis and shall not utilize regular budget resources.

Negotiations towards banning subsidies that encourage overfishing and threaten the sustainability of global fish stocks have been under discussion at the WTO for more than two decades.
European Price Report (EPR) is a monthly bulletin with comprehensive coverage on European markets. Produced by FAO-Globefish, EPR reports on market trends and prices for coldwater as well as tropical species namely cod, hake, Alaska pollack, herring, farmed salmon/trout, European sea bass/sea bream, tuna, tropical shrimp and cephalopods and more.

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

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

// SUBSCRIPTION FORM

**Annual Subscription Fee**

- On-line □
- E-mail □
- Airmail □

INFOFISH Member Countries*..........................USD 320
Other Developing Countries...........................USD 420
Industrialised Countries...............................USD 520

*Bangladesh, Cambodia, Fiji, Iran, Maldives, Malaysia, Pakistan, Papua New Guinea, Philippines, Solomon Island, Sri Lanka, Thailand.

☐ Bank draft (drawn on US bank) payable to INFOFISH

☐ Telegraphic Transfer to INFOFISH

Account No: 512772514667, Malayan Banking Berhad, H-01-09&10, Jalan Prima 5/4, Taman Puchong Prima 47100 Puchong, Selangor Darul Ehsan, Malaysia | SWIFT CODE : MBBEMYKL

Important: i) If your banker is remitting payment on your behalf, please give specific instructions to indicate name and address of sender.

ii) Bank charges for both ends are to be borne by sender.

☐ PayPal (kindly provide copy of the transmission)

Name:

Company:

Address:

E-mail:

Tel:          Fax:

Type of Business:

Please return to:

Street Address: 1st Floor, Wisma LKIM, Jalan Desaria, Pulau Meranti, 47120 Puchong, Selangor D.E. Malaysia.

Phone: (603) 80668112  E-mail:info@infofish.org

Website: www.infofish.org
With the participation of some 249 delegates (in person, 140 and virtual, 109) from 33 countries covering five continents, 35 speakers and 7 moderators, as well as 14 exhibitors, the 6th INFOFISH World Shrimp Trade Conference and Exposition (SHRIMP 2022), accomplished its purpose in a befitting manner at the Everly Putrajaya Hotel, Malaysia. Themed ‘Recovery through resilience and innovation’ the hybrid conference attracted participants from all facets of the shrimp industry who discussed the emerging issues, production trends and market directions in the global shrimp industry. The event was also a useful and timely platform to present updates for stakeholders on investments and partnerships during this post-COVID-19 recovery period.

SHRIMP 2022 was hosted by the Fisheries Development Authority of Malaysia (LKIM) and jointly organized by Department of Fisheries (DOF), Thailand; the Network of Aquaculture Centers in Asia-Pacific (NACA); China Aquatic Products Processing and Marketing Alliance (CAPPMA); as well as supported by Indonesian Aquaculture Society (IAS); Vietnam Association of Seafood exporters and Producers (VASEP).

In her welcome address, Ms Shirlene Maria Anthonysamy, Director, INFOFISH, expressed the organization’s appreciation for the presence of Hon. Datuk Seri Haji Ahmad Bin Hamzah, Deputy Minister of Agriculture and Food Industries; Malaysia; Tuan Haji Yusoff Bin Othman, Director General, Fisheries Development Authority of Malaysia; and Mr Praphan Leepayakhun, Deputy Director General, Department of Fisheries, Thailand. She also thanked the media partners: Aquaculture Asia Pacific; Aquafeed & HATCHERYFEED; Aquaculture Magazine; and Camara Nacional de Acuacultura (CNA), Ecuador and the sponsors: RYANAN Technologies (Platinum), I & V Bio Co. Ltd (Gold), Marine Instruments, AQUA PHARMA GROUP and NEKMAT (Silver) and DelstAsia (Support) for their exceptional collaboration, support and promotion during this significant global event.

Mr Jose Antonio Camposano, Executive President, Camara Nacional de Acuacultura (CNA), Ecuador and Chairman of SHRIMP 2022, mentioned in his welcome speech that “Undoubtedly the last two years have shaped our industry as has happened with many others. The sector had to change its mindset forever and needed to strengthen its commitment to produce healthy and safe protein for consumers. The year 2021 was full of challenges such as the supply chain disruptions that we had to face; however, 2022 has shown considerable recovery. Our economy has been influenced by three major factors which have threatened to limit our ability to adapt and to innovate: (i) The Russian invasion into the Ukraine which increased production costs while restricting the supply of various raw materials; (ii) Worldwide inflation is affecting consumption capacity and will hamper expected recovery; and (iii) the ongoing lockdowns and restrictions applied by China during the outbreak of the Omicron variant reminds us that the pandemic is still not a thing of the past. We have to work together to reduce the indiscriminate use of antibiotics, keep finding sustainable alternatives to fish meal, increase the presence of traceable products, and develop better breeding methods for fishery species”.

The Deputy Minister, Hon. Datuk Seri Haji Ahmad Bin Hamzah, inaugurated the SHRIMP 2022 conference by saying that “Malaysia is truly humbled and proud to have been selected as the host of the first hybrid global SHRIMP event. The last time the country was in a similar position was
in 1988 when the first SHRIMP conference was organized by INFOFISH. As much as Malaysia rapidly progresses towards sustainable use of fisheries resources aligned with the National Agriculture Policy (NAP 2.0, this event is relevant and timely for Malaysia”.

Mr Praphan Leepayakhun, Deputy Director General, Department of Fisheries, Thailand, said that the “Ministry of Agriculture and Cooperatives, Thailand, has declared the marine shrimp sector as the top priority and has set a 400 000-tonne production target to recover the shortfall by 2023. We agree that innovation should be incorporated in the primary production chain, coupled with awareness about environmental impacts and encouraging farmers to use alternative energy sources e.g., solar cells as well as providing financial support to ensure food security and job security.”

In his Keynote Address, Dr Audun Lem, Deputy Director, Fisheries and Aquaculture Division, FAO, Rome, Italy spoke of the longstanding relationship between FAO and INFOFISH; and reminded participants that 2022 is the International Year of Artisanal Fisheries and Aquaculture (IYFA 2022). Dr Lem also underlined the three core areas: (i) demand and supply of shrimp remained remarkably resilient throughout the COVID-19 period as global shrimp production topped 10 million tonnes in 2020 and aquaculture production increased by 9% in 2021; the outlook for 2022 is expected to exhibit the same possible growth of 10% despite disease outbreaks in some countries; (ii) The pandemic has accelerated efforts towards creating digitalization of the sector, and throwing out the traditional value chains; (iii) The Ukraine war has created a ‘catastrophe on top of catastrophe’ with the global impact being limited food availability and a global food security crisis. The seafood sector has shown remarkable ability to adapt in the past and will surely do so again.

The outlook is positive but Asia needs to address its failure rate

Rising production costs (feed, seed, energy, labour etc) and global competition coupled with inflationary pressures continue to pose challenges for both shrimp producers and consumers. It has become clear that the future of the shrimp sector is critically linked to other sectors (for example, water, energy and agriculture) pointing to the need for planning to adopt a holistic cross-sectoral and coordinated approach. In 2022, reopening of the food service sector and easing of restrictions have boosted consumer demand. Slower-than-expected economic growth poses new challenges for the industry and major markets are seeing reduced predicted growth rates as well as higher inflation which have reduced consumers’ disposable income. However, despite all the difficulties, the long-term perspective is positive for shrimp. Strong, underlying demand in most markets, new product forms and a dynamic food service sector is boosting demand, leading to new opportunities for producers.

Session 2 of SHRIMP 2022, chaired by Dr Zuridah Merican, Editor, Aquaculture Asia Pacific Magazine, ended with eight presentations followed by a question and answer session. Speakers discussed the challenges and issues in shrimp production in China (Dr Cui He, President, China Aquatic Products Processing and Marketing Alliance, CAPPMA); Ecuador (Ms Yahira Piedrahita, Executive President, CNA, Ecuador); India (Dr Manoj M Sharma, Managing Director, Mayank Aquaculture Pvt Ltd.); Indonesia (Mr Sudari Pawiro, National Chief Technical Advisor of UNIDO, GQSP SMART-Fish-2); Vietnam (Ms Le Hang, Deputy Director, VASEPPRO and Chief of Information and Communication Department, VASEP); and Asia (Dr Robins McIntosh, Executive Vice President, C.P. Group, Thailand). The major key shrimp markets – USA (Ms Sophia Balod, Editor-in-chief and Analyst, Kontali) and Europe (Mr Willem van der Pijl, Senior Shrimp Industry Analyst & Founder, Shrimp Insights) – were emphasized.

China has changed from being a net exporter to a net importer. The growth of China’s imported seafood (including imported shrimp) will continue for the long-term. Innovation is found to be the key in the Chinese shrimp industry which is now seeing high production efficiency (22 500 kg/ha – 37 500 kg/h). The country is reducing the effects of climate change, as well as improving SPF broodstocks and breeding techniques, disease diagnostic techniques, biocontrol technology; and applying the polyculture model (shrimp farming with other species) for sustainability.

The sustained growth in the Ecuadorian whiteleg shrimp production sector is attributed to the new and best practices throughout entire value chains that have been developed and implemented in recent years. Emphasis on traceability will help to maintain continuous growth and offer consumers safe, traceable and nutritious food.

Although India is one of the largest shrimp producers, the country needs innovation to improve shrimp production (currently about 5 000 kg/ha). The sector also needs to further explore domestic market possibilities in order to boost shrimp consumption.

The Indonesian government, along with support from international organizations such as UNIDO SMART-Fish-2, has taken collaborative efforts to increase shrimp production (889 000 tonnes in 2020, according to the Ministry of Marine Affairs and Fisheries) and productivity by establishing the Special Shrimp Task Force, a shrimp cluster approach, infrastructure improvement and IndoGAP. The country is also targeting an increase in its shrimp export value to USD 4.3 billion by 2024-25.

Vietnam’s shrimp production in 2021 was 9.31 million tonnes valued at USD 8.8 billion (USD 12 billion by 2025). However a drop in shrimp prices and increased production costs (e.g., commodities, energy, wages) are expected and a
holistic cross-sectoral and coordinated approach will be the key for success in the Asian shrimp industry. Seafood is part of a healthy diet and the US ranks as one of the top seafood-consuming (8.6 kg per capita in 2020) nations globally. India, Indonesia and Ecuador are the top suppliers to the US. Online retail and pre-packed items will remain in demand, driven by strong e-commerce trends. However, the logistics bottlenecks such as high freight costs and inflation might limit suppliers and consumers in the US market, respectively.

