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Tailwind for sustainable artisanal fisheries

AQUACULTURE
Alternative ingredients for fishfeeds

VIETNAM
Towards inclusive and sustainable contract farming

KASHMIR
On the way to food insecurity?

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Dear Reader,

Global fish stocks have never been under as much stress as they are today. And never before have so many aquatic species been heading for extinction, with more than a third of fish stocks being fished at biologically unsustainable levels – a share that has tripled in the last 40 years. Perhaps these shocking figures on threats to our biological diversity which were recently published by the UN Food and Agriculture Organization (FAO) are the reason why aquatic food production does not really have a lobby among the public at large and even ekes out a niche existence in international cooperation. Neither is this a merely recent state of affairs. Since 1970, only four per cent of food systems-related research has included aquatic food.

This negligence of the sector contrasts sharply with its significance for rural food security and livelihoods world-wide. In 2018, almost 3.3 billion people, most of them living in Africa and Asia, relied on fish for their daily supply of protein, with fish accounting for 20 per cent intake of animal protein. Fish and seafood secure an income for about 800 million people, 90 per cent of whom are living in developing countries. For many of these countries, fish trade and the granting of fishing rights represent an indispensable source of income – in fact, alongside tourism, the only source for most small island developing states. But while 80 per cent of the fishery and aquaculture products consumed across the world come from the territorial waters of developing countries, fish consumption there is just half as high as in developed countries.

The recent UN Biodiversity Conference (COP 15) in Kunming, China, once again highlighted the poor state of our natural resources. And even small-scale fishers and fish farmers are by no means per se the custodians of our aquatic resources. They too frequently apply unsustainable production methods – often for lack of knowledge or owing to insufficient technical equipment, but increasingly also because factors such as the impacts of climate change or industrial fishing are forcing them to give up their traditional modes of production or extend their fishing grounds. It is for this reason too that the United Nations has declared 2022 the International Year of Artisanal Fisheries and Aquaculture (IYAFA) – a move which is to help get the sector out of marginalisation and highlight the importance of small-scale aquatic food production for food and nutrition security, for employment and income generation and hence for poverty eradication. But above all, it is to help place the sector on more sustainable pillars and make it viable for coming generations.

The ingredients for this are by and large familiar: access to reliable and transparent data on all aspects of the fisheries sector(s), training on how aquatic production, the conservation of natural resources and climate change relate to each other, fairness in negotiating fisheries agreements, flexible and long-term-funding focusing on the special needs of the target groups, promoting local stewardship and the recognition of human rights in general as well as the specific rights of particular groups such as women, youth and Indigenous Peoples.

Our authors show you initiatives addressing precisely these factors – such as the Too Big To Ignore global research network, which has developed a comprehensive information system for small-scale fisheries; the Coalition for Fair Fisheries Arrangements, which has set itself the task of raising awareness about the impacts of EU-Africa fisheries agreements on African artisanal fisheries communities; the Fisheries Transparency Initiative (FiTI), which seeks to boost government accountability regarding fishery via multi-stakeholder partnerships and thus counteract corruption and illegal fishing; or the Fish Forever Initiative of the NGO Rare, which supports the coastal communities in adopting sustainable behaviour to protect their fragile ecosystems while securing their livelihoods. And last, but not least, there is the African Confederation of Professional Organizations of Artisanal Fisheries (CAOPA), which states what expectations African fishing communities have of the IYAFA.

Wishing you inspiring reading on behalf of the editorial team,

Silvia Richter

Imprint

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COP 26 SIDE EVENTS stress importance of aquatic food systems

Aquatic foods have a lower carbon footprint than terrestrial animal-source foods. Sustainably managed, aquatic food systems can buffer communities against some of the impacts of climate change by enhancing their capacity to respond to climate risks. Nevertheless, policy-makers have so far given them insufficient attention in climate-related policies and those regarding the transformation of our food systems. Results of various side events at the world climate conference COP 26, held in Glasgow in Scotland early in November 2021, show that it is high time to change this.

Embracing diversity

Shakuntala Thilsted, Global Lead for Nutrition and Public Health at WorldFish and 2021 World Food Prize Laureate, emphasised the significance of aquatic food systems for human nutrition and health. Aquatic foods are an essential source of protein and micronutrients for 3.3 billion people. Thanks to their nutritional value, they are recognised as superfoods, as they provide multiple highly bioavailable micronutrients such as calcium, zinc, iron and vitamins (vitamin B12, vitamin A) as well as essential fatty acids. The intake of these micronutrients and essential fatty acids in women and children in the first 1,000 days of life could improve both cognition, development and growth in children and healthy nutrition in adults, Thilsted stressed.

In addition to this nutrition-physiological significance, aquatic foods could play a key role in creating healthier low carbon climate-resilient food systems, the scientist maintained. To achieve this, it was necessary to make use of the entire diversity which aquatic food offered. "We must shift from traditional aquatic foods such as fish, crustacean and bivalves to also include aquatic microorganisms and plants," the nutrition expert maintained. For example, farming of seaweed, a superfood rich in multiple micronutrients and essential fatty acids, was showing great potential in mitigating climate change and contributing to adaptation and resilience. In order to benefit from the potential of aquatic diversity, Thilsted recommended looking at traditional knowledge and the ways that indigenous communities had been using this diversity. These lessons learnt ought to be combined with today's new technologies. For instance, the micronutrients and essential fatty acids of seaweed could be concentrated by a factor four to five by removing the moisture content. Moreover, the potential of wetlands for the production of diverse aquatic food was still largely untapped. "Sustainable nature-positive aquatic foods must be a key part of Nationally Determined Contributions and National Adaptation Programmes of Action at COP 26", Thilsted stressed.

Putting equity at the core of food systems transition

All aquatic food systems were vulnerable or prone to the impacts of climate change, noted Essam Yassin Mohammed, Global Lead for Climate and Environmental Sustainability at WorldFish. According to him, this applied in particular in the tropical regions, where the majority of poor people live. He cited a recent study which showed that, other than for high-income countries, profits from aquatic food systems in low-income countries were projected to plummet in the future. For example, the Special Report of the Intergovernmental Panel on Climate Change (IPCC) on the Ocean and the Cryosphere had shown that owing to sea warming, sardines off the coast of Senegal were migrating northwards at a rate of more than 50 kilometres per decade. "Those small-scale fishers along the coasts of Senegal will have neither the financial nor the technical means to pursue these fish and as a result, they will be highly impacted," Mohammed emphasised.

If aquatic food systems were sustainably utilised, they emitted much lower greenhouse gas levels than land-based food production systems. The climate specialist took the example of Egypt. Here, the tilapia, which had been genetically improved by WorldFish with partners, demonstrated an up to 36 per cent reduction in environmental impacts including greenhouse gas emissions. It had also become apparent that the use of low-fuel gear could lower greenhouse gas emissions in some fisheries by 61 per cent, while reducing feed usage and switching to deforestation-free inputs could lower emissions from aquaculture by 50 per cent. "There is a huge opportunity and scope for improvements in putting aquatic foods on low emissions pathways," Mohammed said. However, when making the transition to low carbon aquatic food-based diets, one needed to make sure those furthest behind were not left behind. Equity had to be at the core of the transition to low-carbon aquatic food systems, Mohammed stressed.

Funding structures need to be realigned

What kind of financing is required to deliver the corresponding impacts at scale and ensure at the same time that measures reach the people needing them most? Here, Torsten Thiele, founder of the Global Ocean Trust, pointed to the different levels – local, regional, global – which financing addressed and which needed to intermesh. Thiele took the example of a seaweed value chain project in the Philippines which is supported through the Blue Natural Capital Financing Facility of the International Union for Conservation of Nature (IUCN). Here the local community decide which of the fishermen will get their local micro credits so that they can transition to seaweed production. Putting the seaweed farm in the right places actually supports marine conservation and hence biodiversity – the macroalgae absorb excess nutrients in salt water, decrease ocean acidification and provide habitats for many marine species.

At the regional level, the focus was on how to integrate these projects and ideas into the larger funding flows, for example for infrastructure projects. The Global Ocean Trust aims at convincing large development banks that nature-based solutions as part of an infrastructure approach are not only a sensible way to address resilience and adaptation but are also financially effective and allow bringing in both local communities in the decision-making around the infrastructure and innovative companies with new technologies. Moreover, Thiele noted, the issue of how to embed local products in a transparent, traceable, sustainable way in the global value chain had to be addressed.

And last, but not least, the global funding structure had to be realigned, he said. For example, incentives had to be provided ensuring that funds did not lead to fisheries subsidies

supporting the wrong kind of fishing. All actors had to be aware that standards and frameworks were now in place that recognised the value and the necessity of ocean conservation. "What the blue natural capital approach is really trying to say is that we have these specific benefits from healthy food for local communities, we have these additional carbon benefits, but we also have resilience benefits, and we have adaptation benefits. We need to value all of these, and we need to value them in an integrated way," Thiele summed up.

"We think like a big ocean state"

Given these aspects, it is all the more difficult to understand why only two per cent of climate finance had gone to small island states by 2019 – although they are the countries suffering most from the impacts of climate change and are among the most highly indebted countries in the world, as Ronny Jumeau, the Ambassador for Climate Change and Small Island Developing States Issues of the Republic of Seychelles, stated. With its "Blue Financing" system, Seychelles had raised financing to protect 30 per cent of the ocean space, while 70 per cent remained for sustainable use, Jumeau explained. He referred to the example of a one million US dollar research project for the propagation of juvenile sea cucumbers, to check overfishing in this sector. Furthermore, the country had committed to protect 100 per cent of its seagrasses by 2030.

In the fisheries sector, blue grants and blue loans were being provided to support the transition to sustainable practices, but also to promote new ones. For whereas in the tourism sector, for example, it was not a problem to get a loan, this was virtually impossible in the fisheries sector. Thirty-three per cent of the grants went to youth and more than 50 per cent to women. "We are not asking to stop subsidies, but we can redirect them," Jumeau said, adding: "We are a small island developing state, but we think like a big ocean state. Don't judge us by the size of our population." Many ideas presented at COP 26 came from countries of the Global South, Jumeau stressed.

Silvia Richter

STATEMENTS

> We must think of new ways of getting food out of the oceans

Peter Thomson, United Nations' Special Envoy for the Ocean

> From small islands come big ideas

Ronny Jumeau, Seychelles' Ambassador for Climate Change and SIDS issues

> We need a special fund to support research for healthier food, like the Global Fund to Fight Aids, Tuberculosis and Malaria

Leslie Ramsammy, Advisor to the Minister of Health in Guyana

> Policies and investments must take into account novel aquatic foods and food products that are climate-resilient

Shakuntala Thilsted, Global Lead for Nutrition and Public Health at WorldFish

> If you can't measure it, you can't improve it

Essam Yassin Mohammed, Global Lead for Climate and Environmental sustainability at WorldFish

Photo: Patrick Dugan/ WorldFish

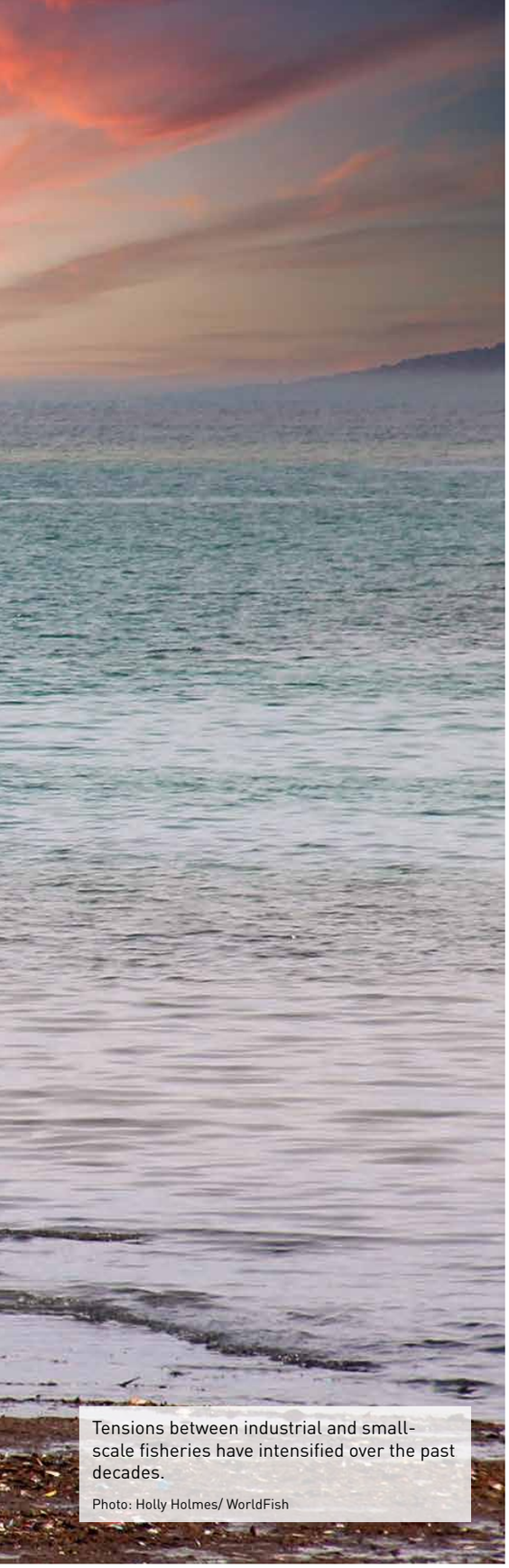
GLOBAL FISHERIES – STILL A BLIND SPOT IN INTERNATIONAL COOPERATION

In discussing the overexploitation of our oceans, the role of the latter in food and nutrition security and the livelihoods of millions of people, especially in the Global South, is often forgotten. Our authors appeal to actors in international cooperation to devote more attention to fisheries in their policies and address the challenges which this sector is facing in a more determined manner.

By Anna-Katharina Hornidge and Niels Keijzer

In March 2021, the streaming service Netflix released the documentary film "Seaspiracy" about the ecological impact of global fisheries. The considerable demand, the social media buzz and support among celebrities soon catapulted the documentary into the Top 10 in several countries. All of a sudden, a topic generally given little attention was in the limelight of an international audience. At the same time, the documentary film attracted strong criticism by fisheries and food experts who were particularly sceptical of its Western bias. Notwithstanding the justified criticism of overexploitation of the oceans, local fishing communities had not been given a voice, while the role of the oceans in maintaining livelihoods, particularly in developing and middle-income countries, received too little focus.

The documentary film and the public response it generated points to a field of tensions which have intensified over the past decades. These include tensions between industrial and small-scale fisheries, between high- and middle-income countries operating fishing fleets, and between developing countries with traditionally rich but increasingly overfished stocks and societies that depend on seafood. These represent transregional power relations and are neglected in development policy and international cooperation.



Tensions between industrial and small-scale fisheries have intensified over the past decades.

Photo: Holly Holmes/ WorldFish

Resource depletion and competition

Fisheries and aquaculture production are the main source of income of ten to twelve per cent of the world population. In 2018, almost 3.3 billion people, most of them living in Africa and Asia, relied on fish for around 20 per cent of their average per capita intake of animal protein (*also see article on pages 10–11*). Competition between small-scale, coastal and industrial fisheries, which has been growing for decades, is resulting in substantial processes of impoverishment in labour-intensive small-scale fisheries, in overfishing and in ecological overexploitation by industrial fishing fleets.

The lack of technical and financial resources needed to build up modern fishing fleets and thus benefit from what used to be rich fish stocks has, for example, caused many West African governments to enter into fisheries partnerships both with European Union countries, as well as with Asian fishing nations such as Japan, South Korea and, to an increasing extent, China. In this setting, European and Asian fishing fleets are vying for the declining fisheries resources of West Africa (*also see article on pages 28–30*). Government subsidies, which account for up to 20-40 per cent of the catch value, represent further incentives to expand these distant water fleets.

Too highly set catch quota, a lack of government capacities, or the unwillingness of local governments to assess the viability of the fish stocks in their exclusive economic zone (EEZ) and control their sustainable use all contribute to considerable overfishing. As a result, in parts of Africa, regional production and supply chains are being continuously weakened, if not collapsing.

Similar trends can be observed in parts of Latin America and South (East) Asia. Last year, lockdown measures in response to the Covid-19 pandemic contributed to worsening this situation, as we observe in a study prepared with colleagues of Germany's Leibniz Centre for Tropical Marine Research. Restricted market access accompanied by price hikes for petrol and fish processing inputs further reduced the gains from production.

The social impacts of impoverishment processes in small-scale and coastal fishing, including local fish processing industries and regional supply chains, vary according to gender, age groups and ethnicity. Owing to a lack of formal education, those affected are rarely able to find alternative employment on the labour market. The fish processing industry and fish marketing in particularly provide income opportunities for women in many parts of West Africa and Asia. These women are increasingly under threat from the impoverishment processes in the sector. The impacts of the Covid-19 pandemic are also further exacerbating these tendencies.

As a coping strategy, fishers stay out at sea for longer periods, adapt their catching methods to the availability of resources, or resort to illegal catching practices. Others diversify their strategies to secure income for their families (including seasonal migration) or leave the sector altogether and move to the services sector, which frequently has only a limited uptake capacity, to work as taxi drivers, kiosk vendors and the like. Thus, illegal, unreported and unregulated (IUU) fishing activities, clearly also including small-scale fisheries, continue to represent a growing major problem, despite international efforts to contain these.

A huge Saiko trade sector

In the West African context, alongside IUU fishing, transfer of fish at sea (referred to as Saiko trade) represents a key challenge. Saiko trade further undermines the local labour markets and efforts to curb overfishing. Over the last ten years, along Ghana's central coast and emanating in particular from the fishing port of Elmina, a thriving offshore trade has developed e.g. between Chinese-owned yet Ghanaian-flagged trawler crews and the local population, centring on the commercially non-lucrative by-catch of small and young fish. Instead of throwing the by-catch overboard, it is frozen in blocks and sold to small-scale fishers at night.

The frozen fish is then sold on, sometimes far inland, and causes a corresponding drop in prices for the legally fished, unfrozen catch. Estimates of the Environmental Justice Foundation put the amount of by-catch landed in this manner at approx. 80,000 tons per year, which is several times higher than the official catch of the Chinese fishing fleet in Ghanaian waters.

At the same time, aquaculture production has been growing rapidly for years. The UN Food and Agriculture Organization (FAO) reports a 528 per cent increase from 1990 to 2018. One much-used input for aquaculture is fishmeal, which is made from fresh fish including by-catch. In addition to being a key input for aquaculture, fishmeal plays a role in poultry production and, alongside regionally varying and changing patterns of consumption, is partly responsible for the widening of the range of species fished (*also see article on pages 31–34*).

However, a look at factories producing fishmeal e.g. in Mauritania (field research Hornidge 2018) quickly explains the limited impact of carefully negotiated catch quota relating to volume and species as a steering instrument. Rather, government implementation bodies and local political willingness

determine to what extent juvenile fish, for example, are protected via checks and sanctions, or whether industrial trawlers are using opaque plastic pipes to pump all kinds of fish and seafood directly into the fishmeal factories (*also see article on pages 16–17*).

Transregionally defined legal spheres

Recognising the world's oceans and their resources as a global commons represents a long-held desire of humankind. In the aftermath of the Second World War, the international community laid the foundations for the United Nations Convention on the Law of the Sea (UNCLOS), adopted in 1982, and the principle of the 'common heritage of humankind' as enshrined in International Law. However, in the negotiation rounds which had already started in 1967, its advocates, Maltese Ambassador to the UN Arvid Pardo and Elisabeth Mann-Borgese, only managed to anchor this principle for the seabed and its mineral resources beyond national borders ("the Area").

Up to this day, it has not been extended to biological resources in the water column. Instead, fisheries management in coastal waters (up to twelve nautical miles off the coast) and within the exclusive economic zone of a coastal state (EEZ; 200 nm, extendable to up to 350 nm off the coast) remains subject to national legislation. In the high seas, beyond the EEZ, the principle of 'the freedom of the seas' applies to shipping, fisheries and research. In fisheries, its precise provisions are determined by Regional Fisheries Management Organisations (RFMOs) focusing on certain regional fishing grounds and migratory fish species.

De facto, implementing and realising a sustainable management depends on available shipping infrastructure, institutional capacities and political determination, the results of which are reflected in transregional negotiations and agreements. For example, in Goal 14 ("Life below water"), Agenda 2030 stresses the need to combat illegal, unreported and unregulated fishing and establish protected zones. Important steps in this effort comprise the FAO Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels (since 2014) or the UN Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (since 2016). The FAO nevertheless estimates that illegal catches continue to represent around 20 per cent of global fisheries. One concrete example of the urgency to combine fisheries policy with development cooperation objectives in the interest of transformative sustainable structural policy is the cooperation between the EU and Germany with Mauritania (see Box).

What development cooperation needs to address

The oceans are a global common which acts as a global climate regulator, a biodiversity hub and a key source of protein for human nourishment. They bind carbon in large amounts and produce around half the total amount of atmospheric oxygen. At the same time, they are increasingly suffering from wastewater being fed into the sea from land. Eutrophication and acidification are going hand in hand with global warming. Growing competition between industrial fishing fleets coming almost exclusively from industrialised and middle-income countries and small-scale and coastal fisheries of numerous developing countries are leading to further overexploitation of fish stocks already under pressure from global warming in the tropics and subtropics.

Collapsing labour markets in small-scale and coastal fisheries, in processing industries and in regional trade networks which have traditionally provided employment for men and women with low levels of formal education prospects have increased incentives to engage in IUU, illegal fishing practices, poverty-driven piracy and trade outside legal sailing routes. Their illegality contributes to further eroding already weak institutional capacities whilst encouraging corruption and exacerbating inequality.

These are all challenges affecting sustainable development. However, they continue to fall between the areas of responsibility and interests of different policy areas, predominantly environment, food and agriculture, industry and commerce, development, security and defence, and between levels of governance e.g. from Germany and the EU up to the multilateral level of the FAO and the RFMOs, or the responsibilities for coastal and high seas.

International cooperation and development policy ought to explicitly address the challenges in the fisheries sector. Owing to its natural

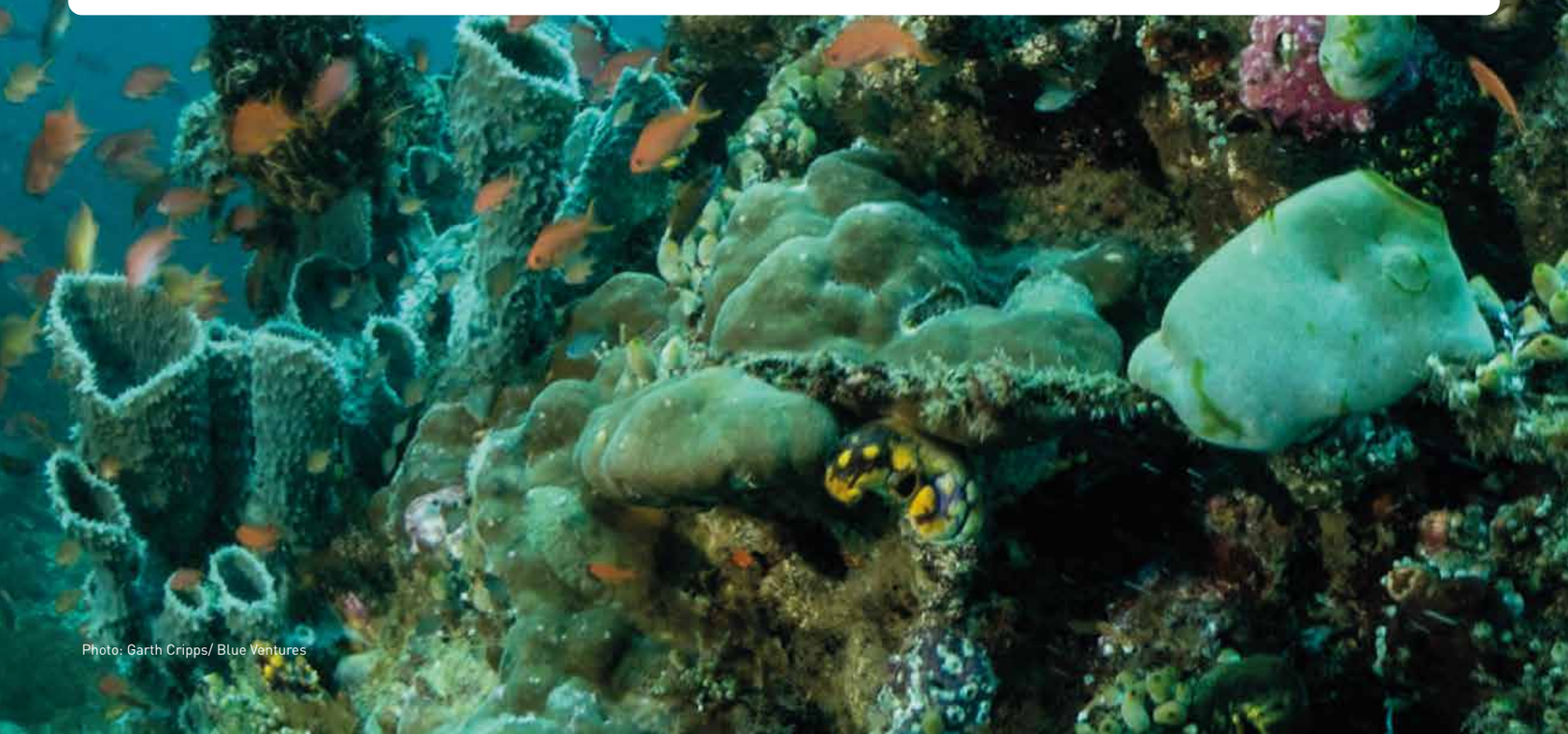


Photo: Garth Cripps/ Blue Ventures

dependence on a cross-border body of water, this economic sector is predestined for combining environmental protection with job creation, poverty alleviation, the development of institutional capacities and good governance structures as well as ambitious regional cooperation.

We regard the following fields of action and concrete steps as crucial for better positioning fisheries in development cooperation and international cooperation to address today's challenges:

1. **Eliminate subsidies for industrial fisheries.** The Organisation for Economic Co-operation and Development (OECD) puts the share of Official Development Assistance (ODA) provided for the sustainable development of the Blue Economy from 2013 to 2018 at an average of 2.9 billion US dollars per year (1.6 per cent of total ODA). This contrasts with the 35.4 billion USD globally spent in 2018 on fishery subsidies, with the predictable failure to combat overfishing.
2. **A ban on all high-sea fishing activities.** In the future, fishing ought to be restricted to coastal seas within the exclusive economic zones. In addition to protecting the ecosystems of the high seas, this would boost the position of small-scale fisheries vis-à-vis industrial fisheries in competition for fish stocks in developing countries.
3. **Institutional strengthening and capacity development of regional fisheries management.** Targeted support should be provided to regional collaborative schemes and agreements on sustainable fisheries management in combination with good governance and rule of law principles via the Regional Fisheries Management Organisations.
4. **Special support for small-scale and coastal fisheries** in developing and middle-income countries with access to traditionally rich fishing grounds and in alignment with the FAO Small-scale Fisheries Guidelines.
5. **Targeted development of local fish-processing industries and (trans-) regional marketing**, including gender-sensitive job creation measures, social and environmental standards, capacity development and training.
6. **Promoting cross-sector cooperation and coordination in ocean-based branches of the economy**. Securing sustainability standards (ecological, social, economic, cultural) in the further development of the 'Blue Economy' with targeted support for integrated approaches (such as the African Union's Integrated Maritime Strategy).

The EU's fisheries agreement with Mauritania

The fish stocks in the upwelling area off the coast of Mauritania are this country's most important natural resource. The European Union's Fisheries Partnership Agreement of 2015 (valid up to the 15th November 2021 based on two extensions) is the EU's most extensive fisheries agreement in financial terms, amounting to an annual total of 61.625 million euros. Out of this sum, 57.5 million euros is to be spent on access to Mauritania's waters, boosting the government budget of this country with 4.2 million inhabitants. Only the remaining 4.125 million euros has been explicitly earmarked for programmes supporting the field of small-scale fisheries, such as strengthening fisheries cooperatives, processing industries and training programmes. While the money spent since 2015 has strengthened an autocratic system continuing to be characterised by slavery (NGOs put the share of the population in slavery at 2.4 per cent), the government formed under President Mohamed Ould Ghazouani in August 2019 gives rise to cautious optimism regarding a step-by-step strengthening of the rule of law.

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References: **www.rural21.com**

Small in size – big in value. Celebrating small-scale artisanal fisheries and aquaculture in 2022

The importance of capture fisheries and aquaculture in human nutrition, employment and trade has long been known and recognised. This is not the case with small-scale fisheries and fish farming. The International Year of Artisanal Fisheries and Aquaculture is to help create the level of awareness which this important and highly diversified subsector of aquatic food production deserves.

By Nicole Franz

The UN Food and Agriculture Organization's flagship report *The State of World Fisheries and Aquaculture* (SOFIA) released in 2020 estimates total global fish production at 179 million tonnes in 2018. Aquaculture is increasingly important, accounting for almost half of global production (46 %). In terms of status of the resources, it is important to note that the share of fish stocks within biologically sustainable levels amounted to 65.8 per cent in 2017. Fisheries and aquaculture globally provide employment in harvesting for almost 60 million people. In terms of its contribution to human nutrition, aquatic food has increased at an annual average rate of 3.1 per cent from 1961 to 2017, providing about 3.3 billion people with almost 20 per cent of their average per capita intake of animal protein. In 2018, 67 million tonnes of fish (live weight equivalent) were traded internationally, representing nearly 38 per cent of all fish caught or farmed worldwide.

SOFIA projects that overall production, consumption and trade of aquatic products will increase, but at lower rates in the future. The role of aquaculture in further ensuring supply is acknowledged while the capacity of capture fisheries to grow will strongly depend on the capacity to improve resource management with an ecosystems approach. This is particularly important given a growing world population. It is noteworthy that only four per cent of food systems-related research since 1970 has included aquatic foods. As a result, current transformation approaches are disjointed and do not account for the potential of aquatic foods, posing a serious risk to achieving a healthy planet and healthy people.

The importance of fisheries and aquaculture for sustainable development is hence undeniable but not without challenges. This is also reflected in the 2021 Declaration for Sustainable Fisheries and Aquaculture of FAO's Committee on Fisheries (COFI), endorsed by members of FAO this year. This Declaration acknowledges 'that urgent targeted action is needed to ensure aquatic foods and products continue to provide inclusive, effective and sustainable pathways to reduce poverty, secure livelihoods and underpin food security and nutrition, as vital to achieving the goals set in Agenda 2030'.

Indispensable for a sustainable global food system

That same COFI Declaration also acknowledges 'the important role and contribution of artisanal and small-scale fisheries and aquaculture in poverty eradication and in providing livelihoods, as well as ensuring food security and nutritional needs of local communities'. It calls to promote policies supporting and recognising the contribution of small-scale fisheries and aquaculture in food security, employment and income, and improve data collection systems, especially from small-scale and artisanal fisheries. Furthermore, it calls to support access for small-scale fishers and fish farmers to local, national, and international markets, and to ensure equitable and non-discriminatory trade for small-scale fisheries and aquaculture products, also through implementing the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines).

In fact, the majority of those operating in aquaculture and capture fisheries value chains are small-scale artisanal actors (see Box), who are located primarily in low and middle income countries. The livelihoods associated with small-scale artisanal catching, farming, processing and trading of fish and other aquatic foods provide valuable income, seasonally or all year round, which can be relatively higher than that in agriculture and can act as a safety net during times of shocks and climate change. Aquatic foods from small-scale producers are also particularly important for the livelihoods of vulnerable populations who are landlocked and live on small islands or in conflict zones, and for vulnerable groups, such as indigenous populations, youth, women, and rural and urban poor. Women's access to income from fish can often have a stronger and more beneficial impact on food and nutrition security, where women are more likely to utilise income to meet basic needs.

INTERNATIONAL YEAR OF
ARTISANAL FISHERIES
AND AQUACULTURE
2022

Photo: FAO/ Gemina Garland-Lewis

Small-scale fishers, fish farmers and fish workers hold enormous potential to promote transformative changes in how, by whom and for whom fish and fishery products are produced, processed and distributed – with positive ripple effects felt throughout the global food system. A forthcoming study by FAO, World Fish and Duke University (USA) called 'Illuminating Hidden Harvests', to be released in early 2022, aims to provide more evidence on the contribution of small-scale fisheries to sustainable development.

What is 'ARTISANAL', what is 'SMALL-SCALE'? – The weakness of definitions

There is no universal definition of 'artisanal' or 'small-scale' fisheries or aquaculture. In general, these terms describe fisheries and aquaculture that use relatively small production units with relatively low input and low output and limited levels of technology and small capital investment. They are commonly managed at family level, sometimes with a small group of employees, or at community level. The fish are often sold in local markets, but can also reach national and international markets. For the purpose of the International Year of Artisanal Fisheries and Aquaculture IYAFA, 'small-scale' and 'artisanal' are used interchangeably (fishing for sport or recreation is commonly not called 'artisanal' or 'small-scale'). In an article published in *Frontiers in Marine Science*, Hillary Smith and Xavier Basurto, having reviewed existing definitions of small-scale fisheries, stress the importance of considering how these definitions determine how knowledge is generated, as they influence "what dimensions of SSF count and consequently what gets counted". Similarly, in an article in *Nature Food*, Rebecca Short and colleagues point to the need to overcome the contemporary governance paradigm that assumes homogeneity in small-scale artisanal fisheries and aquaculture rather than valuing its diversity.

Building global momentum

The role of small-scale producers in fisheries and aquaculture is slowly being recognised, and the United Nations General Assembly has declared 2022 the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022). FAO is the lead agency for celebrating the year in collaboration with countries, small-scale producer organisations, other relevant organisations and bodies of the United Nations system. IYAFA 2022 is an opportunity to highlight the importance of small-scale artisanal fisheries and aquaculture for our food systems, livelihoods, culture and the environment. The objectives of IYAFA 2022 are as follows:

- Enhance global awareness about, understanding of and action to support the contribution of small-scale artisanal fisheries and aquaculture to sustainable development, and more specifically in relation to food security and nutrition, poverty eradication and the use of natural resources.
- Promote dialogue and collaboration between and among small-scale artisanal fishers, fish farmers, fish workers, governments and other key partners along the value chain, in order to further strengthen their capacity to enhance sustainability in fisheries and aquaculture and to enhance their social development and well-being.

IYAFA 2022 aims at building global momentum to accelerate the support required to bring small-scale artisanal fisheries and aquaculture to the forefront of societal attention by raising awareness on the role of small-scale fisheries and aquaculture, strengthening science-policy interaction, empowering stakeholders to take action, and building new and strengthening existing partnerships. IYAFA 2022 can also act as a springboard towards implementing the Code of Conduct for Responsible Fisheries and related documents, like the SSF Guidelines, and take concrete actions towards achieving the Sustainable Development Goals (SDGs) as we enter the last decade of action to achieve the 2030 Agenda. Furthermore, it also falls within the UN Decade of Family Farming, the two observances will reinforce one another in providing greater visibility to small-scale artisanal fishers, fish farmers and fish workers.

A Global Action Plan (GAP) for the IYAFA 2022 was developed with the International Steering Committee composed of government representatives and non-state actors. The GAP provides guidance for the international community, including local and national governments, bodies of the United Nations, non-governmental organisations, international financial institutions and other international mechanisms, regional bodies, producer organisations, academic and research institutes, civil society organisations and the private sector. Structured around seven pillars, the GAP outlines a series of indicative and interconnected actions from the global to the local level that are mutually reinforcing in the pillars of work.

IYAFA VISION STATEMENT:

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

IYAFA 2022 was officially launched on the 19th November 2021, just two days before what is currently celebrated informally as World Fisheries Day, the 21st November 2021. One important ambition of the International Steering Committee of IYAFA 2022 is to elevate this World Fisheries Day to an official UN Day on Artisanal Fisheries and Aquaculture, to create a legacy of IYAFA 2022 that provides an opportunity for all to continue celebrating and securing sustainable small-scale artisanal fisheries and aquaculture for generations to come. Communication materials such as visual identity guidelines and a trello board with social media messages are available on the IYAFA 2022 webpage.

Many actors at all levels are already gearing up support for celebrating IYAFA 2022. Examples include a series of five regional small-scale fisheries congresses organised by the research network Too Big To Ignore in 2022 (*also see article on pages 14–15*), the establishment of three sub-regional IYAFA 2022 committees covering the Caribbean, Central America and South America, the formation of a national IYAFA 2022 committee in Uganda as well as initiatives by the International Institute for Environment and Development (IIED) to organise a series of dialogue meetings and 'Fish Night' events to connect stakeholders and the preparation of a series of infographics and animations.

IYAFA 2022 is a unique opportunity for all – and we invite you to be creative and to get organised to celebrate the power and value of small-scale fisheries and aquaculture in 2022. Contact us at IYAFA@fao.org to share your ideas.

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References: **www.rural21.com**

Thinking terrestrial and aquatic food systems together

Fisheries and aquaculture are important parts of global food systems. The sector employs millions of people in developing countries and feeds billions world-wide. Over-exploitation and other harmful practices jeopardise the sector's sustainability and its actual growth potential. Our author describes how the German Federal Ministry for Economic Cooperation and Development (BMZ) supports sustainable practices in fisheries and aquaculture as an important contribution to food and nutrition security, the protection of livelihoods and the conservation of natural resources.

By Martin Hoppe

On land and below water, the world seems to be out of balance and the Covid-19 pandemic has revealed and exacerbated existing problems in international food systems. The recent UN Food Systems Summit acts as a wake-up call and stresses the need for systemic transformations in various sectors and settings. Fisheries and aquaculture are part of the problem and part of the solution. Fish stocks have never been under such stress as they are today. Never have so many aquatic species been threatened by extinction. At the same time, we have the knowledge, tools and technologies to manage and govern aquatic systems more sustainably. Their use would actually increase the productivity of aquatic systems and contribute to better nutrition (*see article on pages 4–5*) and to securing the livelihoods of hundreds of millions of people world-wide.

Today, although 80 per cent of the fishery and aquaculture products consumed across the world come from the territorial waters of developing countries, their average per-capita fish consumption is only half of that in developed countries (20.5 kg). Fish trade and the granting of fishing rights represent important revenue streams for many developing countries. However, at the same time, export can divert fish away from domestic consumption, and with it the possibility of fighting hunger and malnutrition more effectively. In Africa and other regions with high food insecurity, scenarios for future fish demand far exceed the current domestic supply. There is an urgent need for action to meet this increasing demand in a sustainable manner as part of the global fight against hunger and malnutrition.