Meanwhile, South American (20,475 tonnes in 2021) suppliers look set to take over from Asia (22,537 tonnes in 2021) in the European markets. One major reason is the perception of South American shrimp as being better than Asian shrimp in terms of risk, quality and sustainability.

‘One size does not fit all’ and need to use ‘common sense’ for intensification

The ‘Aquaculture Technologies for Sustainable Intensification’ Session on the second day of SHRIMP 2022, was chaired by Dr Robins McIntosh, Executive Vice President, C.P. Group, Thailand. Dr Daniel Gruenberg, Aquavative Technologies, Bangkok, Thailand, delivered the session’s keynote presentation, followed by technical presentations from Dr Morten Rye, Director of Genetics, Benchmark Genetics, Norway; Dr Patrick Sorgeloos, Emeritus Professor of Aquaculture, Ghent University; and Mr Giva Kuppusamy, Founder and CEO, GK Aqua Sdn Bhd Malaysia, and then a question and answer session.

Sustainable intensification is required to improve biosecurity, increase production, cope with increasing land prices and high energy consumption, and ensure stable supply. In formulating advanced breeding programmes for aquaculture, what producers look for in terms of growth performance, robustness, quality and animal welfare, should be given priority. Microbial management and integration in farming is necessary. Green energy, a circular economy and integration of species and production systems should be taken into consideration during aquaculture technology development using a ‘common sense’ approach.

**Precision farming is the way to go**

Some of the key messages in succeeding sessions were that innovations are ‘key to aquaculture’; ‘the future is bright’; and stronger ‘producer-consumer organizations’ or clusters are needed. To start with, more robust investment in aquaculture R&D is needed in many Asian countries. Having the right software to collect and analyze accurate, real-time data is essential for better productivity, superior monitoring, decision-making and greater transparency so as to drive profitability and sustainability in the seafood industry.

‘Aquaculture Innovations’ were at the heart of the discussions on Day 2 (Session 2) of SHRIMP 2022. Dr Lionel Dabbadie, Senior Aquaculture and Fisheries Officer at FAO Sub-Regional Office for GCC States and Yemen, chaired this session. There were technical presentations from Mr François Vervial, co-founder and COO at AquaEasy Pte Ltd., Singapore; Mr Eric Enno Tamm, CEO and co-founder of ThisFish Inc., Canada; Mr Jorge Perez Bouzada, Sales Director, Marine Instruments, Spain; and Dr My T. Nguyen, Chairman, Rynan Technologies Singapore/Vietnam; followed by a question and answer session. Dr Salin Krishna, Associate Professor and Program Chair, AIT, Bangkok, Thailand presented the session keynote at the start.

**Digitization, diversification, and innovation are key lessons from COVID-19; circularity is the key for sustainable marine ingredients**

Dr Audun Lem, Deputy Director, Fisheries and Aquaculture Division, FAO, Rome Italy, chaired Session 3 of Day 2, where ‘Sustainability and Social Accountability’ were the main focus. There were four technical presentations from Dr Brett Glencross, Technical Director of IFFO, UK; Mr Roy van Daatselaar, Global Improver Programme Manager, Aquaculture Stewardship Council, The Netherlands; Mr Ernesto Julio Godelman, Founder and CEO, CeDePesca, Argentina; along with a question and answer session. Dr Ben Belton, Global Lead, Social and Economic Inclusion with WorldFish and Michigan State University, opened the session with a keynote speech.

With a (relatively) fixed resource base for marine ingredients, further product differentiation and specialist products will generate additional value. Certification agencies (e.g. the Aquaculture Stewardship Council) can develop innovative group certification methodology to provide small-scale farmers with a more cost-effective certification option. The group certification allows groups/clusters of farmers to share the cost of certification; and the group certification is only allowed for small-scale producers (i.e. household-level farming without permanent workers).

**More from less: Need to expand knowledge-base in advancing feed and nutrition**

There is growing need to reduce reliance on imported raw materials and to continue to produce more shrimp from less water, less land and less energy. The optimization of feed is required in the aquafeed sector, and production efficiency can be enhanced by using technologies like Forensic Feed Science for feed processing through feed imaging. In addition, there is a need to continue to reduce feed costs/unit of shrimp in the production cycle. Biosecurity as a part of health management depends on seven key considerations: shrimp, diet, air, water, people, system and equipment especially with regard to larvae production from broodstock to growout. Education is the key in early pathogen detection so that farmers can decide on management and harvest options.
‘Advancing Feed and Nutrition, Biosecurity and Disease Management’ was the focus on Day 3 (Session 1), chaired by Dr Kabir Chowdhury, Aquafeed and Nutrition Expert, Canada. There were five technical presentations from Dr Chowdhury; Dr Craig Browdy, Director of Research and Development, Zeigler Brothers Inc., USA; Mr Steven Goh, Managing Director, DelstAsia Sdn Bhd, Malaysia; Professor Dr Andy Shinn, Senior Technical Support Manager (Disease Management) INVE Thailand; and Dr Melony Sellars, CEO & Managing Director, Genics Pty Ltd. Australia, followed by a question and session. Dr Chowdhury opened the session with a keynote presentation.

Innovations – through collaboration, exploration, learning and investment – will drive resilience

Documenting what worked and what didn’t, identifying the gaps, and looking at solutions and responses is an important part of building back stronger and making the sector more resilient to future shocks. We need to make the short-term responses into longer-term and embed innovations that better protect supply chains, producers, consumers, and systems; and most importantly for those who have less options for their nutrition and livelihood security. This is where innovation will emerge if we foster it. We can help strengthen sustainable seafood by making it far more resilient for the future if we can pull together and invest in innovation collaboratively.

‘Meeting the COVID-19 challenges through innovations’ were highlighted on Day 3 (Session 2) of SHRIMP 2022, chaired by Mr Roy D Palmer, Founder, Association of International Seafood Professionals (AISP) and Ex-Director, Aquaculture without Frontiers (AwF). There were four technical presentations from Mr Chuck Anderson, Vice President, Sales and Operations, Certified Quality Foods, USA; Mr Alastair Smart, Managing Director, SmartAqua and Founding Partner, Eachmile Technologies, Singapore; and Mr Gregory Brown, Executive Director, Global Dialogue on Seafood Traceability (GDST); followed by a question and answer session. The session keynote presentation was by Ms Melanie Siggs, Director, Global Seafood Alliance (GSA).

COVID-19 created opportunity for investments; growth recovery can be ensured through larger partnerships and collaborations

Partnerships for various reasons (policy, knowledge, grants, innovation, technology, experts etc) with necessary key stakeholders in the aquaculture sector is necessary to improve business, collaboration, performance and establish trust. The agenda for greater partnerships is that it offers solutions to real sustainability problems (transparency/traceability); offers cost-sharing opportunities; and the impacts are more, which means more returns as well. Aquaculture insurance is required because of problems, consequences and risks faced by fish farmers and small-scale aquaculture farmers.

The topic of ‘Growth recovery through partnerships and innovations’ was highlighted on Day 3 (Session 3) of SHRIMP 2022, chaired by Dr Simon Funge-Smith, Senior Fishery Officer, FAO Regional Office for Asia and the Pacific. There were four technical presentations from Dr Flavio Corsin, Director of Partnerships, AquaSpark, The Netherlands; Mr Dylan Howell, Global Aquaculture Market & Industry Expert HATCH Blue, Singapore; and Ms Suchitra Upare, Coordinator, CAFI-SSF, FAO; followed by a question and answer session. Dr Xinhua Yuan, Senior Aquaculture Officer and Team Leader, Aquaculture Technology and Production, Fisheries and Aquaculture Division, FAO, started this important session with the keynote presentation.

In summary: Technological and digital literacy; financing; and resilience for all

Mr Jose Antonio Camposano, Executive President, National Chamber of Aquaculture, Ecuador, and Chairman of the 6th INFOFISH World Shrimp Trade Conference and Exposition (SHRIMP 2022), concluded by saying that “rapidly growing technologies will provide better opportunities and better chances for small-scale operations to become more effective and more competitive. But the need for technological and digital literacy; and gaining access to financial resources and technologies still constitute major challenges at the same time. The hope is that change will continue to happen in the dynamic shrimp industry. The industry was resilient during the last two years and it is our responsibility to address issues as they arise, as well as bring appropriate technologies to small-scale fishers”.

Top: The Deputy Minister of Agriculture and Food Industries visiting a booth at the Exhibition; Bottom: A view of the participants who were there in-person at the hybrid event.
MAS - Marine Acoustic System

INTELLIGENT FEEDING SYSTEM FOR SHRIMPS

1. **MAS** MAS increases the profitability of shrimp farms by up to 40%.

2. **MAS** achieves maximum shrimp growth rate and shortens the shrimp production cycle.

3. The initial investment is recovered in less than two cycles! Possibility of financing.
REGENERATION OF KELP FORESTS USING SEA URCHIN SHELLS IN SHAKOTAN, JAPAN

By Tomohiro Asakawa

Shakotan, a small fishing town in western Hokkaido, was faced with a problem which sea urchin harvesters all over the world will be familiar with: roes becoming smaller and more inferior in quality as the urchins over-forage on depleting kelp forests. At the same time, the industry in Shakotan had to find a way to dispose of urchin shells left behind after roe harvesting. The town developed an environmentally sustainable and unique solution to these problems. Urchin shells were used to make an underwater fertilizer which successfully regenerated kelp growth; sea urchins returned to feed on the kelp, and the roe production increased by 48% with improved quality.

However, roe production became inconsistent due to the sea urchins continuously feeding on the kelp forest and causing it to shrink. The urchins on the deserted kelp beds become underfed and deficient in nutrition; consequently, the proportion of sea urchins yielding poor quality roe continued to increase. At the same time, roe harvesting produced huge industrial wastes including about 100 tonnes of sea urchin shells, the disposal of which had to be addressed by fishers and processors. Sea urchin shells are rich in nutrients, including nitrogen and phosphorus.