Commitments, instruments and partnerships of German development cooperation

The Sustainable Development Goals, specifically SDG 1, 2 and 14, as well as guidelines and agreements endorsed by the UN Food and Agriculture Organization (FAO) and its member states (*see article on pages 10–11*) constitute important principles and standards of actions for our programme planning and implementation. On this basis, the German Federal Ministry for Economic Cooperation and Development (BMZ) undertakes efforts to promote sustainable artisanal fishing and aquaculture, encourage sustainable, socially responsible processing and marketing of fish, and, in line with the European Union's zero tolerance approach, support the efforts of partner countries to tackle illegal, unreported, and unregulated (IUU) fishing.

German development cooperation in the field of fisheries and aquaculture relies on various instruments. These include bilateral technical and financial development cooperation. In Mauritania, for example, the BMZ supports the development of effective fisheries surveillance and monitoring systems as well as port facilities and fish landing sites. But we also support global initiatives such as the Global Sustainable Seafood Initiative (GSSI) and the Fisheries Transparency Initiative (FiTI, *see article on pages 22–25*) and collaborate with international or non-governmental organisations.

The Global Programme "Sustainable Fisheries and Aquaculture"

With the Global Programme "Sustainable Fisheries and Aquaculture" (2016–2024), operating in seven countries in Africa and Asia,

PROMOTING SUSTAINABLE FISHERIES IN UGANDA

The Nile perch fishery in Lake Victoria is one of Africa's most important value chains. It contributes to the livelihoods of two million people in the region. But this important source of nutritious food and income for the people around Lake Victoria is under threat. Open access to fish stocks, illegal, unreported, and unregulated (IUU) fishing and a lack of a sufficient supervisory and monitoring system for the laws and regulations applicable to the fisheries sector add to the pressure on the resource. To tackle this issue, as part of the Global Programme "Sustainable Fisheries and Aquaculture", around 12,900 boats have been registered and 25,800 fishers have received fishing licenses to formalise their businesses. In addition, more than 700 inspections have taken place to reduce IUU fishing. So far, more than 40,300 tons of wild catch from Lake Victoria has been regulated and documented in Uganda.

Photo: Maria Winkler/ GIZ/ Global Programme "Sustainable Fisheries and Aquaculture"

SUSTAINABLE RICE-FISH FARMING IN MADAGASCAR

In Madagascar, rice-fish farming has great potential to sustainably improve local livelihoods, especially in rural areas and inland. Around 80 per cent of the population live there, and many people suffer from food insecurity and malnutrition. Better access to fish, which is mainly traded along the coast and in cities, has important economic benefits and improves food security and nutrition in the interior of the country. To date, only 20 per cent of suitable fields are used for rice-fish cultivation. To expand this integrated aquaculture approach, the Global Programme "Sustainable Fisheries and Aquaculture" supports the Malagasy government in creating favourable political, legal, and administrative frameworks. In addition, the programme has already trained 15,000 people in rice-fish farming through trainings and practical demonstrations. Successful application creates several advantages. Fish find an optimal habitat in the rice fields and feed on naturally occurring snails, insects and weeds. In search for food, they churn up the soil and release nutrients for the rice plants. In addition to improving fish production, this increases the rice yield.

Photo: Sabine Wolf/ GIZ / Global Programme "Sustainable Fisheries and Aquaculture"

German development cooperation is working closely with thousands of stakeholders along fisheries and aquaculture value chains (see examples provided in the boxes). The target group includes small- and medium-sized aquaculture producers, fishers, processors, traders, producer organisations, research and training institutes as well as governmental organisations. The Global Programme provides technical training and business development services to sustainably increase production and gain market access. Innovations such as hygienic steel processing tables or steel boxes on boats protect the fish from dirt, sunlight and mechanical damage. This reduces post-harvest losses and increases the availability of fish on local markets. Public, private, and non-governmental organisations are supported to disseminate demand-oriented advisory services and best practices. Policy advice is offered to improve legal frameworks and their enforcement. For example, six countries have implemented a total of 28 measures for sustainable fisheries and aquaculture in accordance with the FAO guidelines. This includes revising national strategies and developing relevant implementation and action plans. Almost 20,000 people have participated in trainings on business management and technical skills. Participants learn how to avoid overfishing or how to produce and process fish resource-efficiently. About 9,100 aquaculture businesses have increased their production capacity. The amount of legally caught fish available for the food-insecure population has more than doubled.

In the last years, BMZ has fostered new and existing partnerships. For instance, we have initiated a collaborative scheme with the Initiative Stop Illegal Fishing (SIF) to support the implementation of the Port State Measurement Agreement (PSMA) to target IUU fishing in Ghana, Madagascar, and Mozambique. In the fight against IUU fishing, we consider it important to have international recommendations to counter the negative implications of transshipment, the unloading of fish at sea from one boat to another as a possible loophole for legalising illegal fish. We therefore support the development of the FAO Transshipment Guidelines.

In the area of direct value chain support, the BMZ supports the EU-funded and FAO-led Fish4ACP project. It serves to promote sustainable value chain interventions in fisheries and aquaculture in twelve selected countries in Africa, the Caribbean and the Pacific. In 2020, together with the EU and FAO, the BMZ organised a policy event to discuss the importance of sustainable fisheries and aquaculture for food and nutrition security in Africa and to emphasise the urgency for substantial and collaborative sector support.

National and international momentum

BMZ's financial and political commitment in the fisheries and aquaculture sector has continuously grown over time. Fisheries and aquaculture will remain important sectors in the context of ending hunger and protecting life on Earth, the environment and natural resources. Given its relevance in global trade, the fish value chain should be considered next-in-line to be given similar attention as other classic commodities, e.g. bananas, cocoa and coffee.

I am confident that the outcomes of the UN Food Systems Summit will guide the much-needed transformation of how we think, produce and consume foods. The Summit has made it clear that a systematic approach means to think terrestrial and aquatic food systems together. For too long, "blue foods" and the people who catch, collect, or produce these sustainably have been decoupled from discourses, policies and support in agriculture and other sectors. That is surprising when you consider that 90 per cent of the more than 200 million people directly and indirectly employed in the sector live in developing countries, with small-scale fisheries accounting for 50 per cent of the global fish landings. The UN International Year of Artisanal Fisheries and Aquaculture (IYAFA) in 2022 (*see article on pages 10–11*) will help to hold up the momentum of an increasing global awareness of the sector's importance. However, recognition alone is not enough, it must lead to better support. Urgency is required, because global crises such as climate change are threatening the resilience of aquatic livelihoods and our food systems.

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Boosting transdisciplinary research for small-scale fisheries

Fisheries are not one and the same, and should not be treated as such. But while there is a lot of knowledge regarding large-scale, marine-based fisheries in developed countries, far less attention is being paid to small-scale fisheries in developing countries, whether in marine or inland areas. Under these circumstances, fisheries management and development strategies work in favour of less than half of the world's fisheries, and disadvantage the rest. The Too Big To Ignore (TBTI) global research network has set itself the task of changing this.

By Ratana Chuenpagdee, Vesna Kerezi and Svein Jentoft

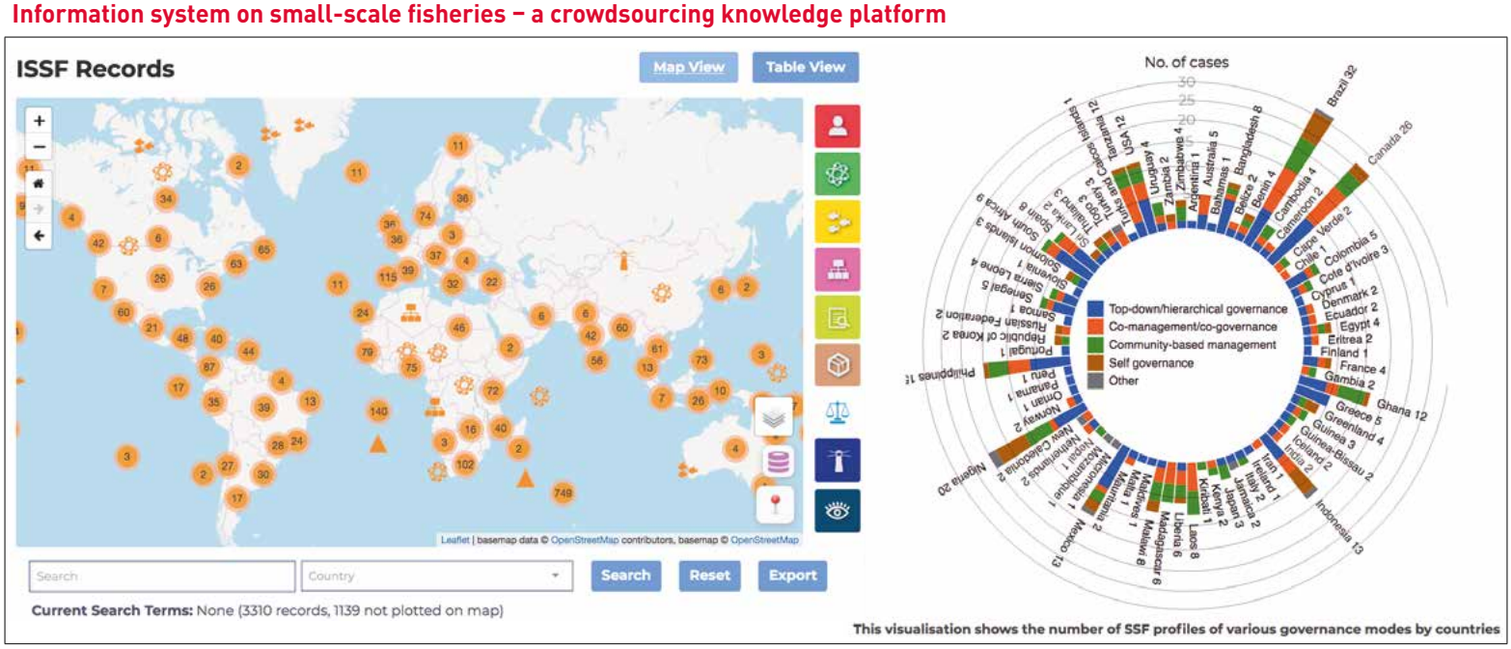
Small-scale fisheries occur in aquatic ecosystems anywhere in the world, often in rural and isolated areas. They are diverse in their characteristics, complex in their organisation and dynamic in their operations. Therefore they present a major challenge for research and a 'wicked problem' for management and governance. This was the impetus for the establishment of the Too Big To Ignore (TBTI) global research network in 2012, which has brought together researchers around the world to work collaboratively with each other and with small-scale fisheries communities and various supporting organisations. The primary aims of TBTI are to enhance knowledge about this important sector and address concerns and challenges affecting their viability and sustainability. With the contribution of more than 600 members, TBTI has been able to provide detailed insights about small-scale fisheries, based on more than 300 case studies from at least 80 countries. This work has been disseminated, not only through conventional academic outlets, such as peer-reviewed books and journal articles, but also as free online publications, available for download from the TBTI website. Furthermore, TBTI has developed a comprehensive Information System for Small-scale Fisheries (ISSF) based on a crowdsourcing platform that enables data sharing and broad-based synthesis (see Figure). ISSF contains information about various aspects of small-scale fisheries research, key characteristics of small-scale fisheries around the world, and examples of injustices in them.

In the past two decades, small-scale fisheries have received heightened attention from governments and non-governmental organisations, funders and donors, as well as scientific communities that are working in parallel and in concert to support and promote sustainable enterprises. One of the key milestones was the endorsement of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SSF Guidelines) by FAO member states in 2014. Among other things, the SSF Guidelines recognise the important role of academia in building more sustainable and socially just fisheries, where small-scale fisheries can continue to play a strong role in the ocean economy. All these efforts make it increasingly difficult to ignore these enterprises. Yet, a better recognition of them, especially of their immeasurable contribution to food security, poverty alleviation, viable livelihoods and wellbeing of millions of women and men involved in pre-harvest, harvest and post-harvest activities, is not a sufficient condition for addressing marginalisation and vulnerability in small-scale fisheries. The threat to their viability and sustainability becomes particularly visible with the discussion about 'Blue Growth' and 'Blue Economy' initiatives, especially those that tend to exclude the sector.

Building transdisciplinary capacity in research and governance

As noted, issues and challenges affecting small-scale fisheries are complex. These factors also evolve with the compounded changes, related to climate, economy, technology, and institutions. Therefore, research questions must be carefully framed in order to address multifaceted concerns in the sector. The five big questions driving TBTI research illustrate the need for comprehensive knowledge about small-

Information system on small-scale fisheries – a crowdsourcing knowledge platform



This visualisation shows the number of SSF profiles of various governance modes by countries

The big five questions driving TBTI transdisciplinary research

1. What options exist for improving the economic viability of small-scale fisheries and increasing their resilience to large-scale processes of change?
2. What aspects of small-scale fisheries need to be accounted for and emphasised in order to increase awareness of their actual and potential social contributions and their overall societal importance?
3. What alternatives are available for minimising environmental impacts and fostering stewardship within small-scale fisheries?
4. What mechanisms are required to secure livelihoods, physical space and rights for small-scale fishing people?
5. What institutions and principles are suitable for the governance of small-scale fisheries?

scale fisheries (see Box). Addressing these questions would then require a broad range of expertise and experience from scientists from different disciplines, fisheries professionals, and knowledge holders like fishers, elders and local leaders. A transdisciplinary (TD) process to co-identify the problem, co-design the studies and consequently co-create the knowledge can then take place, leading to a better, more holistic way of framing the questions, and to a research design that not only enhances learning but also nurtures respect and appreciation between the people involved in research. The TD principle underlies what TBTI is doing, including how it is organised and functions, and in the offering of the online learning platform to help build TD capacity in research and governance.

To some, this may seem cumbersome, and perhaps unnecessary. But investment of time and resource in getting research and fisheries governance right is the best way forward, given that small-scale fisheries are too important to fail. Lessons from past fisheries management approaches from around the world, especially about the negative consequences of some ill-suited management decisions on small-scale fisheries, have been sending clear signals of how technical fixes no longer work. Examples include the application of tools like individual transferable quotas (ITQs) that tend to concentrate quotas in a few companies or how the designation of some marine protected area (MPAs) prevents small-scale fisheries from accessing the fishing ground. A nuanced approach to fisheries management, grounded in mutual respect and agreed-upon principles, applied with sensitivity and careful consideration for the most marginalised and vulnerable groups, is called for.

Demands for interdisciplinary and TD research have been heightened, with growing concerns about climate change, global food security and environmental sustainability outlined in the Sustainable Development Goals (SDGs). The first step in tackling these issues is to build innovative research and governance capacity.

Mobilising for "Blue Justice"

With the Blue Economy/ Blue Growth agenda being enthusiastically adopted by both the government authorities and large-scale, ocean-based industries around the world, as seen in the Blue Economy Conference held in Kenya in 2018, it is more important than ever for the research community to engage in the debate about the future of the ocean and fisheries sustainability. In our forthcoming volume "Blue Justice: Small-Scale Fisheries in the Sustainable Ocean Economy", we argue that if governments do not earnestly implement the SSF Guidelines, the Blue Economy will come at a loss for the sector. If governments fail to secure sustainable small-scale fisheries, a sector that is more sustainable and climate-friendly, and that delivers on secure and just future for the millions of people who depend on fisheries for livelihoods and a way of life, there is little chance to achieve fisheries and ocean sustainability (SDG 14) and other related SDGs.

As a concept, "Blue Justice" speaks to the importance of inclusion of small-scale fisheries and community members as stakeholders; of paying a closer look to the power imbalances and inequity that are happening in the ocean space, mostly in connection with the Blue Growth/ Blue Economy agenda, as well as in the broader context of the development in marine and inland fisheries. This is largely an issue of power and the ability of small-scale fisheries to withstand the pressures they are experiencing when new ocean development projects take place in the areas that they have been able to access, on land and at sea. By bringing in basic principles of justice to recognise that small-scale fisheries have rights and priorities that cannot be ignored, the Blue Justice lens encourages governments and all sectors of the society to help restore justice for small-scale fisheries, making up for past wrongs and enabling them to deliver on their potentials. Blue Justice is also about the need to build upon the existing capacities and capabilities of small-scale fisheries people, so they can be more robust, resilient, and creative. In other words, it is about integrating the sector as one of the key actors in a sustainable ocean development strategy – one that centres on small-scale fisheries, their nature and values, rather than one that excludes them.

Levelling the playing field

Much of the TBTI research effort has been focused on improving fisheries governance for small-scale fisheries such that the governance system, including fisheries institutions and regulations, is based on universal principles, like human rights, dignity, and justice. Appropriate processes and mechanisms need to be put in place to strengthen the involvement and engagement of small-scale fisheries people in decision-making. This may require reform and transformation in the governance system so that it becomes more interactive and collaborative. Small-scale fisheries people have a democratic right, indeed a human right, to be involved in governance processes and decisions that affect their livelihood opportunities, with respect for their cultural practices and norms, which the SSF Guidelines say should happen. All countries have a starting point for this, as signatories of many relevant international conventions and agreements. Still, more effort is required, legally and otherwise, before the playing field is levelled in a way that would sustain small-scale fisheries.

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Vesna Kerezi is a project manager and communication specialist who has been working with TBTI since 2013. A geographer by training, she holds a MSc from Memorial University, Canada. Her interests lie in human dimensions of small-scale fisheries, social science communication and knowledge mobilisation.

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More aquaculture to feed the world? Not at the expense of African fishing communities

Nowadays, aquaculture provides more people with food than capture fisheries, and the tendency is growing. The accompanying demand for fishmeal and fishoil, driven mainly by China, is increasingly being covered by West African fishing. However, putting the blame for the threat to fish stocks in the region solely on China's appetite for seafood falls a little short. Our author explains the complicated context and calls for responsible action – not only on the part of politics.

By Béatrice Gorez

At a meeting co-organised with the European Union and the Organisation of African, Caribbean and Pacific States in late September, the UN Food and Agriculture Organization (FAO) stated that its vision for the transformation of aquatic food systems focused on feeding the world through aquaculture expansion: 'the target is to achieve 30/ 45% aquaculture growth by 2030 with quality food produced sustainably'. The sector has already been booming in the last decades, with world aquaculture contributing 46 per cent of global fish production in 2018, up from 25.7 per cent in 2000, and mainly driven by China. And the trend continues, with aquaculture nowadays supplying more fish and seaweed for human consumption than capture fisheries are. But there is a catch: farmed carnivorous marine species, like salmon or shrimp (scampi), widely consumed in industrialised countries, are grown using fishmeal and fishoil (see Box) made from wild small oily fish, the small pelagic species, including West Africa's sardinella, which are traditionally consumed fresh or artisanally processed by the local populations.

Worldwide demand for farmed carnivorous seafood such as salmon and scampi is growing rapidly. The accompanying demand for fishmeal and fishoil is a threat to the nutrition security and livelihoods of West African fishing communities. Photo: Jörg Böthling

The FAO also predicts that the chief producing countries, such as China, are expected 'to continue the transition from extensive to intensive fish farming' during the next decade. Intensifying fish farming, particularly of carnivorous species, is increasing the pressure on small pelagics, putting in jeopardy the future of African fishing communities whose livelihoods have depended on sardinella for centuries. It is also depriving the West African populations of a healthy, affordable, nutrient-rich source of proteins. In a nutshell, the rich man's fish is eating the fish of the poor.

Sardinella fishing mortality gradually increasing

In Mauritania and Senegal, sardinella is the most important species of small pelagic fish for the nutrition of the local populations. It is traditionally caught by the artisanal fishing sector. In 2018, Senegalese fishermen's organisations raised the alarm about decreasing sardinella catches. Data collected by scientists over the past 20 years indicate that sardinella fishing mortality has been gradually increasing. In the period 2000–2013, this was due to the exploitation of sardinella by foreign factory trawlers, particularly in Mauritania, fishing for markets in Russia and Eastern Europe, but also in West Africa (Nigeria, Ivory Coast, etc.). However, after 2012, they were replaced by those fishing for the fishmeal industry, in Mauritania, but also in Senegal and The Gambia. In the region, fishmeal factories are supplied by industrial vessels, but also by some artisanal fishers.

Whereas catch volumes of artisanal fleets was restricted by the demand from the human consumption market in earlier years, this limitation no longer exists. The fishmeal plants can absorb large quantities of fish, which stimulates artisanal fishermen to increase their effort. Mauritanian fishmeal plants have even brought in a completely new fleet of efficient Turkish purse seiners to supply them with fish. Senegalese fishermen from Casamance are now landing catches at fishmeal plants in Gambia. Sometimes, these landings are so big that even the fishmeal plants cannot absorb them. As a result, considerable quantities of sardinella have to be dumped at sea or on the land. The women fish processors' activity is threatened because of the competition from fishmeal factories that are buying all the sardinella.

This rush is led by the global demand for fishmeal and fishoil (FMFO). The main markets for those products from West Africa are in China. But countries like Norway, where

fishmeal goes to salmon feed, or France, where fishoil is being used for producing Omega 3 rich food supplements, play a role too, as is described below. In July 2021, the Coalition for Fair Fisheries Arrangements (CFFA) reviewed a report from Greenpeace and the Changing Markets Foundation called "Feeding a Monster: How European aquaculture and animal feed industries are stealing food from West African communities", to highlight its implications for the European Union. The report emphasised that "every year, over half a million tons of fresh fish that could be feeding millions of people in West Africa are being diverted to produce fishmeal and fishoil in order to feed animals in industrial aquaculture and farming".

Lack of transparency in the fishmeal and fishoil business

Fishmeal and fishoil business in West Africa is opaque. It's virtually impossible to know exactly how much fish is used for producing how much fishmeal and fishoil, and to trace a particular batch to its end destination. There is room for improvement, when it comes to the transparency and traceability of farmed seafood using fishmeal and fishoil, including for the EU, where today, it is impossible to know whether a farmed salmon sold in your supermarket has been fed with fishmeal coming from West Africa, or whether this fishmeal was even sourced legally. Indeed, the EU regulation to combat illegal fishing, which includes the delivering of a catch certificate to show that the fish products we eat come from legal operations, does not cover farmed fish products.

The global fishmeal and fishoil production is dominated by a few large companies, three of them being Norwegian – Cargill Aqua Nutrition/ EWOS, Skretting and Mowi – and one Danish, BioMar. The Greenpeace/ Changing Markets report underscores that well-known retailers across Europe are sourcing farmed fish (such as salmon) from companies linked in a supply chain to the big four aquafeed companies which are involved in the trade of FMFO from West Africa.

Norway is the home of intensive salmon farming and the main source of farmed salmon imports to the EU. In the last decades, NGOs like the Green warriors in Norway, Greenpeace or Compassion in World Farming have denounced the catastrophic consequences of this trade. Intensively farmed salmon are fed on processed food that includes an important portion of fishmeal and fishoil, and are treated with medicines to fight diseases and parasites such as sea lice, which literally eat the fish alive. Their pens are placed in coastal waters, with thousands of tons of waste (including pesticides, fish faeces and food waste) released into the surrounding environment. Sea lice from farmed fish pens also plague wild salmon as they swim past fish farms. The fact that some of the Norwegian salmon farms use fishmeal and fishoil from West Africa only adds to the social and environmental unsustainability of the operation.

While the EU is not a major importer of fishmeal, it's another story for fishoil. France, in particular, is a major market for West African-produced fishoil. The Changing Markets/ Greenpeace report highlights that in 2019, more than 70 per cent of the 35,000 tons of fishoil produced by Mauritania was destined for the EU, with France totalling over 60 per cent of the EU imports from Mauritania, followed by Denmark. The main French importing company is Olvea, a supplier of vegetable and fishoils for animal feed and human consumption. France therefore plays a key role as an "end market" for fishoil from West Africa, which deprives millions of West Africans of access to this essential source of fatty acids and vitamins.

> The rich man's fish is eating the fish of the poor.

Some EU companies are also producing FMFO in West Africa, causing havoc in coastal communities, like the Spain's Barna, which opened a fishmeal plant in Cayar (Sénégal). Many fishers in Cayar are opposed to the factory, believing it will only contribute to the destruction of the already fragile small pelagics resource. Another reason for the population's anger is the disastrous environmental consequences of the dumping of wastewater and the stench that the factory has given off since it started production, which has led to the appearance of many respiratory infections in the area.

A promising wind of change

However, in the EU, a wind of change may be coming: the 'Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030', adopted not long ago, promotes "low-impact aquaculture (such as low-trophic, multi-trophic and organic aquaculture)". Recently, the Director of the European Commission Directorate on Fisheries and Maritime Affairs, Charlina Vitcheva, highlighted that "the increased demand for feed for aquaculture should not deprive local communities of nutrition security and livelihoods". The European Green Deal and the EU's Farm to Fork strategy give us the opportunity to call for more transparency across fish farming value chains, and to ensure that our food systems contribute to deliver environmental sustainability, food poverty reduction and empowerment of communities.

On their part, West African artisanal fishing communities, with the support of NGOs like Changing Markets, or CFFA, are calling on governments to act now: fishmeal and fishoil production using fish fit for human consumption should be banned in the whole of West Africa, and intensive aquaculture of carnivorous marine species, and consumption of these products, should be phased out.

In the EU, at the moment, this may sound like wishful thinking, given the increasing volumes of (imported) farmed carnivorous seafood, especially salmon and scampis, consumed by Europeans. If they wish to support thriving fishing communities in West Africa, consumers also have a responsibility to act: they should stop eating intensively farmed salmon and scampi!

Globally, roughly one third of fishmeal goes to the agricultural sector to feed pigs and chickens in industrial farms. However, aquaculture became the dominant user of 'reduction fisheries' (which supply fish for FMFO rather than for direct human consumption) in the early 2000s. In 2016, 69 per cent of fishmeal and 75 per cent of fishoil production went to seafood farming (FAO figures).

Béatrice Gorez has been spokesperson and coordinator of the Coalition for Fair Fisheries Arrangements (CFFA) activities since 1994.
The CFFA is a platform of EU-based NGOs and African artisanal fishing organisations which has documented EU-Africa relations that affect African fishing communities, and relays the views of these communities to the EU institutions.
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Sustainable fisheries need transparency

Global fisheries have been slow to catch on to the transparency wave, but the concept is now widely accepted as a fundamental component of sustainable fisheries management. Still, many governments are not disclosing even basic information on their fisheries sector, such as revenues, catch data, stock assessments or subsidies. The Fisheries Transparency Initiative (FiTI) seeks to address this problem.

By Sven Biermann

Marine fisheries have become a critical resource fulfilling the economic, food security and nutrition needs of millions of people around the world. For millennia, those who dedicated themselves to fishing – either for family consumption, recreational interest or as a commercial activity – did not need to worry about the sustainability of this natural resource. Fish stocks replenished themselves with ease. But this is no longer the case.

The global Covid-19 pandemic struck at a time when the ocean was already under increasing threats from myriad impacts, including climate change, pollution and overfishing. According to the latest report on 'The State of World Fisheries and Aquaculture' (2020) from the UN Food and Agricultural Organization (FAO), more than 34 per cent of global fish stocks are already fished at biologically unsustainable levels – a share that has tripled in the last 40 years.

On a more positive note, the same report also states that "in general, intensively managed fisheries have seen decreases in average fishing pressure and increases in stock biomass, with some reaching biologically sustainable levels, while fisheries with less-developed management are in poor shape". Indeed, over recent years, a growing global consciousness around the importance of ensuring sustainable fisheries has been witnessed – that is, fisheries are environmentally regenerative, economically viable and socially equitable. Unfortunately, increased understanding does not automatically translate into improved action. Around the globe, many marine fisheries are still poorly managed, and some are even fully unregulated.

The National Multi-Stakeholder Groups should be composed of equal numbers of representatives from government, the business sector and civil society.

Photo: FiTI

Why transparency counts

Of the many interventions required to improve fisheries management and seafood sustainability, the public availability of basic, credible information is essential. This includes information like what the status of fish stocks is, how many vessels are allowed to fish, and under which conditions, how much is being caught, and how much is paid for the right to fish, etc. A lack of such information affects the capacity of governments to manage fisheries efficiently and sustainably, as well as the ability for effective oversight, accountability and public dialogue.

Perhaps the moment when transparency in fisheries management started garnering greater attention was when the FAO published its annual State of the World Fisheries Report in 2010. It was the first time transparency was mentioned prominently by the FAO as being of central importance to various problems affecting marine fisheries world-wide: "Lack of basic transparency could be seen as an underlying facilitator of all the negative aspects of the global fisheries sector – IUU fishing, fleet overcapacity, overfishing, ill-directed subsidies, corruption, poor fisheries management decisions, etc. A more transparent sector would place a spotlight on such activities whenever they occur, making it harder for perpetrators to hide behind the current veil of secrecy and requiring immediate action to be taken to correct the wrong."

However, the scope of transparency should not be limited to only shining a spotlight on the activities of governments, or companies, in order to address issues such as illegal fishing or corruption. One relatively underappreciated value stemming from improved government transparency is an increase in the visibility of the entire fisheries sector, including actors who are often ignored or neglected. This is particularly relevant for specific fisheries sub-sectors (e.g. artisanal fishing) or certain groups (e.g. women), both of which play a vital role in ensuring people's livelihoods, food security and culture, but are nevertheless often marginalised or undervalued in public debates and policy-making. The persistent lack of such information will likely be emphasised in 2022, designated by the UN General Assembly as the International Year of Artisanal Fisheries and Aquaculture (*see also article on pages 10–11*).

Yet even today, in the age of information, there's a lot of doubt and even secrecy about what's happening in global fisheries. Too few governments are disclosing information on their fisheries sectors, ranging from information on laws, permits, fishing agreements and stock assessments, to financial contributions, catch data and subsidies. Likewise, not enough companies are reliably reporting on catch volumes and fishing practices. Furthermore, data that is publicly available is too often incomplete, old, unverified and difficult to understand for the general public.

How do we know whether the sector is managed in a sustainable way?

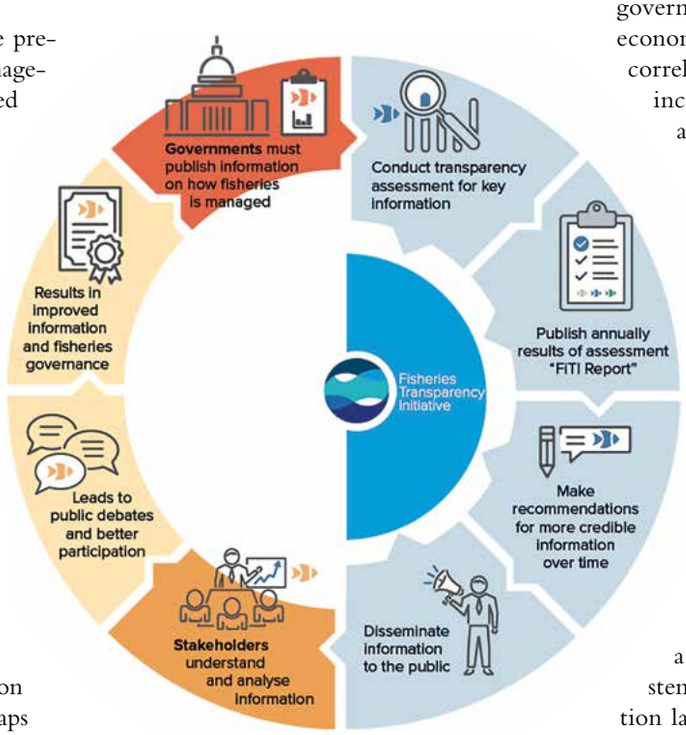
The Fisheries Transparency Initiative (FiTI) was created to address this problem on a global scale. It is a voluntary initiative that promotes transparency and collaboration in marine fisheries management. At the heart of the initiative is the FiTI Standard, the only global framework that defines what information on fisheries should be published online by public authorities. The FiTI Standard was developed over two years (2015–2017) in a global multi-stakeholder endeavour, involving representatives from governments, industrial fishing companies, artisanal fishing associations, civil society organisations and intergovernmental organisations, such as the World Bank, the European Commission, the African Development Bank and the FAO. The FiTI Standard covers twelve thematic areas of fisheries management (see Box).

In addition to defining for the first time precisely what transparency in fisheries management actually means, the FiTI is anchored on several core principles, such as:

- Transparency needs trust to be effective. Information has to be seen as fair, unbiased and not serving a certain political agenda or business interest. This is why the FiTI is set up as a multi-stakeholder partnership, where representatives from governments, business and civil society work together.
- Transparency is a transformative journey. The FiTI does not expect all countries to have complete data for each of the 12 areas from the beginning. Instead, public authorities must disclose the information they have, and, where important gaps exist, they must demonstrate improvements over time. As such, any country can implement the FiTI.
- Transparency has two sides, like a coin. The impact of the FiTI does not only lie in increasing the public availability of government information (visibility). It is equally important to ensure that such information allows others to draw reliable conclusions from it (comprehensibility).

Initial notable examples from Africa

While fisheries have been slow to catch on to the transparency wave, notable progress has been achieved over the last years. For example, Seychelles and Mauritania have become the first two countries to provide so-called FiTI Reports, outlining what fisheries information has been collated by national authorities, and whether this information is easily accessible to the wider public and seen as complete. Both reports have resulted in a range of previously unpublished information being made publicly available by national authorities for the very first time. The two reports were vetted by their National Multi-Stakeholder Group (NSMG) to ensure they can be seen as credible and trustworthy. Both groups – composed of equal numbers of representatives from government, the business sector and civil society – also formulated clear recommendations to progressively enhance transparency in their fisheries sectors over time.



Thematic areas of the FiTI standard

# 1	Fisheries laws, regulations and official policy documents
# 2	Fisheries tenure arrangements
# 3	Foreign fishing access agreements
# 4	The state of the fisheries resources
# 5	Large-scale fisheries
# 6	Small-scale fisheries
# 7	Post-harvest sector and fish trade
# 8	Fisheries law enforcement
# 9	Labour standards
# 10	Fisheries subsidies
# 11	Official development assistance
# 12	Beneficial ownership

Senegal, Cabo Verde and, very recently, Madagascar have all made public commitments to increase the level of transparency in their fisheries sectors through the FiTI. The FiTI International Secretariat, the initiative's executive body – which relocated its operations from Germany to Seychelles in 2019 – is also working with stakeholders in several other countries, such as Peru, Ecuador, Mexico, São Tomé and Príncipe, Comoros and Bangladesh.

However, in order to turn these first notable examples into a global norm, additional issues need to be addressed, two of which are outlined here. Firstly, traditional 'good governance' arguments alone may not emphasise the importance (and political priority) that needs to be given to transparency to strengthen sustainable marine fisheries. This is particularly relevant in times when many governments are focusing on post-Covid-19 economic recovery. In the same vein, stronger correlation must be demonstrated between increasing public access to information and the ways in which transparency can improve government performance (e.g. through enhanced revenue collection, reduced spending) as well as to market-based incentive schemes (e.g. seafood certifications and sourcing policies, sectoral investments and trade agreements).

Secondly, transparency is still often misperceived as a notion with which governments can voluntarily choose to engage. The provision of information on a country's marine fisheries sector is, however, increasingly becoming a legal requirement for governments, stemming e.g. from Freedom of Information laws. This implies that the public have

a right to obtain environmental information (including on their country's fisheries sector) with only limited, explicitly defined exceptions arising from confidentiality claims and security matters.

The importance of access to government information is also emphasised in the UN Sustainable Development Goals (SDGs). Target 16.10 of the SDGs calls on all states to adopt legislation or policies guaranteeing the right to information. This is essential for both the achievement of Goal 16, but also as an enabler for achieving other SDGs.

Yet there are clearly still many actors who benefit from a lack of transparency. It needs to be acknowledged that if there were not such flagrant violations of good practices in fisheries management, there would be no need to insist upon transparency! Which means that there is still a lot do. The FiTI is therefore working not only with governments to increase the public availability of fisheries management information but also with non-governmental partners to promote an enabling environment that demands, understands, utilises and incentivises online government transparency.

Marine resources belong to everyone, and transparency is an essential first step in ensuring that our ocean and fisheries remain a source of income, sustenance, recreation and deep wonder for generations and years to come. For this, an immediate, global, and collective effort is needed. As Seychelles' Minister of Fisheries and the Blue Economy, Jean-François Ferrari, stated in his opening remarks at the launch of the first ever FiTI Report: "[The Fisheries Transparency Initiative] is a tool for future development, and it must be our guiding principle to share all data and information on resources with all stakeholders."

Sven Biermann is the Executive Director of the Fisheries Transparency Initiative (FiTI), based in the Seychelles. The FiTI is a global multi-stakeholder partnership that seeks to increase the level of government transparency in marine fisheries. Contact: sbiermann@fiti.global

"We have nothing to hide, but everything to share"

Why does it make sense for a fishing nation to support the Fisheries Transparency Initiative? Insights from one of the first candidates.

Mr Michaud, the Republic of Seychelles has been a FiTI Candidate country since April 2020 and the first to submit a Transparency Report. Why did your country decide to join the Initiative?
With an Economic Exclusive Zone of 1,365 square kilometres and a land mass of only 454 square kilometres, Seychelles is an oceanic state, and all its activities revolve around the ocean. It now fully focuses on the development of ocean-based activities, essentially tourism and fisheries. Tourism and fisheries are the two main pillars of the Seychelles economy and they have to be sustainable. Marine fisheries are a key contributor to the social, economic and cultural fabric of Seychelles. Good governance is essential and for this industry to prosper there needs to be full participation from all stakeholders and not just government. Furthermore, transparency and participation are some of the key principles of the Blue Economy which government is actively promoting.

The country's decision to become a FiTI Candidate country was taken with the full support of the then Seychelles president and other stakeholders. Seychelles' main objective to become FiTI-compliant was to use the initiative to provide the Seychelles' government with clear procedural guidelines for gathering, verifying and disclosing relevant information on fisheries. It is expected that this will benefit all the fisheries industry – industrial, semi-industrial and artisanal – as well as civil society and investors helping Seychelles to progress as one of the leaders in sustainable fisheries management internationally.