The industry in Shakotan responded with an innovative project aimed at maintaining its output of good quality roe as well as utilizing the dried sea urchin shells. Rather than discarding the shells, the town developed a unique underwater fertilizer whose application to deserted rocky shores successfully reproduced kelp (Saccharina japonica var. religiosa). In the experiment, kelp on the treated rope grew 1.3 to 3.7 times faster than on untreated rope. Sea urchins returned to feed on the kelp, and the roe production increased by 48% with improved quality. Overall, the system recreated a complete and sustainable life cycle of kelp and sea urchin with zero emission and blue carbon while at the same time, reducing industrial waste. This project was categorized as an initiative to “Promote Utilization of Fishery Waste,” in which the Japanese government provided funding to assist local revitalization.

Production of the underwater fertilizer

The fertilizer, consisting of crushed sea urchin shells and natural latex, adds nutrients which improve the growth of kelp beds in the area, including for Hosomekombu kelp (Saccharina japonica var. religiosa), which is a natural feed for sea urchin. It is low in cost to manufacture, and fishers can produce it efficiently. The town experimented with two types of fertilizer; one involving ropes treated with the fertilizer for
Kelp farming, and another was in blocks which were placed on rocks to regenerate kelp forests to attract sea urchins.

Experiments were carried out to determine the effectiveness of the sea urchin underwater fertilizer in regenerating kelp growth. In these trials, ropes treated with the fertilizer mix were lowered into the water at the test sites.

Conventional kelp farming in Hokkaido uses ropes. Wild kelp is harvested to collect seedlings on threads in the on-shore facility. When the seedlings grow 3-5 millimeters after about 40 days, farmers attach the threads to ropes and place the ropes in the oceans for commercial farming.

The production process is as follows:

- Crush sea urchin shells to powder and keep in fresh water for one hour;
- Immerse cotton ropes in this liquid for one hour and dry;
- Apply separately prepared dried sea urchin shell powder mixed with natural latex liquid to the ropes; and
- Before the liquid dries, apply the powder once more to the ropes and dry.

For fertilizer production in blocks to be placed on the rocky shores, the town selected natural latex as a solidifier because microorganisms break it relatively quickly, integrating it into the raw material cycle. Mix crushed sea urchin shells with 2-3 times the amount of freshwater-diluted natural latex. The mixture is placed into containers such as buckets, then dried naturally.

The mixture is placed in containers such as buckets, then naturally dried.

Credits: Shutterstock/ Photossee

Cotton rope treated with dried sea urchin shell powder and latex

Credits: Shutterstock/ Photossee

Treated ropes were lowered into the water at the test sites

Kelp growth at experimental site

Before experimenting, after obtaining the consent of the local fishery cooperative, the fishers discussed the handling of the experiment plan under the relevant laws and regulations with the government agencies of Hokkaido and the town. They also reported to the Japan Coast Guard. In December 2019, fishers placed fertilizer blocks on barren rocks in the selected test area. By March 2020, a kelp forest had grown within a 5m² area, and each blade length was about one metre. Two months later, sea urchins started feeding on the kelp.
A similar experiment was conducted in the same month, but this time in waters where kelp spores were scarce to determine the fertilizer’s effectiveness in a different environment. In March 2020 at this second test area, no kelp growth was observed, indicating the limitation of the fertilizers in waters where there are insufficient kelp spores.

In July 2020, sea urchins were harvested from the two areas. In the first area (fertilized ground), 53 sea urchins weighing 3.26 kg produced 0.76 kg of high-quality roe, representing a gonadal somatic index (GSI) of 23.3%. Meanwhile, 52 specimens weighing 3.06 kg harvested from the non-fertilized ground, produced 0.48 kg of roe with 15.7% GSI. The results indicated that sea urchin grown in the fertilized ground had 1.48 times more GSI against the roe from urchins in non-fertilized ground. In other words, the fertilizer resulted in about 50% more production as well as higher quality roe.

Over two years, the fishers also studied the growth of cultured kelp using ropes treated with sea urchin shell fertilizer. In May 2019, treated ropes resulted in 48.3 kg kelp, whereas untreated ropes produced only 13 kg of growth. By June 2020, the kelp growth had risen to 59.7 kg for the treated ropes against 46.3 kg on untreated ropes. This experiment proved that the nutrients in sea urchin shells effectively increase the production of farmed kelp. Town officials were encouraged to apply the fertilizer to more kelp beds where sea urchins had destroyed the kelp forest.

**A blue carbon farming future for Shakotan**

The sea urchin shell fertilizer reduces industrial waste, has no negative impact on the shore environment, is low-cost and easy to manufacture by fishers, flexible in size and shape, and does not require any special machinery for placement. The kelp forest also helps in sequestering carbon dioxide. Moreover, the town officials are proud to see the revitalization in the shore environment. In 2020 and 2021, 11 districts outside Hokkaido experimented with growing cultured marine plants, including *Undaria* sea mustard, employing Shakotan’s technology.

A Shakotan town executive said, “At first, we were skeptical about the effect of sea urchin shell fertilizer, but we saw that the experiment was successful in regenerating the kelp forest. In the future, we would like to continue such activities to make sea urchin fishing sustainable and to protect the environment with blue carbon.”

---

**Mr Tomohiro Asakawa** is President of TA Pacific Co., Ltd., a seafood international trade consulting firm based in Hayama, Kanagawa Prefecture, since 2015. The company advises Japanese and overseas seafood trading firms and contributes seafood industry reports to a fishery news publisher in the United States. After obtaining his degree in mathematics from the University of Oregon (USA) in 1975, Mr Asakawa worked as Director/International Trade Manager for a trading company in Tokyo; and Market Development Officer at the Alaska State Tokyo Office. From 1987 to 2015, he was appointed Commercial Specialist responsible for the fisheries industry at the US & Foreign Commercial Service, US Embassy, Tokyo; and reported to the NOAA Fishery Service, US Department of Commerce. Between 2015 and 2022 he was the Deputy General Secretary, Japan Aquatic Products Export Council, Japan Fisheries Association.
INSTANT ARTEMIA

INSTART 1
LIVE INSTANT ARTEMIA
Easy and Consistency

INSTART Energy
LIVE INSTANT ARTEMIA ENRICHED
Enriched with Selco Spirulina, Vit.C, Antioxidants Herb extracts, Selenium yeast

M-Bryo
FRESH DECAPSULATED ARTEMIA CYSTS
Intact membrane
No leaching

✔ Ready to feed
✔ Vibrio, EMS, EHP free
✔ Daily delivery
✔ DIV1 free

www.iandv-bio.com
e-mail: sales@iandv-bio.com
FORENSIC FEED SCIENCE – EXPOSING THE PROBLEMS

By Steven Goh and Victoria Dentstaporn

According to the authors, most of the feed used in Asian shrimp aquaculture are poorly processed. Forensic feed science, which was recently developed to assess the quality of processed feeds, clearly illustrates this fact. Feed quality is often overlooked as a major contributing factor to important concerns of the industry such as disease outbreaks, low survival rates and poor productivity. Instead, the blame is frequently directed at farmers for inadequate farm management. While the addition of some nutritional feed additives is beneficial, proper processing of starch and protein in compound feed formulations is of equal importance. Feed processing plays a pivotal role in the processed feed quality.

Shrimp production continues to suffer significant economic losses due to the impact of a wide variety of diseases. Too frequently, the manifestation of disease has been blamed on farmers for poor strategies in areas such as the pond carrying capacity, water quality, feeding management and waste management.

A link has been established between WFS (White Faeces Syndrome) and dysbiosis – an imbalance in the microbiota of the shrimp’s gut. Floating white faeces, loose shells, parasitic infections, stunted growth and very high mortality are often seen with WFS. The aetiology of WFS largely remains unclear. Relatively higher burdens of the microsporidian Enterocytozoon hepatopenaei (EHP), and bacteria from the genera Vibrio and Propionigenium have been isolated in shrimp afflicted with WFS as compared to healthy shrimp. An altered microbial flora with less diversity was also observed. However, a definitive cause could not be pin-pointed.

Shrimp farmers spend copious amounts of their profits in disease prevention and mitigation. Feed producers devote much of their time and effort into improving their feed via the addition of functional ingredients to restore and repair the shrimp gut microbiota. While these steps certainly help in alleviating disease severity and pathogen load, there is an uncharted territory – an area ignored by most, yet could revolutionize the shrimp industry as we know it today.

Forensic Feed Science – A novel concept

The processed feed quality is always not looked into in detail as a possible major contributing factor to the onset of disease. This topic lacks widespread discussion, due largely to the lack of methods and understanding in navigating feed quality. Instead of working blindly, a novel feed imaging method now provides good macro details for feed manufacturers to better gauge the quality of their processed feed, and to make improvements.

Forensic Feed Science has exposed problems that would send shock waves through the shrimp industry. Imaging of feed collected from feed mills around Asia show that 98% of feed is not well processed (Figure 1). This begs the question as to whether the correlation between feed quality and animal growth, health, productivity and disease has been grossly neglected.
Images show shrimp feed captured using Feed Imaging. Notice the high amount of undissolved crystalline starch particles, darkened colour, very poor intra-particle bonding inside the entire pellet, and very visible birefringence of incomplete melting of amorphous starch.

Common problems observed include:

- Very poor processing of starch with poor starch gelatinization and a high percentage of resistant crystalline starch
- Poor pellet binding
- Maillard reaction that impacts the protein quality

Inadequate mash/starch granule hydration is believed to be the problem in thermal feed processing, which leads to failures in achieving proper chemistry changes to starch and protein. We developed a patent-pending concept to address mash hydration for effective starch gelatinisation, which also enhances feeding value and nutrient value of processed feed. Improving the starch-protein matrix produces a strong “super-glue” necessary for intra-particle bonding within the pellet, without the need for pellet binders. Since moisture has been functionally used to swell starch granules for the process of starch gelatinisation, it is now a part of the transformed chemistry change to starch. As a result, a well-processed feed has a lower water activity ($a_w$) at the same moisture content (Figure 2). This offers better chemical stability of the processed feed in post-production, and a reduced potential for microorganism growth. Feed with a higher percentage of gelatinisation would have better pellet integrity, better water stability, and better digestibility resulting in less water contamination.

Forensic Feed Science provides visual investigations and analysis of processed feed

Starch gelatinization is visible – we can see different degrees of gelatinization and binding capability of the starch matrix. Undissolved crystalline starch particles indicate very poor starch gelatinization. A high degree of starch gelatinization is important for strong intra-particle bonding.