Who are the stakeholders in the process?
The process started with a strong implication and support from government. It then invited and involved civil society and the industry. Initially the National Multi-Stakeholder Group, the NMSG, consisted of seven members but it was then extended to twelve to include representatives from the industry, youth and fishermen from Praslin, which is the second biggest island of Seychelles. Government representatives comprised a member of the Ministry of Fisheries and two members of the National Assembly, one of whom speaks for government and the other for the opposition. The civil society through the Citizens Engagement Platform, Seychelles, or CEPS, appointed two members from NGOs, and there is one member of Transparency Initiative Seychelles. The fisheries sector consists of one representative from the artisanal fishermen, one from industrial fishery and one from the fish processors. As chair of the NMSG, I have been stressing that each member has an alternate, as members can't always be present at all meetings.

Was it difficult to get all stakeholders on board? And are all interests really heard?
One big problem we have been facing is that the fishing sector, especially the local fishermen, have weak organisations representing them. This makes it difficult to select members of the different sub-sectors. Nevertheless, efforts are being made to better empower the artisanal fishermen. The meetings of the Na-

Philippe Michaud is presently Consultant to the Ministry of Fisheries and the Blue Economy of the Seychelles. A graduate from the London School of Economics, Michaud was CEO of the Seychelles Fishing Authority and later Technical Adviser to the Ministry of Fisheries. He became Special Adviser for the Blue Economy when the Department was created in 2016 and is a member of the FiTI International Board.

tional Multi-Stakeholder Group have, however, been conducted in a pleasant and constructive atmosphere. It is also very encouraging to see the members of the two political parties working in a bipartisan way.

What practical consequences will your participation have for the stakeholders in the fisheries sector?
The presentation of the first FiTI report has highlighted certain lack of information regarding the acquisition of data and certain gaps in reporting, especially by foreign licence holders. Identifying these gaps has contributed to the improvement of the next report, which is being prepared by the report complier. The report was much appreciated by the parliamentarians when we had a working meeting with them. It enabled them to seek more clarifications in certain areas such as beneficial ownership. In future, more attention will be given to these issues. Civil society's interest in foreign fishing agreements has contributed towards making many of these agreements subsequently available to the public. It will lead to a better dialogue between all sides and reduce misinformation, so as to focus on the real issues benefiting the country.

Are benefits already being felt?
Benefits are resulting from interest being shown by a wide range of stakeholders in areas such as making the names of licence holders in the very lucrative sea cucumber fishery publicly available, comparing of the various foreign fishing agreements, the state of the various stocks, etc. The strong involvement of all the NMSG members contributed to coming up with 34 recommendations on how government can further strengthen the country's leadership in fisheries transparency. These range from creating an online vessel registry to publishing the results of recent stock assessments of fish in our waters. They have also generated an interest in the press and in the social media about the importance of the fishery and also the problems the industry is facing.

At the launch of the FiTI Report, the Minister of Fisheries and the Blue Economy, Jean-François Ferrari, did not hesitate to emphasise the significance of Seychelles' policy on fisheries: "This government has a clear vision to make Seychelles' fisheries the most transparent in the world. We have nothing to hide, we have everything to share."

Would you recommend other countries to follow your example?
A country's general credibility is greatly enhanced if it operates in a transparent way with essential information such as fishery access agreements, revenue earned and status of fish stocks, etc., made publicly available. The fact that there is active participation between government and civil society representatives increases the confidence of investors, as they know that they will be operating in a country with a 'level playing field' where all governments provide information according to a coherent framework.

Stakeholders, such as governments and the commercial fishing industry, are increasingly aware that improvements in transparency are not only expected of them, but will be beneficial to their interests. By making fisheries management more transparent and inclusive, the FiTI yields benefits for all stakeholders. In Seychelles, we also believe that the Initiative will greatly contribute towards the success of our Mahé Plateau Trap and Line Fishery Co-Management Plan, as all stakeholders know that they are considered as equal and essential partners and have access to credible information.

I believe that countries who seriously believe in good governance of the fisheries sector have every interest in joining FiTI.

Philippe Michaud was interviewed by Silvia Richter.

The Seychelles' fisheries sector

The Seychelles' fisheries sector consists essentially of three sub-sectors: artisanal fishery, semi-industrial fishery and industrial tuna fishing.

Artisanal fishery plays a significant role in food security, employment and revenue earnings. It is exclusively reserved and practised by Seychellois small-scale fishermen targeting mainly demersal and semi-pelagic species. Fishing vessels range in length from 4 to 15 metres, and the main gear the fleet use includes hook and line, drop-lines, traps and nets. The estimated total catch recorded in 2016 amounted to 2,516 metric tons approximately 80 per cent of which was from line fishery and 16 per cent from trap fishery, while invertebrate fisheries contributed 4 per cent to the total artisanal catch. The fishery is mostly limited to the Mahé Plateau, an area of around 40,000 square kilometres. Certain stocks on the Plateau are overfished, and management measures are urgently required.

The **semi-industry**, which started in 1995, targets mainly tuna and swordfish. In 2018 there were 41 vessels ranging from 14 to 23 metres in length. These vessels operate mainly in the Seychelles Economic Exclusive Zone (EEZ) though a few operate at time on the high seas. In 2018, the reported catch was 1,228 metric tons. In recent years, this fishery has faced a number of challenges including limited export demand and debt repayment problems.

Sea cucumber fishery, which began in the early 1980s and has experienced rapid growth, is a further branch. By 1999, there were already signs of population depletion, including lower volumes of high value species and fishermen having to dive deeper to maintain catch rates. Concerns were also raised about the sustainability of the fishery. In response to local depletions of some species, the Seychelles Fishery Ministry implemented some management measures in 1999.

Regarding **industrial tuna fishing**, Port Victoria, the archipelago's capital, is an important centre for the purse seine fishery which developed in the mid 1980s. Now, around 44 purse seiners are licenced to fish in Seychelles waters, the majority of them under a Sustainable Fisheries Partnership with the European Union. Thirteen others are Seychelles-flagged vessels, and the rest are from Mauritius and South Korea. This is by far the most important fishery in Seychelles and is a crucial source of foreign exchange, employment and revenue. The challenge is to ensure that the country benefits more from such fishery. Yellowfin tuna, which is the second most important tuna fishery after skipjack, is considered to be overfished.

Then there is the industrial long-line fishery, which is dominated by the South East Asian fleets and which focuses mainly on the high value frozen sashimi market. Seychelles has around 60 industrial longliners, which are flagged in Seychelles but are foreign owned. Very little catch is landed or transhipped in Seychelles, as these vessels very rarely call on ports. Apart from vessel registration, Vessel Monitoring Scheme (VMS) administrative fees and agents' fees, there are no significant contributions to the Seychelles economy.

Fish Forever – community-led solutions to solve coastal overfishing

Coastal ecosystems provide a home for an unparalleled diversity of marine life, mitigate the impacts of climate change, protect coastal shores, and support diverse fisheries that provide livelihoods and food for hundreds of millions of people. Yet these ecosystems are facing unprecedented threats. Through its global coastal fisheries programme Fish Forever, the NGO Rare wants to establish a management paradigm that balances marine conservation with sustainable fishing.

By Courtney E. Cox, Brittany Pashkow, Larrisa Hotra and Rocky Sanchez Tirona

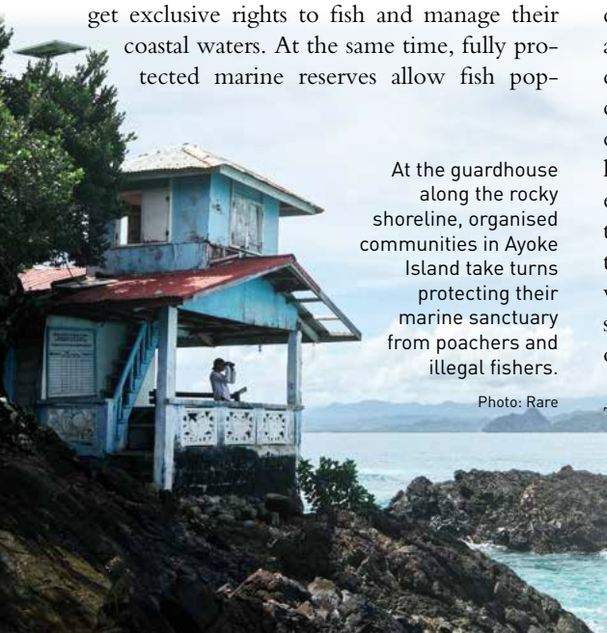
Given their proximity to nature, coastal communities are at the centre of both the cause and the solution to environmental problems. Humans have overfished a third of the world's fisheries, creating a highly destructive feedback loop. Overfishing reduces habitat quality, climate change exacerbates it, and degraded habitats subsequently support fewer fish. Fishers often respond by increasing effort and adopting new and potentially more destructive fishing practices to maintain their catch.

A local leader in Mambungalon, Philippines, doing an initial community consultation explaining the Fish Forever programme.

Photo: Jason Houston for Rare

Pioneering a new way to manage coastal fisheries

Fish Forever is a global effort aiming to provide a replicable approach to end overfishing, protect biodiversity, and safeguard the well-being of coastal communities. The programme recognises that combining local-level actions, policies and behaviours is critical to achieving and maintaining long-lasting change and reaching biodiversity targets. As such, our approach ties biodiversity outcomes to local communities' needs and goals. How do we do this? Fish Forever mobilises coastal communities and their leaders to establish and maintain sustainable managed access areas and fully protected reserves (MA+R). Groups of small-scale fishers get exclusive rights to fish and manage their coastal waters. At the same time, fully protected marine reserves allow fish populations to replenish. Local stakeholders are included in designing, establishing, and enforcing managed access areas. Here, women play a decisive role (see also Box).



At the guardhouse along the rocky shoreline, organised communities in Ayoke Island take turns protecting their marine sanctuary from poachers and illegal fishers.

Photo: Rare

Closing the data gap

Information about small-scale fisheries is incredibly limited. So much is still unknown about who is fishing, what and how much is caught, where the catch goes, coastal habitat quality, in-water fish populations, effects of climate change on coastal communities and habitat, and general fishing household socioeconomics. These unknowns leave communities and governments without the data needed to make critical decisions about the long-term viability of their fisheries, the ecosystems that support them and the livelihoods that depend on them.

Through partnerships with top-ranking software developers and the world's leading scientists, Rare has developed a suite of tools designed specifically for local decision-makers and programme implementers. These tools streamline and standardise the collection of socioeconomic, ecological, and fisheries data, automate data analysis and simplify complex data with the single goal of putting data into the hands of those who need it through a central, publicly accessible portal (portal.rare.org). The Fish Forever Portal provides access to datasets, maps and visualisations developed from locally collected data, global datasets such as climate and habitat and ecological modelling outputs that describe the way fish move throughout their life and predict fisheries recovery potential over time. Through dedicated staff working closely with local communities, we provide sustained access to understandable and usable data needed to make informed fisheries management decisions. In closing this data gap, the programme directly addresses the Sustainable Fisheries targets of SDG 14.

Fish Forever works in many of the world's marine biodiversity epicentres, including Indonesia, the Philippines, the western Caribbean, Brazil, Mozambique, Micronesia and Palau. Since 2012, the programme has partnered

with over 250 local and national governments and stakeholders to establish MA+R areas and build fisheries management capacity across 1,400 coastal communities. Improved fisheries and livelihoods across these areas benefit approximately 150,000 fishers and 1.6 million community members who are impacted by the fishery (fish buyers, processors, fisher family members, etc.). Fish Forever mobilises these communities to establish legal and functional management and protection across nearly 5.5 million hectares of coastal waters.

Evidence from the first 40 MA+R pilot sites reveals 100 per cent increases in fish biomass in newly managed access areas and 300 per cent increases in fully protected reserves over a three-year period. This demonstrated local management effectiveness has resulted in strong support from local governments and empowered fishers who recognise that their fishing behaviour and involvement in management results in positive outcomes. On the latter, the leaders of these communities have created the "Coastal 500": the first-ever global network of local governments committed to achieving sustainable fisheries that elevate community prosperity while safeguarding the environment. To date, over 120 mayors and local government leaders have joined this network.

Overcoming barriers to adopting rights-based fisheries management

Fish Forever applies insights from behavioural science throughout the entire MA+R process to shape norms, encourage sustainable behaviours and cultivate pride in positive actions. The programme focuses on four key fisher activities that lead to critical actions for effective fisheries management and are limited or absent in most small-scale fishing communities: registering as a fisher, participating in local management efforts, reporting catch and complying with fishing regulations. Weaving behavioural science insights into our approach helps galvanise fishing communities to adopt more responsible fishing behaviours and sustain them, empowering them to become responsible stewards of their environment and the local biodiversity for future generations. Fish Forever develops tools to remove barriers preventing fishers from registering and reporting, to build inclusive local management bodies that enable participation and to provide access to data complying.

Another fundamental challenge for coastal communities is lack of financial security. Fish Forever identifies mechanisms to improve catch value, including access to markets and post-processing methods that diversify product types or extend the life of the product, builds financial literacy and delivers financial services such as savings clubs, insurance and credit opportunities where fishers are able to use their income to build financial security. These measures improve fishing communities' ability to retain income from responsible fishing and provide financial mechanisms to guard against shocks and uncertainty that could derail sustainable fishing practices.

The legal pathways undertaken to establish MA+R areas look different across all Fish Forever countries, and political will isn't always present. Building the enabling environment for community rights-based management and communicating to local leaders the significant contributions small-scale fishers make to global challenges like biodiversity loss and sustainable development are ever-present obstacles. The commitment and actions of the Coastal 500 network of local leaders and replication of successful MA+R areas in nearby geographies offers fishing communities important motivators to overcoming barriers.

What's next?

By linking critical habitat protection with a community's exclusive fishing rights, clear incentives are built to replace destructive competition with effective coordination, where communities receive measurable benefits from protecting and managing their local fisheries. This work supports healthier coastal habitats, creates resilience to climate change, and challenges policy-makers to rethink how coastal ecosystems are prioritised and protected.

Our focus in the coming years is to strengthen fisheries management bodies' capacities to manage their MA+R areas and ensure their effectiveness. Simultaneously, we are working to scale our programme and coordination capacity to meet the growing demand for coastal fisheries reform by embedding and institutionalising our approach through government and partners. To do this, we are training more local partners in programme implementation, building capacity to produce and use the best available science to make informed decisions, and setting up financial mechanisms to ensure sustained support of fisheries management groups. Ultimately, this effort is about building a new paradigm for marine resource management and protecting our oceans so that people and nature thrive.

Eulalia Baptista and Martha Norales, members of coastal fishing communities in Mozambique and Honduras, respectively, were recently honoured for their pioneering efforts with coastal fisheries by the 2021 Women's World Summit Foundation (WWSF). WWSF's prize honours "women and women's groups around the world who are exhibiting exceptional creativity, courage, and commitment for improving the quality of life in rural communities". Eulalia is a founding member of the Fisheries Community Council (CCP) in Mozambique, the sitting President of the General Assembly of the CCP, and a community leader in adopting Fish Forever's digital fisheries data collection app, OurFish. Martha has been a powerful ally of Fish Forever, providing continued momentum behind the growth of savings clubs and financial literacy for Honduras's coastal fishing communities. She launched a new bank, a "bank of hope", so that the community can set dates for financial goals and dreams.

By actively tracking women's participation and contributions to the sector, we can see to it that they are recognised, supported and encouraged as decision-makers in their families and communities.

Courtney E. Cox is Senior Director of Rare. She leads the central science team in developing strategies for applying science in programme implementation and has a background in marine ecology and fisheries. Rare is a not-for-profit environmental organisation headquartered in Airlington, Virginia, USA. Its stated mission is to help communities adopt sustainable behaviours towards their natural environment and resources.
Brittany Pashkow manages programme data at Rare and develops tools that simplify the way spatial data is visualised. Her background is in fisheries management and geospatial analysis.
Larrisa Hotra is Rare's lead conservation writer with 15 years of experience in strategic planning, writing, cause-related communication, marketing and advocacy.
Rocky Sanchez Tirona is Managing Director of Fish Forever. She leads the programme across eight countries and has a background in marketing and behaviour change communications.
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References: **www.rural21.com**

“Certification is not an end in itself”

In our no 3/2015 issue, we presented a project run by the WWF on sustainable tuna fisheries in the Philippines. The project was aiming for Marine Stewardship Council (MSC) certification for the yellowfin handline fisheries in the project sites. Last month, on October 19th, 2021, a group of small-scale tuna fishers and tuna processor-exporters in the country were certified. A brief assessment by WWF Programme Manager Joann P. Binondo.

Ms Binondo, the MSC certification is the latest development in a decade-long fisheries improvement project being run with handline tuna fishers. What has changed since the project started ten years ago?
When we started the project in 2011, there were gaps in the knowledge of local tuna fishers with regard to environmental conservation and sustainable fishing practices. They also lacked political organisation. Through our work, though, we were able to facilitate the organisation of 21 Municipal Tuna Fishers Associations and two Fisher Federations, one for Lagonoy Gulf and another covering Mindoro Strait. Prior to our work, differences in priorities had caused much mistrust amongst the different stakeholders in the tuna supply chain. But through the alliances we helped them forge, they have been able to work past these differences in pursuit of MSC certification, and the larger goal of sustainable fisheries.

Much was also lacking in the management of the Mindoro Strait and Lagonoy Gulf fisheries when we began our work. Without a management plan to refer to, and with small-scale fishers kept out of governance of their very own fisheries, compliance with fisheries policies remained low, which resulted in a high incidence of illegal, unreported and unregulated fishing, or IUUF. Now, however, tuna fishers are strongly represented in their local fisheries management councils, with their elected leaders making recommendations to the policies that manage the conservation of the marine resources they rely on.

Moreover, our partner fishers once depended on local traders and consolidators to finance their livelihoods and the needs of their families. Without alternative sources of income and vulnerable to predatory business practices, they found themselves in a cycle of debt, without the capacity to negotiate better prices for their catches. Now, however, they have come up with ways to augment their livelihoods through social enterprises. They have also been able to pool capital within their community through Group Savings and Loan Associations, which has helped them gain more leverage for themselves and their communities within the supply chain.

So, by coming together, organising themselves and lobbying for their rights and better representation, and with the support of partners who have helped bridge whatever gaps in knowledge and capital that may have once existed, our partner fishers are in a better position to work towards environmental sustainability for their fisheries. MSC certification is an important milestone on this path.

I suppose this was not an easy process …
There are many different parties within the tuna supply chain, each of whom holds varying degrees of trust and confidence in the other stakeholders. It took us several years just to get representatives of each party onto a single dialogue platform. As we gathered the stakeholders, we also had to level the playing field such that the fishers themselves could stand on their own in these conversations. We worked with our partner fishers to build their confidence towards articulating the issues that concerned them, so that they wouldn't be intimidated by those further upstream in the tuna supply chain. Bringing together traders and processors at the negotiating table was another matter. They see themselves as competitors and were cautious when it came to disclosing important catch data and trade information – all needed for the effective management of these fisheries.

And the geographic behaviour of tuna across its lifespan was a challenge of its own. Tuna are highly migratory; managing their species requires agreements and organisation beyond borders, on a trans-national scale, which we have tried to achieve along with the other nations of the Western Central Pacific. Harmonising our conservation management measures as one region has been difficult. The stakeholders' consultation process has proven to be tedious given the wide range of parties involved, spanning the entire Western Central Pacific. However, it is necessary for us to gain consensus for the representative management plans we have been preparing.