Under the microscope, a loss of birefringence without the undissolved crystalline resistant starch indicates good processing of starch. A poor approach in feed processing also intensifies the Maillard reaction. A darkened colour indicates the degree of the Maillard reaction, which impacts the protein quality (Figure 3). This is known to impact the nutritional quality of the processed feed, but there are still limited studies on the damaging effects of Maillard reaction products (MRPs) to animal health.

Is there a link between feed processing, the pond ecosystem, and diseases in shrimp farming?

Processing starch and protein well improves both water stability and integrity of the pelleted feed. A pellet must be stable after immersion in water to a degree which prevents rapid deterioration and nutrient leaching. It should not disintegrate into crumbs and fine particles while the shrimp are consuming the feed. Disintegrated feed particles are not only a waste of resources, but also contribute to contamination of the pond water system.
Poorly bonded particles within a pellet result in nutrient leaching, releasing large amounts of phosphorus and nitrogen into the water. On top of that, the decomposition of uneaten feed consumes oxygen crucial to the shrimp’s wellbeing.

The introduction of large amounts of nitrogen and phosphorus into the water encourages the growth of phytoplankton and algae, a process normally limited by a healthy balance of nutrients in the water. The high density of phytoplankton, algae over-bloom, and suspended feed particles in the water column cloud the water and block light penetration. Phyto-organisms with no access to sunlight eventually die. Their decomposition consumes oxygen, which contributes to an increasingly hypoxic state in the pond. Some species of algae produce toxins which are harmful to shrimp growth and reproduction.

For any living organism, there is a delicate balance between the host, pathogen and environment. The presence of any two variables alone is not enough to produce disease. In the presence of a susceptible host, an infective pathogen, and an environment conducive to the pathogen, disease will manifest. Under intensive farming conditions, the infective pathogen is generally found in the environment. It is therefore our duty to remove additional stressors on the host and environment to prevent the occurrence of disease.

Hypoxia, toxins, water contamination and poor nutrition are significant stressors which affect the hepatopancreas – the shrimp’s main organ for metabolism, detoxification and immunity. Injury to the shrimp hepatopancreas is a well-known trait observed in White Faeces Syndrome (WFS), a disease resulting in high mortality and a rapid decline in growth. Removing these stressors may aid in alleviating the severity of disease.

Under the afore-mentioned stressful rearing conditions, both the host and environment are jeopardized, and susceptibility to disease is increased, especially under conditions of reduced immunity which comprise more than half of a shrimp’s moulting cycle.

Shrimp only have approximately 40% (in intermoult) of its moulting cycle to prepare for the immunologically-challenging and energy-consuming process of moulting. During this period, a lack of readily-available energy might lead to protein deamination as an energy source.

The remainder of the shrimp’s moulting cycle is spent in a state of reduced feeding and immune vulnerability. This makes it all the more important that feed consumed by the shrimp during this short period is of the utmost best nutritional quality. Processing starch and protein well also greatly contributes to the much-required energy and protein quality needed for moulting and growing.

Reduced energy utilization
- Incorrect processing can lead to feed with low levels of readily available energy.
- If there is insufficient energy during or after moulting, the shrimp can use protein for energy.
- Proteins are deaminated and the carbon fraction used for energy while the nitrogen component is excreted.
- Not only is this process inefficient, the process of nitrogen excretion from utilizing protein as an energy source further consumes energy. The excreted nitrogen also pollutes the water.
- A highly digestible feed increases nutrient assimilation and reduces excreted materials which can contaminate the shrimp’s living environment.
- A highly digestible feed also reduces stress on the shrimp’s hepatopancreas.

Poorly processed feed brings with it a myriad of unnecessary profit erosion, wastage of resources, environmental contamination, losses in animal productivity and increased susceptibility to disease. Feed imaging sheds light on the need to process starch and protein correctly.

Feed producers should take advantage of this novel advancement in feed quality monitoring, and conceptualize new approaches to improving the quality of their processed feed. They should make it their prime objective to maximize the innate nutrition harvested from raw materials in the feed formulation, instead of over-reliance on exogenous performance boosters.

With good feed, farmers will greatly benefit – with better productivity, improved survival rates and profitability. Feed producers can certainly contribute greatly to the sustainability of the industry if the highlighted problems in the current processed feed quality are addressed with heightened concern.

---

**Steven Goh** is co-Founder and Managing Director of DelstAsia S/B, based in Malaysia. It began as a marketing company acting as a sole agent for Delst Inc (USA) in distributing DMX-7, a food-grade grain and feed conditioner, for the Asian market.

**Dr. Victoria Dentstaporn** obtained her DVM from the University of Melbourne. She is in charge of field trials in the R&D team at DelstAsia.
PLASTIC NEUTRAL FISHERIES: FEASIBILITY AND OPPORTUNITIES THROUGHOUT THE WORLD

By Emilia Dyer, Philippine Wouters and Zacari Edwards

Plastics in the ocean, of which fisheries gear makes up a significant percentage, kill thousands of marine animals every year. In two interesting projects involving the International Pole and Line Foundation (IPNLF), and based in the Maldives and the Azores, the results show that a plastic neutral tuna fishing industry is entirely attainable, although so far for only a section of the industry: the one-by-one fishing sector. Nevertheless, the IPNLF has issued a reminder that the health of the ocean is a shared responsibility and that we should start to turn things around to clear our oceans of plastic wastes.

Plastic pollution has quickly become a global concern. This is particularly true in our oceans where plastic litters our coastlines, entangles endangered and protected animals and, when broken down to small enough pieces, is consumed and accumulates up the food chain all the way to humans.

Recent evidence shows that ingesting plastic can result in reduced energy, have toxic effects on the body, and even cause behavioural changes in some species, so the plastic crisis directly affects us all. Around 14 million tonnes of plastic are disposed of at sea every year and the nature of plastic means that it can take decades, even centuries, to fully degrade. That means almost all of the plastic ever created still exists somewhere today, even in dynamic environments like the ocean.

When left at sea, plastics can drift for thousands of miles until they are removed. This means that, as well as spreading diseases and contributing to the invasion of alien species to an environment, they will regularly enter the waters of those who did not cause the pollution. Often, the burden of plastic pollution is felt by small island developing states (SIDs) whose waters have become increasingly plagued by plastic bottles, packaging and, more regularly than we often realise, abandoned, lost or discarded fishing gear.

Ocean plastics kill

We don’t talk about it enough, but fishing gears make up a significant amount of oceanic plastic and, worse still, are the most harmful for the marine environment. They can include anything from lost fishing nets and buoys, to drifting Fish Aggregating Devices (dFADs) which are intentionally left to drift at sea and attract marine life.

When abandoned, lost or discarded at sea, these gears become known as ‘ghost gear’ as they will drift aimlessly at sea, entrap unsuspecting animals and snag on sensitive habitats, even in protected areas, until removed. On their journeys they meaninglessly kill thousands of marine animals every year. For example, studies have estimated that as many as 960 000 silky sharks are killed every year in the netting associated with dFADs every year. This doesn’t account for other species of sharks, turtles, dolphins, seabirds or whales, let alone other types of fishing gear. Additionally, a 2016 study found that ocean plastics and ghost gear have contributed to the demise of 45% of threatened species on the IUCN Red List. Every year, more research finds similarly destructive implications of ghost gear at sea, and yet, vast amounts are still being lost.

Reports over recent decades have found these destructive gears to make up 10% of ocean plastic, which is currently estimated to equate to between 800 000-1.2 million tonnes annually. However, a 2018 report published in the Nature journal found that “86% of large, floating plastics [in the Great Pacific Garbage Patch] are fishing nets”. Later, in 2019, a report released by Greenpeace found that 85% of the plastic pollution on sea mounts, ocean ridges, and the sea floor is fishing equipment, and that buoys alone make up 58% of all large plastics floating on the ocean’s surface.
Fishing methods vary in their impact

There’s little doubt that the fishing industry is a significant contributor of oceanic plastic pollution, but fishing methods vary greatly in their relative contributions. For example, pole-and-line fishing depends on the ability to consistently and quickly land tuna during short fishing events. Therefore, these fishers carefully choose the monofilament lines they will use based on the breaking resistance and their target species to ensure they are not regularly broken and lost during fishing events, the replacement time of which would otherwise compromise the profitability of the vessel.

Whilst lines can still occasionally be lost, the breakage often occurs close to the hook so only a small amount of line is lost even when gear losses do happen. As these hooks are barbless, hooked fish can reject them relatively easily and the weight then causes the hook and line to sink to the ocean floor. This means that the minimal amount that is lost by pole-and-line fisheries is unlikely to become an ingestion risk to marine life and is also highly unlikely to pose an entanglement risk, even to small animals, as lengths of line are very short.

The negligible contributions of the one-by-one fleets, which encompass pole-and-line, handline and troll methods, have been evidenced by studies conducted by the Azores Fisheries Observer Program (POPA) of the Azores pole-and-line fleet. Their research found that the entire fleet only lost 0.5kg of fishing gear annually. Additionally, when lost, one-by-one gears do not have the same ecological consequences as floating nets and buoys. This is because a hook and line is unlikely to entrap an animal as it sinks to the seabed.

On the other hand, fishing methods which release gears to drift at sea unattended for any length of time, like drifting gillnets and dFADs, threaten the ocean ecosystem on a different scale. The thin netting of gillnets make these contraptions a particular risk to almost all ocean species as it is difficult to see them in the water. These types of nets are very slow to degrade and even though some studies estimate they will ghost fish for up to three months, others have found evidence that they can remain ghost fishing at sea for as long as 20 years! As a result, thousands of marine animals are entangled and killed in ghost nets each year. Some researchers estimate that 4.1 million small cetaceans have been ghost-fished by gillnets in the Indian Ocean alone, between 1950 and 2016.

Drifting FADs, whilst easier to see in the water, present a similar risk to ocean life. Whilst these devices often have satellite buoys attached in order for the deploying ship to find and fish them again, it is rare that they are responsibly removed. Research has found that, of the 121 000 dFADs deployed annually, 90% are never retrieved. After decades of plastic pollution and poor performance in terms of resolving the issue, as an industry, we need to take on a different approach to tackle the problem and protect the ocean.

Plastic offsetting is one solution

The longevity of plastic’s lifespan and the scale of the problem means that reducing plastics is no longer enough and we need to take it a step further; we need to remove the decades of pollution which have accumulated at sea. It’s important that we now remove plastics at a faster pace than we are polluting the ocean, and do so at a greater scale than we currently are.

Parallels can be found across industries which have previously polluted or degraded environments. For example, issues of carbon emissions, deforestation and biodiversity loss face the same mountain to climb. In a bid to reduce the negative impacts of various industries, offsetting has risen to the forefront as a potential solution.

We’ve all heard of offsetting, where companies and consumers can compensate their plastic consumption by purchasing plastic credits or directly funding social and environmental projects which use plastic waste. From carbon offset flights or fossil fuel offsets to toilet paper brands which plant trees, the idea has taken off in recent years. However, there is hardly any evidence of offsetting among the fishing industry at all, particularly in relation to ocean plastics, despite the fact that this industry is one of its greatest contributors.

Plastic offsetting is not only a plausible solution for industry, it is already being implemented in one-by-one fisheries.

Pilot plastic neutral projects

Despite the slow progress in plastic reduction or offsetting among the industry, the scale of threat that plastic pollution from fisheries presents to ocean ecosystems means that the
idea of a plastic neutral fishery has been increasingly talked about in some sectors as a way to show consumers that fleets can be environmentally sustainable. The concept is that a fleet would remove as much plastic from the ocean as it loses on an annual basis to have an overall neutral, or even positive, effect.

Despite their minimal gear loss contributions, one-by-one fisheries across the world have acted as pioneers for ocean plastic offsetting programmes with the goal of becoming plastic neutral.

The International Pole and Line Foundation (IPNLF) recognised this opportunity in the fisheries they work with and began to develop projects to test the feasibility of plastic neutrality in one-by-one fisheries. Now, pole-and-line fisheries in the Maldives and the Azores are leading the way and have set a new standard for what it means to successfully reduce and offset their ocean plastic contributions. This new approach is replicable and therefore, it can, and should, be adopted by other areas of the fishing industry.

**Maldives Ghost Gear Collection Programme**

In 2020, IPNLF developed a pilot ghost gear collection project in the Maldives with the Olive Ridley Project (ORP), funded by World Animal Protection’s Joanna Toole Ghost Gear Solutions award. The Maldives hosts a diverse array of marine species but are increasingly threatened by ghost gear. Commercial net fishing is illegal in Maldivian waters and the national fleet uses only environmentally sustainable pole-and-line and handline fishing methods. Nevertheless, ghost gear, lost, abandoned or discarded by foreign fleets operating elsewhere in the Indian Ocean, drifts into their waters and puts their wildlife in danger by killing marine species, like turtles and sharks, and inflicting damage on critical habitats, like coral reefs and seagrass beds.

Entangled sea turtle in the Maldives

Twelve vessels from Gemanafushi Island took part in the project which built on the relationships IPNLF has formed with one-by-one Maldivian fishers and incentivised them to collect the ghost nets they encountered during their fishing trips. This at-sea collection model meant that the ghost fishing cycle of nets was drastically curtailed in comparison to collecting beached nets, and less damage could be done to the ecosystem.

During ghost gear collection, fishers were to note the location of collection and bring ghost gear aboard to be dismantled or stored before being taken back to shore. Back on land, ghost gear were weighed, recorded and then either responsibly recycled, or distributed among the community to be upcycled.

The fundamental aim of this project was to explore the feasibility of developing a plastic neutral one-by-one fishery in order to set a new standard for what is considered best performance in the sector. By the end of the project, these one-by-one tuna fishers from the 12 small vessels in Gemanafushi Island had enough ghost nets to offset the total weight of all gear loss contributions of half of the national Maldivian fleet (almost 350 Maldivian vessels).

It was clear from these achievements that there was promising potential to develop plastic neutral one-by-one fisheries in the Maldives and the project formed a replicable model which could, in time, be used in other fisheries around the world.

**Azores Ghost Gear Collection Competition**

On the other side of the world, IPNLF also developed a Plastic Neutrality Competition in the Azores, jointly supported by Biocoop and Fish4Ever.
The Azores’ waters are a hotspot for cetaceans and a number of environmentally-threatened species, such as blue whales and whale sharks. However, their location, at the edge of the North Atlantic subtropical gyre, puts these beautifully unique islands and diverse waters within a retention zone for floating ocean plastic. The bulk of the pollution that floats into their waters is fishing gear that have been lost or abandoned by foreign vessels fishing elsewhere in the Atlantic Ocean. The Azores’ fishing fleet, on the other hand, is largely made up of small vessels and, in terms of tuna fishing, use largely pole-and-line methods.

In order to obtain plastic neutral status, IPNLF, in partnership with Azores Ocean Observatory (OMA); Azores Fisheries Observer Program (POPA); Associação de Produtores de Atum e Similares dos Açores (APASA); Federação das Pescas dos Açores (FPA); and the Institute of Marine Research (IMAR), had developed a ghost gear retrieval competition to be held among the Azores pole-and-line fleet. The project incentivised fishers by putting them in competition with the plastic contributions of the entire fleet, to remove more in three months than they had collectively lost throughout the year, and in competition with the other vessels to remove the most as an individual vessel.

POPA collected data on the fishing gear loss rates of the pole-and-line fleet from 2019 until 2021. The data showed that the entire one-by-one fleet only produces 0.5 kg of fishing gear-related litter on an annual basis. IPNLF calculated that, with such little contribution, it would take the entire Azores pole-and-line fleet approximately 1 000 years to lose the same weight of plastic as a single industrial purse seine net. This puts the disparities between the two gears into perspective. Based on the above, and results of past competitions, IPNLF anticipated that the competition would result in at least 100kg of ghost gear being retrieved, and that the Azores fleet would attain “plastic neutral” status.

Seven vessels of the APASA pole-and-line fleet took part in the three-month competition from June to September 2021. The vessels were advised to collect marine litter that they encountered on fishing trips, with a focus on removing ghost gear. The weight and type of collected debris was recorded by onboard POPA observers who evidenced collections with photographs. Once weighed and recorded, the collected ghost gear was disposed of responsibly through Lotaçor; an Azorean, public-owned organization that supports the fishing sector.

Throughout the 2021 competition, the seven vessels of the APASA fleet removed 452.1 kg of marine plastic litter. A total of 437.6 kg of this was ghost gear in the form of buoys, nylon cables and multifilament nets. This means that, in three months, these vessels retrieved 875 times more ghost gear in weight than they lost annually in their own fishing operations. These achievements by the Azores fleet far surpass plastic neutrality.

Future opportunities

These two ground-breaking successful projects from very different island communities demonstrate the scope of opportunity that one-by-one tuna fishing fleets have, to contribute to the solution on plastic pollution.

Only nineteen vessels have taken part in these projects in total so far but, with more than two million small-scale
fishing vessels worldwide, there is great potential to replicate and upscale these projects elsewhere. The success of these projects was determined by the strong engagement from fishers, which was driven by incentives, a sense of community, and, indeed, a healthy dose of competition.

So far, the best performance among the global fishing industry in terms of plastics has been very weak. Some fisheries management organisations urge fleets to remove dFADs from the water and encourage the responsible disposal of single-use plastics but until now, no fleet has come close to achieving and evidencing plastic neutrality. The IPNLF-developed projects raise the bar of expectations and set a new standard for what we can achieve at sea. Whilst the nature of one-by-one tuna fishing offers a strong foundation for these projects, IPNLF hopes that their results can be replicated among other gear types and, in time, achieving plastic neutrality can become the new standard within the fishing industry.

In order to really tackle the plastic crisis however, the fishing sector must do both – fishers need to reduce their plastic pollution contributions and put processes in place to facilitate the removal of plastics from the ocean during their fishing operations, to work towards plastic neutrality. It’s important that the two go together as offsetting should not be there to support business-as-usual; it should be used to compensate for pollution which cannot be avoided.

As plastic pollution threatens the future of our marine life and ocean ecosystem, it is in the best interest of the fishing industry to resolve the crisis that is coming to the surface. The results from the plastic neutrality projects in the Maldives and the Azores show that a plastic neutral tuna fishing industry is entirely attainable for at least a section of the industry. We should embrace and harness the potential of these achievements to help restore oceanic biodiversity, and to ensure a healthy, functioning ocean for generations to come. If the fishing industry can contribute to the clean-up of the oceans then it can ensure the longevity of the resources it relies so heavily upon.

Additionally, ocean plastics are a key issue of concern for consumers when it comes to sustainable seafood, second only in recent years to climate change. Moving forwards, it has been demonstrated that one-by-one tuna fisheries can far surpass plastic neutrality and this will either evolve into a new standard for the sector as a whole, or one-by-one plastic neutral tuna will be uplifted as a premium. Plastic neutrality is an opportunity for the fishing industry to build trust with its consumers and, therefore, it’s important from a business perspective that the industry is able to meet the standards of its customers.

The plastic pollution crisis has a firm grip on our oceans and we must all contribute what we can to its clean-up and to prevent the enormous gear loss by certain fisheries. As we move to loosen its hold, we must first be aware of the scale of the issue and the greatest sources of pollution. We need to talk more about the contributions of the fishing industry, as well as the potential solutions they could offer as an industry that operates on the water. At the moment, companies and fisheries are praised for having mitigation strategies in place, even if that means they are still contributing to the problem, but only to a lesser extent. It’s time for the industry to move towards a place where all vessels collect more plastic than they lose. It is vital, then, that the industry is supported as they move to turn things around through plastic reduction and removal, to achieve plastic neutrality. One-by-one fishers are proving that this is possible and hopefully the rest of the fishing industry will be able to follow suit.

We need to look at the fishing industry differently. The one-by-one fleets of the Maldives and the Azores have shown themselves to be unexpected allies of the ocean. They have demonstrated great success in achieving plastic neutrality through innovative ideas and now it is time for the rest of the fishing industry to pursue the same goals. The health of the ocean affects us all; we are all responsible so now that we know a plastic neutral tuna fishing industry is possible, we shouldn’t take a neutral stance on its potential. ☛
The total organic aquaculture production at EU 27 level is estimated at 74 032 tonnes in 2020, accounting for 6.4% of the total EU aquaculture production. The production has increased by 60% compared to 2015 (46 341 tonnes at EU 27 level in 20151), according to the European Market Observatory for Fisheries and Aquaculture Products (EUMOFA).