How do fishers and fishing communities benefit from the MSC certification?
The certification process has opened our partner fishers the opportunity of being recognised by various sectors of the tuna industry that they had never before interacted with, building their political clout in areas such as national government. The MSC Certificate itself will also give them access to markets concerned with quality and sustainability, and has empowered them towards having a greater influence in tuna supply chains.

So what is next?
While the fishers may have earned MSC certification, maintaining it is another matter. The Philippine Tuna Handline Partnership will continue working among them to maintain their MSC certificate, and will continue to collaborate with the other stakeholders in the tuna supply chain. Their next goals are to ensure that their catches are being fairly and transparently priced, through the implementation of a traceability system that spans the breadth of the tuna supply chain, from hook to cook. The client group also aims to be represented in fisheries councils at national level, in order to influence national and regional policy. What our partner fishers have stressed and what we fully agree with is that certification is not an end in itself, but rather an important milestone in their ongoing journey towards environmental sustainability.

Joann P. Binondo
is Programme Manager at WWF Philippines.
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Full-length interview: www.rural21.com

How to achieve an equitable and just "30 by 30"

No doubt protecting marine areas is an effective tool to combat climate change and the damaging effects of industrial fishing. But the best way to protect nature is to protect the human rights of those who live among it and depend upon it, our author maintains.

By Steve Rocliffe

All eyes have been on COP 26 in Glasgow recently, and the world's attempts to curb emissions and avert catastrophic climate change. But 26 isn't the only COP in town, nor the only major meeting focused on ensuring our planet is liveable for generations to come. COP 15, the UN biodiversity conference in Kunming, China, may not be capturing all the headlines, but it's every bit as crucial for life on Earth as its Glaswegian big brother.

The conference, delayed repeatedly by the Covid-19 pandemic, is taking place in two parts – online in October 2021 and in person in April 2022. It's bringing together 196 nations and territories and is billed as one of the last, best opportunities to halt biodiversity loss and put the world's lands and oceans on a pathway to sustainability. At the top of the agenda is a new strategy to advance nature protection for the next decade. Known as the Global Biodiversity Framework, this strategy will replace and extend the current plan with its 20 Aichi Biodiversity Targets, agreed in 2010.

Protecting 30 per cent of the ocean by 2030

As part of this process, Aichi Target 11, concerned with establishing effective, equitable and globally representative systems of protected areas covering 10 per cent of the ocean and 17 per cent of land by 2020, is set to be replaced with an ambitious new goal: "30 by 30". Simply put, 30 by 30 seeks to protect 30 per cent of the planet by 2030. It's being backed by large nonprofits and governments all over the world, including the G7 group of wealthy nations (though not, notably China). There are good reasons for this support.

First, when properly managed and funded, protected areas can create win-wins for people and nature alike, replenishing fisheries and strengthening local livelihoods. They are one of the most valuable tools we have to combat climate breakdown, coastal poverty and the damaging effects of industrial fishing. We urgently need more of them, and we urgently need to make sure existing areas live up to their promise. Second, most nature exists where local communities and Indigenous Peoples live. It's estimated that such communities manage or hold tenure over lands containing 80 per cent of the world's biodiversity. Along tropical coastlines, they govern or oversee areas of seabed covering tens of thousands of square kilometres, and have often proved to be better stewards of these lands and fishing grounds than governments.

Third, an expanded and effective system of protected areas can deliver real economic returns. According to a recent study led by the University of Cambridge, the global economy stands to gain 5-to-1 from delivering 30 per cent protection, an increase of at least 250 billion US dollars in annual economic output. Because of these benefits, "30 by 30" has a critical role to play in achieving key Sustainable Development Goals to end hunger (Goal 2), ensure sustainable consumption and production (Goal 12), combat climate change (Goal 13) and conserve and sustainably use marine resources (Goal 14).

Yet there are also good reasons to be cautious. With protected areas currently covering 15.4 per cent of the Earth's surface and 7.6 per cent of the oceans, achieving 30 per cent by 2030 would mean doubling the current land area under protection and quadrupling the ocean area. This would make 30 by 30 the most extensive governance project in human history, requiring an additional area of land that is two thirds of the size of Africa and 20 times that of the world's largest terrestrial protected area (Northeast Greenland National Park). The area of ocean needed would be greater still: nearly three times larger than Africa and 40 times that of Marae Moana in the Cook Islands, currently the world's largest marine park.

Such an unprecedented scaling of conservation efforts brings several challenges, opportunities and trade-offs that will need thorough consideration, particularly by tropical coastal nations, who are among the most endangered by the twin emergencies of runaway climate change and biodiversity loss. There are both enormous practical difficulties in putting 30 by 30 into practice effectively

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and potentially widespread negative consequences to local communities and Indigenous Peoples from doing so (*also see Rural 21, issue 2/21*). Failing to recognise these challenges risks creating more failed conservation efforts than ever before, as well as marginalising those who are not only least to blame for the biodiversity crisis, but best placed to help solve it.

The gulf between rhetoric and reality

Much of the promise of 30 by 30 lies in the simplicity and near universal appeal of its messaging. Aside from the strong backing from governments and multinational environmental groups for 30 by 30 specifically, there is broader public support for protecting more of the planet. A recent synthesis of surveys led by academics from Canada's Dalhousie University and involving over 32,000 respondents from 21 countries found that more than 70 per cent wanted to see at least 20 per cent of the ocean protected, with most supporting 50 per cent protection.

Biodiversity loss and climate change are two sides of an unevenly weighted coin. Humanity needs to address both crises urgently and concurrently, but climate change has historically received significantly more attention and financing, even more so since the 2015 Paris Agreement. In much the same way that nations rallied around a simple and clear target with broad appeal on that occasion – limiting warming to 1.5 degrees – there is hope that the same will happen with 30 by 30 in Kunming next year. For the goal's supporters, the UN Biodiversity Conference will be a "Paris moment" for biodiversity, dramatically increasing funding and support for conservation efforts, and putting the natural world on a pathway to sustainability.

However, while agreeing a vision of where the world needs to be is not without its challenges, the far harder part lies in making that vision a reality. Doing so effectively will mean resolving two sets of complex and interrelated challenges: those concerning 30 by 30's feasibility, and those that deal with the consequences to communities and Indigenous Peoples from implementing it.

How feasible is 30 by 30?

As we saw earlier, this is not the first global plan to save nature. The 20 Aichi nature protection targets agreed in 2010 covered everything from tackling pollution to protecting coral reefs. Some progress was made over the past decade, particularly on protected area coverage (Target 11). Today, there are far more marine protected areas (MPAs) than there were in 2011. After a slow start, which saw the global goal of 10 per cent protection pushed back from 2012 to 2020, the pace of establishment accelerated. MPAs currently cover more than 28.7 million square kilometres of the Earth, 7.9 per cent of the world's oceans and 18.4 per cent of national waters.

Local or collaborative stewardship should be the principal mechanism by which conservation is achieved in near-shore waters.

Photo: Garth Cripps/ Blue Ventures

Yet while the world got close to reaching headline protection goals, it fell well short when it came to ensuring that the areas were representative, well connected and effectively managed. In the rush to meet Target 11, speed trumped quality. Many of the protected areas established are paper parks, and lack the financing, management, local engagement and enforcement they need to deliver the promised biological and social benefits. Against this backdrop, the substantially more ambitious increases in coverage demanded by 30 by 30 seem unlikely to be realised, especially once the requirements for effective management and connectivity are taken into account.

That said, 30 by 30's achievability does rest to a large extent on the type of protected area that is being proposed. And unfortunately it appears to mean different things to different people. The Campaign for Nature, leading the 30 by 30 initiative, suggests that all conservation efforts should have outcomes that are at least equivalent to highly or fully protected areas. However, many of the international conservation NGOs and governments supportive of 30 by 30 have differing views, with some calling for complete bans on fishing in all protected areas. This latter view is stricter and likely to lead to more negative outcomes for Indigenous Peoples and local communities.

Consequences for communities

Beyond the questions around the feasibility of the 30 by 30 proposal, there are fundamental issues concerning the consequences for local and indigenous communities. What will 30 by 30 mean for power dynamics, equity, equality, and engagement in the stewardship and governance of affected seascapes?

Here, the Campaign for Nature certainly talks the talk. It has produced a report about the critical role played by Indigenous Peoples and local communities in biodiversity conservation and acknowledges that local stewardship has often proved more effective than government-driven approaches. Expanding recognition of local and indigenous land rights, it concludes, is "an effective, moral, and affordable solution for protecting our world".

Encouragingly, this is a view that's been increasingly echoed in international fora in recent weeks. The Kunming declaration, adopted by more than 100 countries during part 1 of the COP 15 biodiversity conference, calls for recognition of the rights of Indigenous Peoples and local communities in conservation initiatives and for their full and effective participation. And at COP 26, governments pledged to give at least £1.25bn to Indigenous Peoples and local communities in recognition of their key role in protecting the planet's natural resources.

COMMUNITY-DRIVEN MARINE CONSERVATION IN MADAGASCAR

Fifteen years ago, two dozen fishing villages in southwest Madagascar joined forces to create a locally managed marine area (LMMA) known as Velondriake. Across an area of reefs, lagoons, mangroves and sea-grass beds the size of a quarter of a million football pitches, they banned destructive practices like poison fishing and established marine reserves permanently off limits to all fishing. The first LMMA in Madagascar, Velondriake is managed entirely by communities, for communities.

In Velondriake, Blue Ventures supports members of the community to collect, analyse, and present data on fisheries landings quickly to other community members and management associations in order to inform decisions on livelihood initiatives and fisheries management. Results from this community-led monitoring have led to the recent decision by the community to increase coral reef no-take zones by 59 per cent, establish areas of protection for seagrass and enforce management measures that protect reef flat health. While the area in which no fishing is allowed has increased, it remains small enough that livelihoods are not negatively impacted. And by taking these bold steps towards more protection, the community is helping to secure more sustainable fisheries long into the future.

Inspired by Velondriake's success, coastal communities across the country have followed suit, grouping together to establish hundreds of similar initiatives. This growing network now covers a fifth of Madagascar's inshore seabed, several times more than government-run protected areas. In just a decade and a half, this movement has become a dominant force in the conservation of one of Africa's longest coastlines, and it is continuing to expand with a scale and ambition that's unparalleled among coastal countries in the region.

Velondrikae, meaning "to live with the sea" in the Vezo dialect of the Malagasy language, is one of the largest LMMAs in the western Indian Ocean.

Photo: Garth Cripps/ Blue Ventures

These are reasons for cautious optimism. But behind this rhetoric is the sad reality that the world does not have a strong track record of effectively involving local people in conservation efforts. Over the last century, millions of people have been forced from their lands and fishing grounds in the name of conservation, often violently. The pace of expulsion has slowed in recent years as conservationists have started to appreciate that Indigenous Peoples and local communities can be their allies rather than adversaries, but conservation refugees continue to be created. For example, in Colombia, the military's "Operation Artemis" is "recovering" land by emptying it of its people. The "no people allowed" baggage of traditional fortress conservation is hard to shed, and as such, trying to protect more of the planet risks more of the same: more violations of fundamental human rights, more conflict, more violence, with these impacts falling disproportionately on those who are the most marginalised and least responsible for the biodiversity crisis.

Realising the promise of 30 by 30

30 by 30 thus holds both enormous potential, and enormous peril. How can we maximise one and minimise the other? How can we ensure that fundamental rights aren't extinguished and equity undermined in the rush to deliver the additional conservation our ocean so badly needs?

We believe that the solution starts with accepting that the best way to protect nature is to protect the human rights of those who live among it and depend upon it. In practice, this means recognising the centrality of Indigenous Peoples and local communities to conservation success and developing a robust framework to monitor human rights and equity-focused dimensions. It means recognising that local or collaborative stewardship should be the principal mechanism by which conservation is achieved in near-shore waters. It means secure tenure for all coastal communities.

It means an explicit commitment to ensuring that the burdens and benefits arising from protection are shared justly and equitably. It means recognising and protecting human rights in general as well as the specific rights of particular groups such as women and youth.

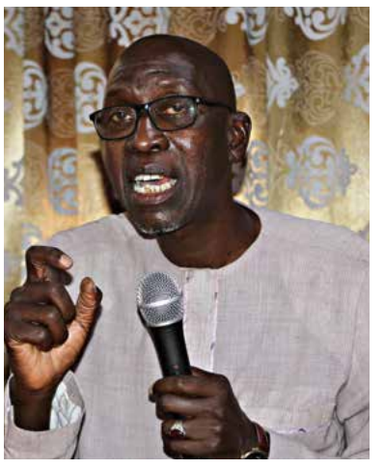
It means sustainable, flexible long-term funding for community-based initiatives, simpler legal frameworks and democratising fisheries data – using digital tools to transform access to information, allowing communities to adaptively manage and rebuild their fisheries.

It means establishing open, robust and internationally recognised grievance mechanisms to resolve tenure disputes and ensure that community voices are heard and elevated at the international level.

Finally, it means recognising and respecting the rights of communities and Indigenous Peoples to not participate in the 30 by 30 process and not have their territories designated as protected areas.

Ultimately, 30 by 30 is an unrivalled opportunity to halt biodiversity loss, safeguard human rights, and put the world's oceans on a pathway to sustainability. But it can only succeed if it emphasises the primacy of human rights, and puts communities first. Achieving all this won't be easy, but it's key to a 30 by 30 that benefits people and nature alike, delivering sustainable fisheries, vibrant oceans, and improved food security for over a billion people.

References: **www.rural21.com**



Gaoussou Gueye is President of the African Confederation of Professional Organizations of Artisanal Fisheries (CAOPA). Gueye completed training as a navigator, worked on industrial fishing vessels and oil platforms and developed a ring of intermediate fish product dealers in order to secure better prices for fine fish, especially in international trade. In addition, he was active in the Senegalese Association of Artisanal Fisheries (CONIPAS) and was their Vice President up to 2009. Gueye is Chairman of the platform for non-governmental actors in fisheries, newly set up by the African Union, and is a member of the Fisheries Transparency Initiative (FiTI) executive board.

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Building a better future for African coastal fishing communities

Overexploitation of fish stocks, global warming and the effects of the coronavirus pandemic are just a few of the challenges which coastal fishing communities in Africa are facing. The African Confederation of Professional Organizations of Artisanal Fisheries (CAOPA) shows which concrete measures are called for to ensure the sector's viability and hence the livelihoods of thousands of artisanal fishers and their families.

By Gaoussou Gueye and Francisco Marí

Fishing catches are stagnating at the global level, despite the ever increasing size of fishing fleets on the oceans. This situation is due to the overexploitation of fish stocks. Since the 1950s and the end of the World War 2, every country in the world has been racing to industrialise fishing. In Europe, Russia, North America and, more recently, Asia, massive subsidies are being employed to encourage this trend. These industrial fleets are now fishing in every ocean, including the territorial waters of the African countries. Currently, ever more and ever larger ships, using fishing techniques that are sometimes highly destructive, such as bottom trawling, are capturing fewer and fewer fish. In an effort to increase their catches, industrial ships are adding more and highly sophisticated instrumentation to locate and catch the remaining fish. This situation is threatening not only fish stocks, which are unable to renew themselves, but also coastal fishing communities, who account globally for two-thirds of catches destined for direct human consumption and 90 per cent of the sector's employment.

CAOPA – a strong, self-established organisation of the artisanal fishing sector in Africa

To build a better future for coastal communities who depend on artisanal fishing for their living, like those in Africa, it is essential to reshape the model of development in the fishing sector. Since its creation in 2010, the African Confederation of Professional Organizations of Artisanal Fisheries (CAOPA) has been advocating a model of development centred on sustainable artisanal fishing which emphasises informed participation by the women and men of fishing communities.

The International Year of Artisanal Fisheries and Aquaculture declared by the UN for 2022 is an opportunity for decision-makers to respond to the needs and problems faced by artisanal fishing, which constitutes a crucial source of employment, livelihood, food and nutrition for millions of families and coastal communities. The importance of artisanal fishing was demonstrated once again during the coronavirus pandemic. Despite the restrictions which have severely impacted African artisanal fishing and continue to do so, this crisis has brought into public view the capability of fishing communities to continue to provide essential food to the populations.

Orientation on promoting sustainable artisanal fishing is provided by the UN Food and Agriculture Organization Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. These guidelines advocate an approach based on human rights which goes beyond the fishing value chain to take into account questions of gender, social development, transparency, global warming and commerce.

What needs to be done

Concrete measures are needed to achieve this goal of establishing sustainable artisanal fishing. For the coming International Year of Artisanal Fisheries and Aquaculture, representatives of African associations of fishers and women working in processing and the fish trade organised within the CAOPA have identified three priority areas for action.

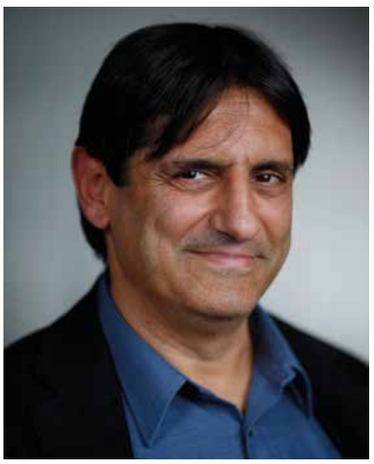
Priority access to fishing areas. The first priority is to guarantee African artisanal fishing secure access to resources. Anything which can be sustainably fished by artisanal fishing to feed populations should be left to artisanal fishing. This is particularly important for fish stocks which have strategic importance for food security, such as small pelagic fish in West Africa.

One tool for guaranteeing artisanal fishers access to fish is for states to grant them exclusive fishing rights in coastal waters. To ensure sustainable management of these coastal regions, they should be placed under co-management by the state and artisanal fishers, including appropriate measures to protect ecosystems, such as protected marine areas managed in cooperation with the communities dependent on fishing.

Another aspect which could improve fishers' access to fish is reinforcing safety onboard small fishing vessels. Deep sea fishing has always been one of the most dangerous occupations in the world. Today, the scarcity of fish, and also global warming, which is drawing certain fish further off-coast towards colder water and triggers weather conditions that make shipping increasingly difficult, are factors making artisanal fishing even more dangerous as an occupation. Signature by African countries

States should grant artisanal fishers exclusive fishing rights in coastal waters.

Photo: Francisco Marí



Francisco Marí has been working since 2009 as a project officer for lobby and advocacy work in the areas of Global Nutrition, Agricultural Trade and Maritime Policy at Brot für die Welt (Bread for the World), focusing on food security, artisanal fisheries, WTO, EU-Africa trade and fisheries agreements, deep-sea mining and the effects of food standards on small-scale producers. He represents Brot für die Welt on the boards of the EU Long Distance Action Committee (LDAC) and the Fisheries Transparency Initiative (FiTI), on the advisory board of the Coalition for Fair Fisheries Agreements (CFFA), on the Stakeholder Forum of the German Alliance for Marine Research and on the International Council of the World Social Forum.

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Women are present at all stages of the African artisanal fishing value chain.

Photo 1, 2: Francisco Marí; Photo 3: Jörg Böthling

and implementation of International Labour Organization Convention 188 should make it possible to improve maritime safety for fishers. Training captains of small vessels, the use of new technologies (geolocation etc.) and raising awareness among fishers of the need to wear life jackets are all essential issues for safety.