Based on data collected for this study (EU and national sources), the main species produced are mussels (41 936 tonnes), accounting for more than half of the total organic aquaculture production, followed by salmon (12 870 tonnes), trout (4 590 tonnes), carp (3 562 tonnes), oyster (3 228 tonnes) and European seabass/gilthead seabream (2 750 tonnes).

The main EU producers of organic aquaculture are Ireland (salmon and mussel), Italy (mussel and finfish), France (oyster, mussel, and trout), the Netherlands (mussel), Spain (mussel and sturgeon), Germany, Denmark and Bulgaria (mussel). The main developments over the last years are:

- A significant increase in organic mussel production, the main producing MS being the Netherlands, Italy, Germany, Ireland, Denmark, France, Spain and Bulgaria. The organic mussel production accounted for 41 936 tonnes in 2020 (10% of EU mussel production), compared to 18 379 tonnes in 2015;
- An increase in organic oyster production at EU level (mainly produced in France): about 3 220 tonnes produced in France in 2020 compared to less than 900 tonnes in 2018;
- The decrease or stagnation for most of the finfish species:
  - Slight decrease in organic salmon production; this is mostly due to a decrease in the Irish production (12 870 tonnes in 2020 compared to a peak of 16 481 tonnes in 2017) and to Brexit (the UK produced 2 400 tonnes in 2015). Over the same period, the production of organic salmon increased by almost 10 000 tonnes in Norway (25 546 tonnes in 2020), and 8 000 tonnes in the UK (13 128 tonnes in 2020);
  - Stability of organic trout production: 4 590 tonnes in 2020 compared to 4 700 tonnes in 2015 (EU 27); the UK produced 200 tonnes in 2015;
  - Decrease in organic carp production: estimated at 3 562 tonnes in 2020 (7 000 tonnes in 2015), the main EU producers of organic carp being Hungary, Romania and Lithuania; and
  - European seabass/gilthead seabream is the only finfish group on an increasing trend: 2 750 tonnes in 2020 (2 000 tonnes in 2015), the main EU producer being Greece.1

For shellfish, in most cases there are limited differences between conventional and organic in terms of production methods. Thus, shifting to organic is not complex for producers but it increases the administrative burden. The main barrier to market growth for the organic shellfish segment is to be found in the somewhat limited market incentives for producers in terms of price premium or demand from customers. In addition, the evolution of the EU organic Regulation2 on the quality of water suitable for organic production adds some uncertainty for producers to establish their strategy on organic production (Until the 31th of December 2021, waters classified under categories A and B were suitable for organic production. However, as stated in the EU organic regulation (point 3.1.3.2. of part III of Annex II), only waters classified under category A, or of high ecological status as defined by Directive 2000/60/EC or of good environmental status as defined by Directive 2008/56/EC are suitable for organic production since the 1st of January 2022).


### EU 27 organic aquaculture production in 2020 (tonnes)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mussel</td>
<td>409 622</td>
<td>41 936</td>
<td>10%</td>
<td>+110%</td>
</tr>
<tr>
<td>Salmon</td>
<td>17 095</td>
<td>12 870</td>
<td>75%</td>
<td>-1%</td>
</tr>
<tr>
<td>Trout</td>
<td>187 936</td>
<td>4 590</td>
<td>2%</td>
<td>-8%</td>
</tr>
<tr>
<td>Carp</td>
<td>85 198</td>
<td>3 562</td>
<td>4%</td>
<td>-49%</td>
</tr>
<tr>
<td>Oyster</td>
<td>97 544</td>
<td>3 228</td>
<td>3%</td>
<td>na</td>
</tr>
<tr>
<td>European seabass/gilthead seabream</td>
<td>174 501</td>
<td>2 750</td>
<td>2%</td>
<td>+38%</td>
</tr>
<tr>
<td>Other species</td>
<td>121 900</td>
<td>5 096</td>
<td>4%</td>
<td>na</td>
</tr>
<tr>
<td>Total</td>
<td>1 093 796</td>
<td>74 032</td>
<td>7%</td>
<td>+60%</td>
</tr>
</tbody>
</table>
As for finfish, organic production has not increased because of the limited demand from the market and the technical difficulties in producing under the organic scheme (availability of organic feed and juveniles). In addition, the organic scheme may not be in line with the production method developed by producers (for instance extensive pond polyculture in some Eastern MS or closed recirculating aquaculture systems) or national requirements (for instance requirements for the largest aquaculture sites in Denmark).

Another difficulty that stakeholders face when establishing a clear communication strategy toward their clients is the competition with other certification schemes (for instance Aquaculture Stewardship Council (ASC) or Marine Stewardship Council (MSC), the latter may also apply to shellfish production in the Netherlands) and the fact that organic scheme only covers aquaculture products and not wild caught products (farmed products account for about a quarter of EU seafood production and consumption).

**PROSPECTS FOR GROWTH OF ORGANIC AQUACULTURE IN THE EU**

The development of organic aquaculture is supported by the EU policy. The Farm to Fork strategy established in 2020, aims at “25% of the EU’s agricultural land under organic farming by 2030 and a significant increase in organic aquaculture”. In 2021, the “EU Action Plan for the development of organic production” (COM(2021)141 final) clearly identifies organic aquaculture as a sector with a potential for development. The Action Plan states that the Commission intends to 1) support research and innovation and 2) identify and address obstacles to the growth of EU organic aquaculture. Still in 2021, the “EU Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030” (COM(2021)236 final) defines the promotion of organic aquaculture (and other aquaculture systems with lower environmental impact) as a key issue.

In order to assess the potential for growth, we propose prospects for the growth of organic aquaculture. These prospects are differentiated between molluscs and finfish.

In each case, we propose

- **“pessimistic” prospects** where the different barriers identified are not addressed,
- **“optimistic” prospects** indicating the maximum growth potential perceived at present, if the barriers identified are addressed.

These prospects are realistic but are not a prediction of the future as many factors may impact the development of organic aquaculture at EU level (evolution of organic Regulation, consumer demand, costs of production, other regulations related to aquaculture, etc.).

The time frame for these prospects is 2030, as for the EU’s Farm to Fork strategy.

These prospects have been elaborated by the EUMOFA team and are based on the data collected in the context of this study (volume of production, identification of barriers and drivers).

<table>
<thead>
<tr>
<th></th>
<th>“Pessimistic” growth prospects</th>
<th>“Optimistic” growth prospects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molluscs</td>
<td>Prospects: about 33.000 t - 30.000 t of organic mussel and 3.000 t of organic oyster (6% of EU production)</td>
<td>Prospects: about 120.000 t of organic molluscs (20% of EU production - 10-20% of the production in the main producing MS, 70% in other MS)</td>
</tr>
<tr>
<td>Present situation:</td>
<td>45.000 t organic (mainly mussel) About 600.000 t of production (organic + conventional)</td>
<td>Within the “optimistic prospects”, the organic shellfish production could reach:</td>
</tr>
<tr>
<td></td>
<td>Within pessimistic prospects, the organic scheme remains a company choice (no sectoral strategy to develop the organic scheme at regional, national or EU level) in a context of low incentive from the market for organic (low demand, no price premium).</td>
<td>• about 10-20% of the production in the main MS (namely Spain, France and Italy for mussel and France for oyster). At present, the share is 10% for mussel in Italy and 5% maximum in other MS and other species.</td>
</tr>
<tr>
<td></td>
<td>In terms of volume, the share of organic decreases in Denmark, Germany, Ireland and the Netherlands and remains stable in the main producing MS: Spain, France and Italy.</td>
<td>• about 70% of the production in other MS, with the organic scheme used with a differentiation objective. At present, the share of organic is 73% for mussel in Denmark and between 20% and 35% for mussel in Ireland, Germany and the Netherlands.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The development of the “optimistic” prospects will depend:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• on the producers and professional bodies strategies regarding organic,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• on the evolution of EU water quality (% of water area suitable for organic production).</td>
</tr>
<tr>
<td>Finfish</td>
<td>Prospects: about 15.000 t (3% of EU production) of organic finfish</td>
<td>Prospects: maximum 125.000 t (25% of EU production) of organic finfish</td>
</tr>
<tr>
<td>Present situation:</td>
<td>24.000 t organic</td>
<td>Within this scenario, the technical barriers for producing organic finfish are addressed (structuring of the value chain and possible adaptation of the EU Regulation).</td>
</tr>
<tr>
<td></td>
<td>About 500.000 t of production (organic + conventional)</td>
<td>The higher production costs are counterbalanced by a price premium and there is a growing demand for organic. Some large-scale retailers require “organic” as a market access condition for farmed seafood products.</td>
</tr>
<tr>
<td></td>
<td>Within these prospects, the technical barriers to developing organic finfish production remain (low availability of feed) and higher production costs (lower density, specialised production sites) are not compensated by the price premium.</td>
<td>For consumer communication, there is an articulation between organic scheme (for farmed products) and other initiatives for wild caught products, which makes the message of “organic seafood” clear for consumers.</td>
</tr>
<tr>
<td></td>
<td>A small demand for organic products remains (in particular for specialised shops in organic).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In this context, the EU organic production remains small because 1) the EU organic market is mainly supplied with products from third countries (namely UK and Norway) and/or 2) the market requires other certifications than organic (other sustainability certification, local production, etc.).</td>
<td></td>
</tr>
</tbody>
</table>

Source for full article: European Market Observatory for Fisheries and Aquaculture Products (EUMOFA).
Consumers, particularly in Europe and the US, are increasingly demanding proof of transparency, traceability and sustainability of the fishery species and products that they purchase. In response, there is a growing number of traceability technology providers which collate and present trustworthy data to importers and consumers. Another vital function they fulfil is that they can act as B2B or B2C platforms as well as link producers direct to markets. In this “Innovations” section of the INFOFISH International, we take a look at a few leading e-commerce platforms for seafood.

**Platform in the Pacific**

Traseable Solutions is especially noteworthy, being pioneers in the use of blockchain technology for traceability that can foster greater transparency and better returns for communities in the Pacific. Through Internet of Things (IoT) technology, it facilitates transparency by providing regulators with the means of verifying and validating end-to-end forward and backward traceability of seafood and agriculture products.

**Consumers can scan QR codes in the Middle East**

In the Middle East, Seafood Souq is a Dubai-based online seafood marketplace which has implemented ‘SFS Trace’, a QR Code that diners can scan to view all traceability details of their fish from the moment it is caught until it reaches the retail outlet. The QR Code can also be displayed on packaging and on dishware. Their B2B marketplace also connects seafood producers and seafood buyers directly.

**Rapid digitalization in Indonesian fisheries**

In 2018, Minapoli – the first fully integrated business-to-business digital aquaculture marketplace company in Indonesia – set up a startup called Digifish Network with a mandate “to become the leading ecosystem of digital innovation for marine and fisheries in Indonesia”. It works by integrating aquaculture business and information networks throughout the fisheries supply chain, and acts like an online marketplace.

More than 30 startups in aquaculture and fisheries have joined the Network so far, including companies such as eFishery, Jala, FisTx, AquaEasy, Pictafish, AquaReader, nanobubble.id, Venambak, and Banoo that are involved in advanced sensor and IoT-based technology. The Ministry of Marine Affairs and Fisheries estimates that there are about 700 fishery startups in the country.

(Editor’s note: In the March/April 2022 issue of the INFOFISH International, we published an article entitled “A moment for Indonesian aquaculture to accelerate competitiveness through the presence of startups”, written by Asep Bulkini, Business Development Manager at Minapoli. Part of what he wrote was that the presence of tech-based startups needs to be seen as a new impetus in treading the long road of competitive aquaculture. By placing farmers at the centre of development, the startup ecosystem will be sustainable because it provides benefits for farmers as users and also for companies as technology providers.)

**Startup in India goes global**

Set up in 2019, Indian startup company Captain Fresh says that it helps farmers and fishermen sell close to a hundred tonnes of fresh fish and over three dozen other seafood species each day. The startup, which has set up over 50 collection centres, is helping farmers sell to over 2,500 businesses across nearly all the coastal states in India. It is also experimenting with ways to help farmers sell more – its app offers useful information...
and according to its Chief Executive, “if you are a fisherman, you can load up your inventory details on our platform and we will sell it on a real-time basis.”

Incentivizing data capture

Fishcoin has been designed as a peer-to-peer network that allows independent industry stakeholders to harness the power of blockchain using a shared protocol so that data can be trusted, transparent, and secure. Unlike many blockchain initiatives, it is not based on a central company or entity; instead it is designed to be a decentralized ecosystem that incentivizes data capture so that an ecosystem of companies and third party developers can benefit by adding value to the network.

The team behind Fishcoin points to the fact that there are millions of small-scale seafood producers in developing nations, and while they almost all have mobile phones, they generally cannot afford even the most basic electronic Catch Documentation & Traceability (eCDT) technologies. Therefore there was a critical need to develop a data ecosystem that can facilitate and incentivize the sharing of data in order to foster more efficient trade.

Their Trace Protocol blockchain open source platform addresses the key challenge of who pays what, when, where and how for traceability systems in supply chains, with digital tokens being the medium of exchange for the key data elements (KDEs), allowing the market to price the data, and use the system, as and when they need to. It rewards those who make the extra effort to capture and communicate data and shifts the economic burden to downstream actors such as hotels, restaurants and retailers who benefit most from traceability. It also allows for makers of third party tools such as Internet of Things (IoT) devices (sensors, etc) and other data inputs and dApp developers to participate and be rewarded accordingly.

Canadian company with a global reach

XpertSea leverages AI technology to help farmers modernize their operations and boost profits by providing access to fast payments, production insights and vetted networks of sellers and buyers.

Farmers are paid up to 80% at harvest so they can restock and start growing more shrimp right away. They are also guaranteed same day payment, proofs of transaction and payment notifications.

After downloading the app and creating an account for their farm, farmers place their shrimp in the XpertSea tray, use the app to take a picture and add details about the crop for sale. Buyers and sellers can then negotiate their pricing and terms before clicking on ‘Sell’. The farmers then harvest their crops and receive up to 80 percent of the payment upfront.
The focus of the Equipment & Supplies section in this issue is on tools against parasites and vectors which cause disease in fish.

Fighting against flukes

A new tool that helps fish farmers manage flatworm infections in kingfish and amberjacks has been developed by the Cawthron Institute, New Zealand. Called ‘BeNeZe’ (pronounced “Ben-easy”), it is named after three important ectoparasites: skin flukes *Benedenia seriolae* and *Neobenedenia girellae*, and gill fluke, *Zeuxapta seriolae* which impact Seriola aquaculture. The free tool is available through the BeNeZe website and is mobile-compatible.

Research leader Dr Kate Hutson says parasites are a persistent problem in kingfish aquaculture globally and can be challenging for new aquaculture businesses. “Kingfish are susceptible to several ectoparasites, and left untreated, numbers can build quickly on fish in aquaculture farms and compromise their health,” Dr Hutson said in a press release.

Further information: Cawthron Institute, New Zealand (https://www.cawthron.org.nz/).

Anti-sea lice bath

Benchmark Animal Health’s Ectosan® Vet is the first sea lice veterinary medicinal treatment for the treatment of pre-adult and adult sea lice (*Lepeophtheirus salmonis*) on Atlantic salmon (*Salmo salar*) and Rainbow trout (*Oncorhynchus mykiss*). Applied exclusively in wellboats, it ensures that all treatment water is retained, and once the fish are free of sea lice, they are rinsed and released back into their ocean pens.

The medicine left behind is removed by the company’s water purification system called CleanTreat which then returns purified water into the sea. Benchmark says that the treatment is an effective Integrated Pest Management strategy for sea lice as it improves fish welfare whilst protecting the environment.

Further information: Benchmark Animal Health Ltd (media@bmkanimalhealth.com)
AI against sea lice

A new project that involves using artificial intelligence (AI) to help select salmon that are resistant to sea lice has been launched by the Danish Technological Institute (DTI) and Benchmark Genetics Norway. The new project will use AI to analyse photos of the fish in real time, to swiftly obtain an accurate number of lice infections per animal.

The imaging technology uses a combination of a half-circular light-dome (CSS dome light HPD2-400FC) and a 5-megapixel monochrome camera to take an image of each salmon. The high-power light-dome has three individual triggered colour diodes: red (622 nm), green (525 nm) and blue (470 nm). The mono-camera takes one picture at each wavelength, and then images are post-processed using the developed AI.

It was found that this imaging system provides the user with the best visibility and contrast between the lice and the fish. The algorithm uses a deep learning segmentation model, based on a multiple convolutional network architecture U-net image model, initially developed for biomedical image segmentation.

The AI model is trained to segment the sea lice and salmon. After image segmentation, the sea lice are filtered and counted. By repeating this process many times and automatically augmenting the image appearance in various ways, the model learns the shape and becomes robust against varying fish and lice sizes, image angles, illumination variations etc. The training dataset is created by manually marking pixels with lice in the image. The model can then compare its results against the training dataset and gets trained. The bigger the training dataset, the more accurate the algorithm can detect lice. The model’s performance improvement is verified by keeping a subset of the annotated data for model validation.

Further information: Benchmark Genetics (https://bmkgenetics.com/).

Precise microdose vaccination syringes

A Swiss company has developed syringes which deliver microdoses as low as 0.02mL if needed. The 1810 Ultra is made from moulded plastic with a glass barrel, light in weight, and easy to disassemble and clean. It is also resistant to water, including saltwater, has a long life span, is fully autoclavable at 121° C and the instruments can last indefinitely as long as properly maintained and seals and springs are replaced when needed.

It works best with a range of accessories to help to optimise performance. These include Fish Guide (a copper loop that facilitates the accurate injection of fish while protecting the operator’s hand from accidental self-injection); an Abacus counter, which allows operators to know how exactly many doses they have delivered; and high-quality needles.

The 1810 Ultra is suitable for a wide range of species including salmonids, tilapia, pangasius, seabass and sea bream. It will also work with both oil- and water-based vaccines.

Further information: Socorex, Switzerland (https://socorex.com/en/).
MANUAL FOR BIVALVE DISEASE MANAGEMENT AND BIOSECURITY


Shellfish farming is a vital economic sector in Europe, employing more than 40,000 people. However, it must cope with recurring episodes of mortality. For instance, the OsHV-1 virus has been responsible for high rates of mortality in juvenile cupped oysters in various European Union member states, especially since 2008. Another pathogen, the bacteria *Vibrio aestuarianus*, has been linked to mortality episodes affecting adult cupped oysters in France and Ireland. Other farmed mollusc species have not been spared: for instance, the cockle populations in Galicia which have dramatically declined, linked to the presence of a parasite called *Marteilia cochillia*.

This manual on mussels was produced by the VIVALDI project funded by the European Union. A co-construction process involving scientists, decision-makers, hatcheries and producers from the main European producing countries was considered as the best approach in order to make it relevant and easy-to-use for the greatest possible number of stakeholders. The biosecurity manual is aimed to have a long-term impact on the end users’ practices and biosecurity in shellfish farming. It does not have regulatory goals but it aims to provide technical advice to assist implementing the legislation.

When covering farming activities, recommendations identify best practices that need to be adjusted taking into account geographic and species specificities. For each recommendation, a brief description is provided as well as the benefits and main limitations. Recommendations are organised by section and, then, by category of actions.

This publication can be viewed at https://www.vivaldi-project.eu/.

TAKE CARE OF YOUR CATCH. A GUIDE TO FISH HANDLING ON BOARD SMALL BOATS


Fresh fish is an important source of food and income. Its quality is affected by handling and hygiene practices at all stages of the value chain – from production to consumption, starting with fishing. What happens to fish after it is caught has a big impact on its quality. Good handling and hygiene practices must be used onboard the fishing vessel.

This guide is for fishers, vessel owners, extension services, and anyone interested in how to maintain fish quality. The guide describes good handling and hygiene practices that will help fishers maximize the value of, and income from, fish. It will help fishers meet required standards and access new and high-value markets.

This publication can be viewed at: https://doi.org/10.4060/cb8791en.

SQUIDS IN THE SPOTLIGHT

A Greenpeace International publication, 2022.

Squids in the Spotlight uncovers the huge scale of the global squid fishery, which has grown over 10-fold since 1950 to almost 5 million tonnes annually in the last decade and is now jeopardising marine ecosystems around the world. Operating out-of-sight in international waters, the meteoric rise of squid fishing and resulting demand for the species has no historical precedent, with some areas seeing a more than 800% increase in the number of vessels in just the last five years.