Strengthening the processing sector dominated by women in artisanal fishing. A further priority is recognising and valorising the role of women in African artisanal fishing. Women are present at all stages of the artisanal fishing value chain in African countries: financing fishing trips, preparing fishing equipment, receiving and processing the fish. They are also the mainstay of the families and an essential link in getting fish to local and regional (perhaps international) consumers. Many women in artisanal fishing work in intolerable conditions, some breath-in smoke for more than ten hours a day and work without access to drinking water, electricity or sanitation, all for a starvation wage.

Consequently, on the occasion of this International Year, states should invest in the services and infrastructures required to improve working conditions for women in artisanal fishing. Some measures, such as the possibility of freezing catches or providing improved smoking ovens using solar energy, will also improve the quality of the raw material supply to the women and enable them to improve the processed product, ultimately resulting in a decent income.

African women in artisanal fishing are also involved in artisanal fish farming, which is a good way of supplementing their supply of raw materials and also covers periods when there is no fishing (during a closed fishing season for biological recovery, for example). States should accordingly support initiatives in this sector such as improving access to land and credit for the necessary equipment, or assisting research and development for an integrated artisanal fish farming.

Placing survival of coastal communities above the interests of the extractive and tourist industries. But none of these measures will bear fruit if artisanal fishing continues to be a marginalised sector in the national economy. Current discontent in African artisanal fishing is rooted not only in competition with industrial fishing but also – and particularly – in competition with other sectors included in "Blue Economy" strategies which are more powerful financially and politically, such as extraction of petroleum and natural gas, tourism and fishmeal factories, which pose a threat to the future of artisanal fishing.

CAOPA believes that development of the Blue Economy must proceed with caution. States should commission independent studies on the social and environmental impacts, with maximum transparency and with the participation by the affected coastal communities. No new use of ocean resources should be permitted or supported by lenders if it impacts negatively on marine ecosystems (oil pollution, for example) and on the activities of fishing communities who depend on these ecosystems for their living. It is equally important for states to implement transparent consultation and conflict-resolution mechanisms between users of maritime domains, with informed and active participation by the affected fishing communities.

Finally, it must be stressed that pollution of marine ecosystems and coasts by human activities, including plastic, is a disaster for the communities. It is important to promote the use of biodegradable materials, ban single-use plastics which pollute our oceans and invest in processing the waste which clutters our shores and our waters, including support to citizen initiatives for cleaning coastal areas.

A future for young women and men

The future is full of challenges to African artisanal fishing communities, notably from the impacts of global warming which are already making themselves felt in our activities: increasingly difficult shipping and navigation conditions, coastal erosion, relocation of resources further offshore. However, the principal challenge to the future of our communities is giving young women and men a prospect of decent living and working conditions in artisanal fishing, and to stop them sliding into crime or embarking on the dangers of clandestine emigration.

The best way for African states to offer a future for this sector is to recognise the importance of artisanal fishing and place it at the focus of maritime policy, rural development and food security, developing national action plans which are transparent, participative and sensitive to gender issues for implementing the FAO Guidelines for sustainable artisanal fishing. We hope that the International Year of Artisanal Fisheries and Aquaculture will be the starting point for this movement in Africa.

More information: www.caopa.org

To improve the overall sustainability in aquaculture, producers, feed manufacturers and scientists have long been working on alternative ingredients for fishfeeds.

Photo: Jörg Böthling

Aquaculture feeding – problematic, but not without alternatives

Animal production is a major contributor to climate change and greenhouse gas emissions, mainly due to the feed production and global trade. Aquaculture is no exception when considering the species which are "fed", i.e. species depending to a large degree on feed supplied by the operators. Our author describes current feeding practices in aquaculture and the problems they involve and gives an account of progress in research on alternative protein sources.

By Timo Stadtlander

Globally, around 120 million tons of animals and plants were produced in aquaculture in 2019 (FAO 2021). Of these, around 34.7 million tons were plants, primarily macroalgae (seaweeds and kelp) but also some microalgae (i.e. *Spirulina* spp.), while the other 85.3 million tons were animals: fish (e.g. salmon, rainbow trout, carps, tilapia), crustaceans (mainly shrimps and prawns) and molluscs (e.g. blue mussels, oysters or snails). Some of these animals are produced in rather extensive natural systems with no or only few inputs, but most of them come from more intensified or even highly intensive systems depending largely or wholly on feeds. The nutrient requirements are mainly species- and life-stage-specific, but in general, high trophic-level animals (carnivorous species) require more and higher quality protein compared to lower trophic-level species (herbivorous or omnivorous species; also see Box on page 32).

Fishmeal has been the traditionally most important source of proteins in aquaculture. At around four to six million tons, the annual supply of fishmeal has been more or less stable over the last decades. Around one third is produced from so-called trimmings – the leftovers of filleted wild-caught or cultured fish. While fishmeal production from trimmings is more sustainable than targeted fishmeal production (also called reduction fisheries), being a by-product from industrial fishery and aquaculture operations, it results in other problems derived from high mineral content. The higher phosphorous (P) content in trimmings fishmeals can cause increased P-emissions, which can lead to increased eutrophication of surrounding water bodies. Also, the protein content of trimmings fishmeal is usually about five per cent lower than that of conventional fishmeal. And targeted fishmeal production is also in direct competition to human consumption: according to a report by Cashion et al. (2017), 90 per cent of fish destined for fishmeal production were of either food or prime food grade and could therefore directly be consumed by humans.

Insect larvae production is among the most advanced and promising ways of increasing animal protein production – not only as animal feed.

Photo: Thomas Alföldi

Duckweed can be grown on nutrient rich wastewaters. Its protein content corresponds to that of fresh soybean.

Photo: Timo Stadtlander

Photo: Thuy An

Although, at around 80 per cent of global production, aquaculture is the most important consumer of fishmeal, over the last decades, the relative amount of its inclusion into aqua-feeds has significantly decreased as seen in salmon feeds with an estimated 45 per cent of fishmeal content in 1995 versus 18 per cent in 2010 (Tacon and Metian 2008). Fish feed is like a cake with various ingredients including not only fishmeal but also e.g. wheat flour, soy beans or sunflower oil. The crucial aspect of the feed formulation is its nutrient content. Thus, without substantially raising available fishmeal production, a significantly larger amount of fish can be produced, albeit with "diluted" fishmeal, as it were.

Since fishoil is a co-product of fishmeal production, it follows the same production and sustainability issues and challenges. It is rich in unsaturated fatty acids, especially the two important fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) when the fishoil is derived from marine fish. These are the most important omega-3 fatty acids discussed as highly beneficial for human (especially cardiovascular) health. However, while fishoil remains an important lipid source for fed aquaculture species (mostly for high trophic level carnivorous marine fish species) for which alternative lipid sources are researched and developed similarly to alternative protein sources, this article focuses on protein sources.

The fish in to fish out ratio (FIFO)

In 2012, around 70 per cent (35.7 mill. t) of all aquaculture fish and crustaceans were "fed". Carps contributed most to global aqua-feed consumption (11.03 mill. t in 2012), followed by tilapias (6.66 mill. t), shrimp (6.18 mill. t), catfishes (including pangas catfishes; 4.27 mill. t), salmon (2.98 mill. t) and trout (1.14 mill. t) (Tacon and Metian 2015). One often calculated parameter is the so called fish in to fish out ratio, or simply FIFO. The higher it is, the more fishmeal (and oil) is fed to that specific species in relation to its overall production volume. In a 2021 review, the estimated global FIFO of the 11 most important fish and shrimp species showed that all considered high trophic level species (eel, salmon, trout and marine fish such as sea bass or sea bream) were net consumers of fishmeal with values between 1.25 (marine fish) and 2.98 (eel), while low trophic level species (carps, tilapia, catfishes and shrimp) were net seafood producers with values between 0.82 (shrimp) and 0.02 (fed carps) (Naylor et al. 2021).

The trophic level of a species

The trophic level of a species describes its position in the food chain (or rather the food web, given the various interactions between different trophic levels). The lowest trophic level (either 0 or 1, depending on definition) are the primary producers – usually the plants (mostly macro- and microalgae in aquatic ecosystems). The higher an animal is positioned in the food web, the higher its trophic level and share of animal prey in the respective species' natural food, up to the apex predator, which is always the highest trophic level, usually between 4-6, depending on the amount of trophic levels in the respective ecosystem, and not considering humans.

On step towards more sustainability: reducing the feed conversion ratio

Overall, aquaculture contributes significantly to global food security but encounters similar problems as terrestrial animal production, although on a smaller scale given lower global production volumes. Therefore, the issues and challenges associated with aquaculture animal nutrition and feedstuff production are basically the same as for terrestrial animal production – with some exceptions. The majority of aquatic animals are poor converters of carbohydrates, making proteins and lipids more important compared to terrestrial animals. While aquatic animals can use proteins and lipids as an energy source, proteins are the most expensive feed ingredient (Kim et al. 2019) and when used as an energy source also increase excretion of nitrogen (N), thus wasting it, besides raising the feed cost. A high N or protein retention is crucial, since using protein as an energy source contradicts the notion of sustainability. The so-called protein sparing effect was already identified in the early 1970s and afterwards studied and described very well (NRC 2011). The goal would be to supply the animals with all necessary protein and essential amino acids but not to over-supply protein.

Lipids are a cheaper energy source which does not raise N emission when over-supplied. Therefore a good knowledge of the protein, amino acid and energetic requirements of the animals produced (especially the optimal dietary protein to energy ratio) and of the nutritional content and chemical composition of the feedstuffs is key to sustainable animal production. One indicator of a good performing

feed in aquaculture is the feed conversion ratio (FCR). A low FCR is therefore essential in a sustainable aquaculture operation, and reducing the FCR is often the fastest way to increase sustainability.

Alternative protein sources and their pros and cons

To improve overall sustainability in aquaculture production, it has been proposed to reduce the trophic level of the fish feeds (i.e. increase the amount of plant ingredients), even for carnivorous fish and especially concerning the marine ingredients (Olsen 2011). For several decades, the aquaculture sector (producers, feed manufacturers and scientists) has worked on alternative ingredients. These can be sub-divided into ingredients of plant and of animal origin and into primary products and secondary or by-products derived from other industries and utilised as animal feed. The Table on page 34 includes an overview with a selection of examples, some of which are already in use. It ought to be mentioned that while carbohydrates play a minor role in aquatic animal nutrition, certain fish species (e.g. carps) can utilise carbohydrates and starches sufficiently well, especially when extrusion-cooked.

In aquaculture production, the most important **plant-based** aqua-feed ingredients are soybeans which are among the crops produced most in the world, and around 85 per cent of global production is processed and almost exclusively used as animal feed (Kim et al. 2019). Soybeans show an excellent amino acid profile but contain several anti-nutritional factors inhibiting digestion and utilisation if not treated accordingly (Francis et al. 2001). In more recent years, soybean production has increasingly been criticised for its own set of sustainability issues and challenges, but their nutritional value is undisputed. Sustainable soy production could contribute significantly to increased aquaculture sustainability. Other more conventional protein sources are the protein fractions of major crops such as wheat (wheat gluten), canola/ rapeseed or maize (Hardy 2010), already in use for many years.

Several potential alternative plant-based protein sources which are mostly by-products from food oil production of different oil-seeds have been looked at as aquaculture feed ingredients. These include pumpkin seed press cakes (Greiling et al. 2018a), sunflower seed press cakes (Greiling et al. 2018b), kernel meals or protein isolates from *Jatropha curcas*

Using bamboo sticks as substrate for periphyton communities could help improve global aquaculture production, as controlled experiments in Vietnam have shown.

Photo: Marc Verdegem

Farmers showing periphyton on sticks they keep submerged in their pond in the background. This provides extra food for the fish and protects against poaching at night.

Photo: Marc Verdegem

(Nepal et al. 2017), pea seed meal (Davies and Gouveia 2010) and lupine kernel meal (Weiss et al. 2020). Potential primary plant-based protein sources comprise various marine macroalgae and seaweeds such as the green alga *Ulva rigida* (Azaza et al. 2008), the red algae *Porphyra yezoensis* (Stadtlander et al. 2013) and *Gracilaria* sp. or microalgae such as *Schizochytrium* sp. (Stoneham et al. 2018) or *Spirulina* spp. (Olvera-Novoa et al. 1998).

Duckweed, consisting of small floating aquatic plants (see Photos on page 32), can be grown on nutrient rich wastewaters and shows very high growth and biomass production rates (around 70 t of dry matter/ hectare/ year) as well as a protein content similar to fresh soybeans, with up to 45 per cent (Mbagwu and Adeniji 1988). This combination enables the plants to produce between five and ten times the protein amount per unit time and area compared to soy (Xu et al. 2011). The plants can be produced on different animal slurries and could therefore be integrated into other animal production cycles (pigs, cattle, poultry) to improve the N and P efficiencies and afterwards be fed to various fish (Fasakin et al. 1999, Xu et al. 2011, Stadtlander et al. 2019) or other animal species such as pigs or poultry (Haustein et al. 1994, Gwale and Mwale 2015). However, they are mostly used in extensive systems and have reached commercial-scale production in only a few places.

One very important **animal-based** protein source being developed globally is insect meals. Insects could be produced relatively sustainable when fed with true wastes such as (pre-consumer) food waste or animal manures. One African company even uses human night soil, which would not be possible in Europe due to biosafety concerns. However, it is a good example of really closing the nutrient cycle, provided effective R&D and disinfection measures can ensure biosafety. Insect meals have proven to be excellent fishmeal replacements, and the most prominent insect species here is the black soldier fly (*Hermetia illucens*), which has been tested in different fish species (Kroeckel et al. 2012, Lock et al. 2015, Stadtlander et al. 2017).

Moringa oleifera (the drumstick tree) is another potential candidate for a fishmeal substitute, but contrary to insects or duckweed, it would not close nutrient cycles but requires targeted production. The leaves and kernels are consumed in several areas as food. So certain competition to human nutrition would arise. Nevertheless, both leaves and kernels are rich in macro- and micronutrients and especially the leaves have been discussed as a potential measure against micro-nutrient deficiency for many low-income countries (Thurber and Fahey 2009, Stadtlander and Becker 2017).

The way forward

There are many potential alternatives for fishmeal both of animal and plant origin. However, the ideal substitute would need a high protein content, a favourable amino acid profile, not compete with human nutrition, and

contribute to closing nutrient cycles. Since such an ideal protein source does not exist (probably with the exception of insects), using otherwise under- or unutilised nutrients for biomass production or by-products can be a big step towards more sustainable global animal production, including in aquaculture.

Another option would be to increase the production and consumption of low trophic level filter feeding aquatic animals such as mussels, clams or snails instead of increasing production of high trophic (and high-value) carnivorous or even medium trophic omnivorous species which need feed as well.

A large share of global aquaculture production could also be improved, sometimes with relatively simple methods such as the periphyton system (see Photos on page 33). In a controlled experiment, the production of fertilised carp polyculture ponds could be tripled by using bamboo sticks as substrate for periphyton communities (also called "Aufwuchs") consisting of microbes, cyanobacteria and algae providing food for small invertebrates which then serve as natural food source for certain fish or shrimp species (Azim and Little 2006). By providing more substrate to the periphyton communities to grow on, the ponds were basically structurally enriched, providing additional ecological niches and thus increasing overall nutrient use efficiency.

In the current global food system(s) around one third of total food production is either lost or wasted, accounting for an estimated 1.3 billion tons per year and an estimated 990 billion US dollars in economic losses, without considering environmental impacts (FAO 2011, Schanes et al. 2018). Given the capacity of insect larvae to utilise organic wastes, they appear to be ideally suited to recycle at least a certain part of the food wastes into protein, while the food losses need to be addressed as well. Insect larvae production is among the most advanced and promising ways of increasing (animal) protein production in general, be it as animal feed or probably even human food. However, while insects are often considered as the most sustainable alternative to fishmeal, the true sustainability of the various existing insect production technologies and insect species needs to be evaluated by life cycle assessments in parallel to technological advancement. Some studies, including one (as yet unpublished) at FiBL, point towards potentially high greenhouse gas emissions which would then need to be addressed.

Conventional and alternative examples of protein sources for aqua-feeds

Protein source	Distribution and global annual production	Origin (animal, plant, other)	Typical protein content in dry matter	Conventional or alternative*
Fishmeal	Globally available; different qualities; 4-6 mill. t	Animal Targeted fishery or trimmings	50–75 %	Conventional; disputed sustainability for targeted catch
Soybeans	Widely available; globally traded; soybean production > 350 mill. t	Plant Agricultural production	38 % (whole beans); 80 % (soybean protein isolate)	Conventional, most important protein source in aquaculture; sustainability depends on production area and system, limited availability of protein isolates
Wheat	Globally available; wheat production > 760 mill. t	Plant	12 % (flour); 80 % (wheat gluten meal)	Conventional, availability of wheat gluten meal limited in low-income countries
Canola/ Rapeseed	Widely available, production ca. 70.5 mill. t	Plant	38 % (rapeseed meal, solvent extracted)	Conventional, availability somewhat limited
Sunflower press cake	Widely available, production ca. 56 mill. t	Plant	46.5 % (sunflower meal, solvent extracted, de-hulled)	Alternative, underutilised resource in aqua-feeds
Algae (macro and micro; red, green or brown)	Widely available, production around 30-35 mill. t	Plant	20–40 % depending on species, location and environmental conditions	Alternative, not utilised in larger scale, experimental application mostly
Jatropha curcas, kernel meal	Not widely distributed	Plant	65 % (kernel meal, solvent extracted)	Alternative, not in use, experimental stage
Insect meal, different species, most prominent: black soldier fly *Hermetia illucens*	Distribution range increasing, locally in commercial production	Animal	40–60 %, depending on species, production and processing	Alternative, utilisation in aqua-feeds increases, can close nutrient cycles when produced with food waste or manures
Duckweed, different species	Distribution range very limited	Plant	20–45 %, depending on species and production	Alternative, mostly experimental stages, little commercial production, can close nutrient cycles
Distillers grains and solubles	Global distribution, by-product from beer brewing or ethanol production	Plant	26–44 % (depending on grain type)	Alternative, underutilised
Moringa oleifera, leaf or kernel meal	Limited distribution, mostly tropical and subtropical	Plant	19–38 % (kernel usually higher in protein)	Alternative, locally used but usually underutilised or directly consumed as food (leafs)
Animal by-products (e.g. hydrolysed feather meal, blood meal)	Globally distributed, utilisation as feed ingredient regionally strongly regulated	Animal	40–80 %, depending on by-product	Underutilised but regionally in use, where legislation allows

* Conventional: already in use; alternative: not in use due to experimental stage or underutilised.
Note: This list provides only a short overview and is far from being complete.

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References: **www.rural21.com**

Cell-based (fish) meat – no longer a pie in the sky

Nobody doubts that the world's meat consumption is far from being sustainable. For many people, and also for many reasons, making do without animal protein is out of the question. For some years now, cellular-based meat production has been discussed as a potential alternative. A brief stocktaking of developments.

By Gommaar D'Hulst

Worldwide consumption and production of meat continue to surge as demand is boosted by increases in population growth, but also by urbanisation and individual economic gain. The United Nations projected in 2012 that demand for meat would augment towards 455 million metric tons by 2050, while similarly, the global demand for fish is projected to reach 140 million metric tons by 2050 – an increase by over 50 per cent from 2005. With such rapid growth, food demand may outpace production via conventional farming and aquaculture techniques, thus rendering sustainable food production methods highly desirable. Cellular agriculture denotes a method to produce food products such as meat via animal cell-based cultivation techniques and in the absence of farming or killing of animals. This technology is expected to provide an alternative "cleaner" and sustainable approach to produce meat products for food consumption.

A wide range of cell-based meat products are expected to hit the shelves within the next two years.

Photo: AdobeStock/ tilialucida

Generating cell-based meat can be segmented into isolation and culturing of starter cell lines, tissue building and output. The primary inputs are starter cells derived from muscle stem cells or engineered cells that are isolated from a tissue sample obtained from an animal. In the initial stages, these cells are 2D-cultured in a cell culture dish and fed with the necessary nutritional inputs, such as amino acids, sugars, fats vitamins and inorganic salts. During this step, culture conditions are optimised to maximise proliferation capacity.

The next segment is bioprocessing, whereby starter cells are proliferated at large scale in bioreactors and subsequently structured via scaffolds to produce tissue-like meat structures in 3D. It is estimated that 45.2 billion starter cells need to be grown to produce a standard, daily dose of fish meat (155.5g). Therefore, optimisation of proliferation capacity (doubling time) of the starter cell lines is an essential prerequisite for time- and resource-efficient production of cell-based fish. Finally, meat can be placed on the market as finished products, like fillets or steaks, etc., or included in existing products, such as chicken or fish nuggets, burgers, etc... The generation of cell-based meat is considered to be highly disruptive in the Foodtech industry and is foreseen to dramatically change the landscape of how humans view and consume meat.

Currently, roughly 80 early-phase companies exist with a primary focus on generating cell-based meat, of which 30 are directed towards cell-based seafood. A major breakthrough in the commercialisation of cell-based meat products came in late 2020, when the Singapore Food Agency (SFA) gave its seal of approval for cultivated meat products made by US firm Eat Just. It is expected that a variety of cell-based meat products will hit the shelves within the next two years as more regulatory instances green-light such products for human consumption. Nevertheless, most cellular agriculture companies are backed by private investors emphasising impact and unique intellectual property, which threatens sound, shared scientific knowledge. Few biological or engineering breakthroughs get published in open scientific journals, which dramatically delays progress in the field. Until a few years ago, biomedical funding agencies were reluctant to fund research on cell-based meat as the science was unproven and too many disciplines were intercrossing. Luckily, non-profit organisations like the Good Food Institute and New Harvest are filling the funding gaps, and more and more governments have begun injecting cash into the field.

Clearly, cell-based meat is growing rapidly worldwide, and the technology could prove to be a more efficient, less resource-intensive method of producing fish meat. A more open approach with synergies between academia and early phase ventures is needed to drive the field forward by providing trained workforce and efficient use of basic biological or engineering knowledge.

Gommaar D'Hulst is a postdoctoral student at the Regenerative Movement Biology lab at ETH Zurich, Switzerland. He has been working in the field of muscle biology for years. His overarching goal is to bring science into practice. Hence, Gommaar has switched interests towards cellular agriculture. He wants to use his multi-year expertise to develop starter cell lines that are optimised for the generation of cell-based seafood and meat.
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Towards inclusive and sustainable contract farming

In order to help Vietnamese smallholder farmers tap into high-quality rice export markets, the International Rice Research Institute supported farmer groups and export companies in negotiating an inclusive rice farming contract that would encourage and support farmers in producing high-quality rice following sustainable production standards. Our authors describe the ideal contract that both parties agreed upon and discuss the changes in the enabling environment that are required to foster adoption of inclusive and sustainable contract farming in Vietnam.

By Reianne Quilloy, Phoebe Ricarte and Matty Demont

Vietnam is known as a global supplier of low and medium-quality rice. The low-quality rice provides an affordable staple to countries that need to prioritise food security. On the other hand, Vietnam also exports quality rice to more demanding consumer segments in Europe and the USA. Rice consumers pay attention to quality, brand, reputation and product traceability; for example, urban consumers in Vietnam exhibit preferences for rice which is produced using sustainable methods (*also see Rural 21, no. 4/18, p. 37–39*). With this, Vietnam became supportive of producing higher quality and sustainable rice. Entry points in producing sustainable rice are now being streamlined through national programmes encouraging the production of high-quality rice complying with sustainable production standards such as "One must do, five reductions" (*also see Rural 21, no. 3/21, p. 40–41*) and scaled through horizontal coordination mechanisms such as the "small farmer, large field" programme. These will be used for crafting global standards on environmentally sustainable rice production such as the one promoted by the Sustainable Rice Platform (SRP; see www.sustainablerice.org), a global multi-stakeholder alliance. This effort presents an opportunity to Vietnam given the rising demand for sustainably-produced products in local and global markets.

A farmer in a "One must do, five reductions" (1M5R) demonstration farm. The programme is aimed at making the country's rice production more sustainable. Photo: IRRI

Contract farming as an entry point towards sustainable rice production

Implementing a national programme on sustainable rice production in Vietnam aimed to motivate farmers to reduce chemical use. This was complemented by enhancing research on sustainable practices and standards and launching training programmes to improve the skillset of extension workers and farmer groups to comply with sustainability standards. In the context of the programme, discussion platforms were set up for farmers and other sectors to elicit issues and determine opportunities for strengthening linkages among rice value chain actors.

Contract farming is gradually being adopted by rice export companies. It is is one mechanism for promoting sustainable rice production in Vietnam via farmers' participation through strong linkages and coordination among farmers as suppliers and food companies as buyers of sustainably-produced rice. The contract enables food companies to govern rice quality and tailor it to their customers' needs. Such a mechanism can encourage the companies to provide production support to farmer groups and improve their access to better quality agricultural inputs, technical support, storage facilities, and secured output markets. Through support of this kind, companies such as the Loc Troi group have been able to successfully encourage farmer groups to adopt sustainable rice quality standards.

Ideally, farmers should be able to negotiate mutually beneficial contractual arrangements. Trust among farmer groups and food companies is essential to ensure adherence to contract terms and certification schemes, resulting in the production of environmentally sustainable and premium quality rice. The arrangement becomes inclusive if the active players can effectively influence contract terms.

Fostering inclusiveness of contract farming

Creating a safe, transparent and enabling environment for negotiation can help craft an ideal contract between farmers and food companies that is inclusive and promotes sustainable production standards. This can help support both parties in negotiating the details of the contract, and discuss the regulations, policies, and institutions that need to be introduced or modified. For this purpose, the International Rice Research Institute (IRRI) organised a multi-stakeholder participatory workshop in October 2018 during which it set up a negotiating platform among 73 participants which included farmer groups, the Provincial Project Management Unit (PPMU) and food companies in the Mekong Delta.

The negotiation process revolved around eight contract attributes:

1. **Price premium**: the price incentive that the two parties will agree on, conditional to farmers complying with the terms and standards stipulated in the contract.
2. **Pre-financing mechanisms**: the extent to which food companies pre-finance inputs such as seed, fertilisers, pesticides or credit.
3. **Flexibility**: the degree to which contract terms can be modified to farmers' preferences (e.g. flexibility in choice of chemicals).
4. **Quality of rice**: the quality class both parties agree on (e.g. low-medium, high-quality or premium rice).
5. **Production standards**: sustainable production standards, free of pesticide residue, etc.
6. **Private extension**: food companies hire their own extension workers who provide technical assistance to farmers in order to ensure that farmers adhere to the production standards.
7. **Paddy storage facility**: food companies provide a storage facility where farmers can store the products interest-free while waiting for better market prices.
8. **Production season**: the rice production season to which the contract applies (e.g. winter-spring or summer-autumn season).

The workshop participants were also encouraged to add their own preferred attributes in their ideal contract and identify changes needed in the enabling environment (e.g., regulations, policies, etc.).

Negotiations during the workshop took place in the form of moderated plenary discussions between spokespersons of farmer groups (suppliers) and food companies (buyers) in order to achieve consensus on the agreed contract terms (also see Table). There were several points of contention, among them the price premium that would incentivise farmer groups to comply with sustainable production standards. The optimal level of pre-financing was also heavily debated among suppliers, who had diverging preferences. Some farmer groups favoured total pre-financing (of seed, fertilisers, and pesticides) from the food companies, while others opted for partial pre-financing to maintain some flexibility in the choice and cost of inputs (brand, dose, etc.). The season was also a point of contention; while farmers preferred to receive a contract for all three production seasons, food companies were only interested in the winter-spring season, as this season features the lowest production risk. Remarkably, there was little discussion on compliance with sustainable production standards; farmers claimed to be happy to follow the preference of food companies, as long as they are incentivised.

Contract attributes, buyers and suppliers' preferences and consensus

Contract attributes	Buyers	Suppliers	Consensus
Price premium on top of the market price	7 %	3–15 %	7 %
Pre-financing	Total pre-financing of inputs	Total or partial pre-financing	Total pre-financing
Quality class	Medium quality	High quality	At least medium quality
Standards	Sustainable Rice platform (SRP), organic rice	Will follow preference of food companies	Client's preference
Private extension	Included	Included	Included
Paddy storage facility	Included	Not included	Not included
Season	Winter-spring season only	3 seasons	No consensus
Harvesting time	Flexible agreement	10 days	7–10 days

After negotiation, representatives of farmers and food companies achieved consensus on several attributes of a sustainable contract. Both parties accepted a seven per cent price premium and total pre-financing of a fixed package of seeds, fertilisers and pesticides without flexibility in the choice of the brand or dose of chemicals. Food companies will also provide credit, but it will be under control of the farmers' organisation. It was also agreed to produce medium-quality rice following the rice production standards set by the client and harvest time to be announced seven to ten days before harvesting to provide ample time for the food companies to secure the necessary arrangements. Changes in the enabling environment that were recommended included creating mechanisms to foster better understanding of policies, enhancing participation by farmers and improving capacity building skills of cooperatives.

Lessons learnt

To support positioning Vietnam as an exporter of sustainably-produced rice, farmers need to be provided with the right incentives to comply with sustainable production standards. Creating an inclusive contract requires a safe space for rice stakeholders to negotiate contract terms that are mutually beneficial for buyers and suppliers. Pre-financing enables exporters to govern agricultural input use, product quality and production standards. This can decrease the use of harmful chemicals and reduce environmental footprints. The negotiated "ideal" contract is already being adopted by certain food companies, such as shown above with the Loc Troi group, and can serve as a champion or blueprint for future negotiations between food companies and farmer organisations. It will help enhance the goals of inclusive contract farming and generate optimal gains not only for both suppliers and buyers, but also for the environment. It should be taken with a caveat, however, that farmers may lose some autonomy in the process as governance of production (and production risk) is gradually shifted towards food companies.

In the long term, the promotion of sustainable practices in rice production and the growing consumer preferences for sustainably-produced rice can serve as opportunities for farmers to build brands of their own through certified sustainable production labels. Encouraging farmers to create their own brand will enhance their competitiveness, but requires increasing farmers' organisations' capacity in branding, management, and trading. This includes adopting quality standards complemented by establishing protocols, and allocating adequate resources and facilities that will improve the groups' rice processing facilities and food processing. A continuous chain of capacity building can be developed and scaled out to other farmer organisations in the Mekong Delta who are keen to develop their own rice brand satisfying sustainable rice production standards. Lastly, developing prototype brands and testing them in urban markets to elicit consumer response could help in identifying the right move to link the products to the markets.

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Is conflict-hit Kashmir heading for food crisis?

In August 2019, India suspended the special status of the Jammu & Kashmir region. Experts feared that in combination with drastic changes in citizenship and land laws, the country's new agriculture policy would aggravate the impacts of years of shrinkage in farmlands in the Himalayan region, thus negatively affecting the population's food situation.

By Athar Parvaiz

Between 2006 and 2016, Kashmir lost 53,000 of its total 158,000 hectares of paddy land.

Photo: Athar Parvaiz

Indian Administered Kashmir (Jammu & Kashmir), the northernmost region of the Indian subcontinent, where an armed conflict has been simmering for the past three decades, has a predominantly agriculture-based (including horticulture) economy, with 70 per cent of population directly or indirectly engaged in agricultural and allied occupations.

However, lack of proper governance owing to the perpetual political and armed conflict in the region in recent decades has led to shrinkage of agricultural land because of haphazard housing construction, including construction on agricultural land. Such an increase in built-up area over agricultural land in a region where farmers have small land-holdings, with an average farmer owning less than an acre of land, is going to have adverse impacts on the food security of the region, experts say.

Sultan Parray, a farmer in Shalteng-Kashmir, said that roughly some 25,000 Kanals (1,241 hectares) of the croplands once surrounding his village now form residential colonies. Parray and his neighbours say that they often hear lorries carrying land-filling material buzzing around in their area. "It has been happening for years and has entirely changed our surroundings, which are now in total contrast to when we were young," says the 60-year-old.

Farmers in other parts of Kashmir narrate similar tales of built-up areas steadily stretching while more and more agricultural land rapidly comes under housing. "Twenty years back, there were large swathes of agricultural land separating our town from Srinagar, but now, the two towns have joined with buildings and houses built on the agricultural land in these years," says Abdul Rashid, a farmer living near Ganderbal town, north-east of Srinagar, Kashmir's capital.

The Himalayan region, as per the official estimates in 2018, had lost 53,000 of its total 158,000 hectares of paddy land from 2006 to 2016. Sajad Hassan Baba, an agricultural economist at Kashmir's Agricultural University, says that losing the paddy land to built-up areas is a problem because Kashmiris are voracious rice-eaters, with rice being their staple food. "As per our surveys, there have been economic reasons for the major conversion of paddy land, and if the trend continues, coupled with the climatic change, we will be 80 per cent dependent on imports for meeting our food requirements by the end of this century," says senior agricultural scientist Mohammad Yousuf Zargar.

According to Peerzada Amin, a sociologist at Kashmir University's Department of Sociology, agricultural land has been used for housing "because the state has failed to implement the laws which prohibit conversion of agricultural land for any other use". He says that it was mostly agricultural land around towns that became affected as people from villages moved towards urban areas where educational and health facilities existed. Plus, he said, towns were considered safe security-wise compared to the rural areas, which were militancy-infested and therefore attracted anti-insurgency operations from the government forces.

A new agriculture policy

According to Kashmir government's agriculture department, it is important to address and overcome several challenges in the agriculture sector, including low agricultural productivity, susceptibility to weather shocks, poor management of land, water, and soils, and high agricultural losses. "[Our mission is] to position Jammu and Kashmir as a Global agro brand by creating an enabling framework for the growth of Agriculture, Horticulture and the Food Processing Industry along with enhancing farmers' income and farming standards by social, technological and financial inclusion," reads a segment of the government's new agriculture policy.

The agriculture department has now opted for prioritising crops and increasing yields through the introduction of high-yielding varieties, hybrid varieties and increasing the genetic potential of different varieties in the next few years. For example, vegetables are currently grown on an area of 48,000 hectares, which is expected to double in the next five years as per the estimates of Kashmir's agriculture department. Also, the current 81,000 bee colonies in Kashmir are to be increased to 700,000 colonies in the next five years. Similarly, in the same pe-

riod, productivity per hectare in the case of maize, currently 32 quintals, is to be increased to 60 quintals per hectare.

However, experts say that much focus should be on growing rice, which is consumed in all households in the region. "Most of our agricultural land is suited for rice and maize. So, it makes a lot of sense for us to produce food grains to feed our population, which is growing fast. We simply can't afford to import all our food grain," says Baba. As per the official figures, Jammu and Kashmir imports 265,000 metric tons of food grains annually, and the food grain deficit in the region is put at 21.7 per cent which, experts say, is mainly due to geographical and climatic conditions, small and fragmented land-holdings and the conversion of agricultural land for horticulture and other non-agricultural purposes.

Demonstrators react to tear gas fired by police during a protest outside Srinagar, India, in August 2019.

Photo: Atul Loke/ NYT/ Redux/ laif

Against this background, the government's land-use policy appears to be somewhat intriguing, especially when seen in the context of its claims to boost agricultural growth and food security in the region. For example, the new Housing Policy introduced last year approved slum rehabilitation projects, special townships and incentives like exemptions from building permit fees and land use conversion.

Conflict history and recent actions by India

For over 70 years, Kashmiris have borne the brunt of the dispute between India and Pakistan over the erstwhile princely state of Jammu and Kashmir, with an armed conflict (and frequent border tensions between India and Pakistan) continuing in the Himalayan region for over three decades. The prolonged political and armed violence has resulted in large-scale human rights violations. For example, according to a UN human rights report on Kashmir in 2018, one of the most dangerous weapons used against protesters in 2016 – and one which is still being employed by Indian security forces – was the pellet-firing shotgun. "According to official figures, 17 people were killed by shotgun pellets between July 2016 and August 2017, and 6,221 people were injured by the metal pellets between 2016 and March 2017. Civil society organisations believe that many of them have been partially or completely blinded," the UN report said. A Reuters report in 2019 stated that in an attempt to stifle the protests sparked by the removal of Kashmir's semi-autonomous status by New Delhi in early August in 2019, India arrested more than 38,00 people in Kashmir, besides cutting Internet and mobile services and imposing curfew-like restrictions in many areas.

The Kashmir dispute is internationally recognised through UN Security Council resolutions (1948–1951) although the intergovernmental organisation has so far not succeeded in bringing India and Pakistan together for talks on the final resolution of the dispute.

India had granted a semi-autonomous status to Kashmir (Jammu and Kashmir) under its constitution during the 1950s which, among other things, meant that Jammu and Kashmir had its own constitution, flag and laws, including on citizenship and land. But the Indian government annexed the partially autonomous state of Jammu and Kashmir in August 2019, after imposing a blanket communication lockdown of the entire Kashmir Valley to disallow any kind of protests against its decision. Until August 2019, Jammu and Kashmir state subjects (citizens) had had exclusive right to property (land) and jobs in the Jammu and Kashmir state which India has now converted into a Union Territory – no one except a citizen of Jammu and Kashmir could own land in Kashmir as long as its semi-autonomous status was intact. However, the Indian government has since made drastic changes to citizenship laws and land ownership laws, re-designated conservation areas and taken control of agricultural policies that emphasise production and export of high-value horticultural foods. For example, all the laws related to land-use or utilisation of land have been amended by omitting the sections prohibiting transfer of non-movable property to the non-permanent residents of Jammu and Kashmir. This means that any land (including agricultural land) in Kashmir can be purchased by non-indigenous people – the semi-autonomous status of Kashmir provided a strong protection against ownership of land and other immovable property by people other than the original or permanent residents of Kashmir.

Also, the government of India passed a set of new controversial farm laws in Indian parliament in September 2020 which are now also applicable to Jammu and Kashmir (under the semi-autonomous status, Jammu and Kashmir state had a choice to implement or decline laws in the state made by the Indian parliament). Among other things, the new farm laws lay much thrust on commercialisation of crops. Researchers say that the shift from cultivation of food grains to cultivation of commercial crops is reminiscent of the British colonial period, when the cultivation of export crops, such as opium and indigo, was forced upon the peasantry by the East India Company.

"As a result of the new farm laws, cultivation of food grains in Jammu & Kashmir is bound to take yet another hit. Commercial crops, including apples, almond, walnut, peach, cherry, and saffron, will witness an escalation in demand, as this category will increase export prospects, generating greater profits for farmers and private players," a researcher wrote in an article published on October 13th, 2020 in an Indian online publication. The impact of this on the population's food situation remains to be seen.

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