In this report, Greenpeace examines the expansion of squid fisheries and looks at three regions where this expansion has occurred. The publication considers the ways in which these fisheries...
have been allowed to expand with little scrutiny or management rules – even in areas where Regional Fisheries Management Organisations (RFMOs) have a mandate to manage them – and explore why several major squid fisheries have been characterised as unregulated.

This publication can be viewed at: https://www.greenpeace.org/international/squids-in-the-spotlight-2/.

DEMOCRATIZING THE IMPLEMENTATION AND MONITORING OF THE VOLUNTARY GUIDELINES FOR SECURING SUSTAINABLE SMALL-SCALE FISHERIES IN THE CONTEXT OF FOOD SECURITY AND POVERTY ERADICATION


This publication describes a small international initiative to examine how local communities can undertake the tasks of democratization with specific reference to the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication.

Communities may have been active participants in proposing inputs which were aggregated and shared in the formulation of the guidelines, yet their role in monitoring and evaluating the implementation of the adopted texts is peripheral. At best, they watch implementation undertaken in their name, but as passive observers. A radical change is needed in order to mainstream community participation into the implementation and monitoring of guidelines of the type described above. There is a need to “take back voluntary guidelines to the community”; demystify their contents; assess with the community what indicators will be utilized to evaluate the progress of implementation; and think through with them the nature of tools to be used for this purpose. Basically, the call is for a democratization of the implementation and monitoring of voluntary guidelines, making them by, for and of the community.

This publication can be viewed at: https://doi.org/10.4060/cb8058en.

WOMEN AND MEN IN SMALL-SCALE FISHERIES AND AQUACULTURE IN ASIA

Kusakabe, K. & Thongprasert, S. 2022. Women and men in small-scale fisheries and aquaculture in Asia – Barriers, constraints and opportunities towards equality and secure livelihoods. Bangkok, FAO.

Fisheries and aquaculture contribute to food security and livelihoods of millions of people in Asia. Both women and men are engaged in fisheries and aquaculture. In the past ten years, many actors have worked on raising awareness on women’s contribution as well as promoting gender equality in fisheries and aquaculture.

This study aims to consolidate the efforts to date to provide recommendations for action and future studies. Its objective is to answer the following questions for small-scale fisheries and aquaculture in Asia: (i) What is the division of labour between women and men in specific fisheries and aquaculture practices and what are the differences with respect to their access to assets, resources and entitlements? (ii) What are the drivers of such differences? (iii) What could be critical entry points and opportunities for addressing inequalities and discriminatory practices? To answer these questions, the study conducted an online literature search on gender and fisheries and aquaculture in Asia, selecting articles published between 2011 and 2021. The findings based on each research question are presented in this publication.

This publication can be viewed at: https://doi.org/10.4060/cb9527en.
Eurofish and FAO host webinar on success stories from artisanal fisheries in Europe

To commemorate the International Year of Artisanal Fisheries and Aquaculture 2022 (IYFA 2022), Eurofish in cooperation with the FAO Subregional Office for Central Asia hosted on 15 June 2022 a two-hour webinar that highlighted successes in small-scale fisheries in Europe. Eurofish welcomed five speakers: Ante Sladoljev from Croatia, David Lange from Denmark, Erko Veltson from Estonia, Nuri Basusta from Turkey, and Valentina Cappanera from Italy.

Ante Sladoljev discussed the success of small-scale fishermen in embracing EMFF funding and grants to, among other benefits, expand their business, gain access to resources, plan for long-term development, and obtain new equipment. He also shared the development of a fishing cooperative that allowed small-scale fishermen to develop a processing facility, be recognized as a producer organization, and gain a bigger market influence. Finally, he discussed the success of the “Fishermen Recommend” quality label. The label is designated for fish that are local, wild, and fresh. The label allows small-scale fisherman to establish a greater foothold in local restaurant and tourism markets and thereby limit their individual carbon footprint from transporting fish.

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

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

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

Valentina Cappanera shared the success of the tonnarella fishing practices in coexisting with the environmental protection of the Portofino marine protected area. Tonnarella is a traditional way of fishing that uses nets to catch fish by exploiting the currents. The fishery has provided an opportunity to cooperate with science to create a biological record of changes in biodiversity over time. The cooperation between interested scientists and the fishermen is valuable for the data it generates.

The presentations prompted a lively discussion with the active participation of the attendees, emphasizing the importance of artisanal fisheries for communities around the world.

Online publication of IYFA 2022 e-photobook

The e-photobook on the International Year of Artisanal Fisheries and Aquaculture 2022 (IYFA 2022) which was launched on the 29th of March 2022, has been published online.

This photobook is an output under a Letter of Agreement between the FAO Regional Office for Asia and the Pacific and INFOFISH. Special thanks are due to the many local, national and regional organizations, authorities, and other stakeholders who have made it their mission to shine a spotlight upon the men, women and children in the small-scale fisheries and aquaculture sector in the unshakeable belief that they and their contributions matter. The most important acknowledgement goes to the millions of small-scale fishers, fish farmers, and fish workers throughout the world who harvest, process, and market fish and fishery products, often under difficult and tiring conditions. The world is indebted to them.

The publication can be downloaded at:

The 6th INFOFISH World Shrimp Trade Conference and Exhibition 2022 ("Recovery through resilience and innovation") was held on 8-10 June 2022. Chaired by Jose Antonio Camposano (Executive President, National Chamber of Aquaculture, Ecuador), the hybrid event began with an opening speech by the Hon. Minister of Agriculture and Food Industries (MAFi), Malaysia. An exhibition (partly virtual) showcasing the latest in equipment and services was held alongside the Conference.
In accordance with its mandate as an intergovernmental organization, INFOFISH Member States comprise several countries in Asia and the Pacific.

We also invite any legal entity in Member States as well as non-Member States related to the Fisheries, Aquaculture and Seafood Industry to join us as an Associate Member. These include:

- Aquaculture companies
- Animal health companies
- Seafood processors
- Certification agencies
- Academia
- Equipment and supplies companies
- Fishing technology companies
- Packaging and printing companies
- Investors
- Innovators
- Business forums and professional associations
- Others

For further details, please visit [www.infofish.org](http://www.infofish.org) or contact [info@infofish.org](mailto:info@infofish.org)
2022

AUGUST

23 - 26
11th Symposium on Diseases in Asian Aquaculture (DAA11)
Sarawak, Malaysia
https://www.daa11.org/

24 - 26
Japan International Seafood & Technology Expo
Tokyo, Japan

SEPTEMBER

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

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

OCTOBER

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

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

NOVEMBER

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

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

Advertising rates are available on request from:
INFOFISH, 1st Floor, Wisma LKIM, Jalan Desaria,
Pulau Meranti, 47120 Puchong, Selangor MALAYSIA
Phone: (603) 8066 8112 Fax: (603) 8060 3697
E-mail: info@infofish.org Website: www.infofish.org
<table>
<thead>
<tr>
<th>ISSUE</th>
<th>SMALL-SCALE SECTOR</th>
<th>PROCESSING &amp; MARKETING</th>
<th>FISHING &amp; AQUACULTURE</th>
<th>GLOBAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2022</td>
<td>Insurance services for the Asian small-scale fisheries sector</td>
<td>Innovation in seafood packaging</td>
<td>Achieving resilience and sustainability in the seaweed industry in Malaysia</td>
<td>Leading seafood supply chains towards sustainability</td>
</tr>
<tr>
<td>(Jan/Feb)</td>
<td>Assessing and improving value chains in small-scale fisheries</td>
<td></td>
<td></td>
<td>International Year of Artisanal Fisheries and Aquaculture (IYAF 2022)</td>
</tr>
<tr>
<td>Deadline:</td>
<td>15 Nov 2021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/2022</td>
<td>Illuminating Hidden Harvests: contributions and drivers of change in small-scale fisheries</td>
<td>Selling fish to Generation Z</td>
<td>Sensible seaweed technologies</td>
<td>Towards industry 4.0: digital transformation in the tuna industry</td>
</tr>
<tr>
<td>(Mar/Apr)</td>
<td></td>
<td></td>
<td>Aquaculture business and information networks in Indonesia</td>
<td>Ballast water management – implications for fisheries</td>
</tr>
<tr>
<td>Deadline:</td>
<td>15 Jan 2022</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/2022</td>
<td>Small-scale businesses that thrived during the pandemic in South and Southeast Asia</td>
<td>The alternative seafood sector</td>
<td>The urgent need for comprehensive fishery stock assessment in Asia</td>
<td>Impact of climate change on fisheries and aquaculture</td>
</tr>
<tr>
<td>(May/June)</td>
<td></td>
<td></td>
<td>Investment opportunities in aquaculture</td>
<td></td>
</tr>
<tr>
<td>Deadline:</td>
<td>15 March 2022</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/2022</td>
<td>Role of Civil Society Organisations (CSOs) in the implementation of SSF Guidelines</td>
<td>e-commerce in the seafood sector</td>
<td>Restorative aquaculture systems</td>
<td>Plastic neutral fisheries: feasibility and global opportunities</td>
</tr>
<tr>
<td>(July/Aug)</td>
<td></td>
<td>Business ecosystem in Indian fisheries: prospects and strategies</td>
<td>Reduction of greenhouse gases from aquaculture</td>
<td></td>
</tr>
<tr>
<td>Deadline:</td>
<td>15 May 2022</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/2022</td>
<td>Gender equity in small-scale fisheries: leaving no one behind</td>
<td>The role of retailers in sourcing food responsibly</td>
<td>Intelligent aquaculture</td>
<td>Value added products from aquaculture: a global trend</td>
</tr>
<tr>
<td>(Sep/Oct)</td>
<td></td>
<td></td>
<td>Reduction of greenhouse gas emissions from shrimp aquaculture</td>
<td>The fisheries industry in a zero poverty/zero hunger world</td>
</tr>
<tr>
<td>Deadline:</td>
<td>15 July 2022</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/2022</td>
<td>Small-scale seaweed production and trade: factors influencing success</td>
<td>Biodegradable seafood packaging</td>
<td>Inclusive business models in aquaculture: suitability and growth potentials</td>
<td>UN Decade of Ocean Science 2021-2030: The science we need for the ocean we want</td>
</tr>
<tr>
<td>(Nov/Dec)</td>
<td></td>
<td></td>
<td>Welfare considerations in shrimp and fish culture</td>
<td>Inland fisheries and its contribution to the Sustainable Development Goals</td>
</tr>
<tr>
<td>Deadline:</td>
<td>15 September 2022</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>