



3.16 Addressing ‘invisible’ underwater issues for food systems: The “blue food” revolution

2.1 What, in brief, is the solution?

To maximise the potential benefits of “blue foods¹” to address malnutrition and hunger globally, and rebalance the distribution of aquatic resources, there needs to be a re-focus by leaders at all levels. That re-focus should incorporate blue foods into broader food-systems policy beyond production to consider efficiencies, equity, affordability, socio-cultural well being and consumption, climate resilience and embed under-represented groups in decision-making.

The solution is focused on designing aquatic food systems (freshwater and marine) to be equitable and inclusive, with efficiencies that minimise waste and loss (e.g. by-catch, fish-farm outputs, supply chain losses) and cost sustainable and responsible resource management into food products. This can include:

- i. Equitable access and benefits, e.g. inclusion of under-represented groups, labour practices that eliminate slavery/under payment.
- ii. Costing social equity and sustainable management into aquatic food products [true cost option to pay] via supply chain verification (helping to eliminate IUU) and costing the full life-cycle of production (e.g. packaging, transport, disposal).
- iii. Promoting diverse food systems that embrace a variety of fisher/fish-farmer groups, technologies and species, to provide greater nutrition where needed and utilize under-valued species.
- iv. Closing the loop – circular food production systems that are waste positive (e.g. use of suitable organic by-products as inputs to fish farming to be waste positive), or multi-trophic systems.
- v. Decentralised policy development that engages and empowers under-represented groups (such as small-scale actors (i.e. fishers and small-holder fish farmers), women, ethnic minorities) in decision-making and co-management, as agents in achieving sustainability, food security and improved nutrition.
- vi. Precision fishing – minimise bycatch, habitat impacts and carbon footprint via approaches such as fish distribution models (making sure that effort/output controls are in place to prevent overfishing), alternative gears, shortening supply chains and using forecasts of environmental conditions (e.g. maximise safety, minimize steaming time and lost gear during storms etc).
- vii. Market-driven fishing and aquaculture harvests – pre-sale of blue foods² – with minimal wastage and considering profitability of products. These producer-consumer partnerships can also serve other advantages (e.g. less packaging, faster delivery, less holding facilities using power) and support stability of small scale actors.
- viii. Climate resilient approach – include practices and management that adapt to changing species abundance and distributions, at all scales, including agreements negotiated between nations.

2.2 What was/were the source(s) from which this solution emerged?

The solution builds on a number of international directives that focus on transformational change for aquatic fisheries and aquaculture (marine and freshwater) to maximise food and nutrition security as well

¹ Edible aquatic organisms, including fish, shellfish and algae from marine and freshwater production systems

² <http://digitaleditions.smedia.com.au/afr-todays-paper/shared/ShowArticle.aspx?doc=AFR%2F2021%2F03%2F09&entity=Ar02202&sk=F96F33CB&mode=text>



as sustainability, and minimise environmental impacts. These include the Food and Agriculture Organization of the United Nations (FAO)³, the food system commitments of the FAO/WHO Second International Conference on Nutrition (ICN2) and the UN Decade of Action on Nutrition 2016 – 2025, the 2021 COFI declaration for Sustainable Fisheries and Aquaculture, and many global Sustainable Development Goals, including SDG 2: *Zero Hunger*, SDG 3: *Good Health and Wellbeing*, SDG 10: *Reduce inequalities*, SDG 12: *Responsible Consumption and Production*, and SDG 14: *Conserve and sustainably use the oceans, seas and marine resources for sustainable development*⁴.

In addition, a number of international and multi-disciplinary programs are focusing on the potential for blue foods to provide enhanced nutrition for malnourished people and support an ever growing human global population. The Blue Food Assessment⁵ and Future Seas⁶ collaboration are two such initiatives that have provided input to this solution. The Blue Food Assessment is a coalition of international researchers working to put “blue food” (food from marine and freshwater systems) in the center of the global food policy agenda. Future Seas aim, initially via a series of collaborative visioning papers, is to motivate international efforts to improve ocean health by providing the science necessary for sustainable development of the oceans, to underpin one of the tenets of the Decade of the Ocean, ‘*The ocean we need for the future we want*’.

Ultimately, the solution emerged through the ACAI Action Track 3 discussions, public surveys, scientific papers and alignment with international initiatives focusing on this issue.

2.3 What problem is it trying to address within food systems?

Increasing the production of food from aquatic systems is seen as a pathway toward more sustainable and nutritional human diets. Yet this potential is being overshadowed by competing uses of aquatic resources in an accelerating “blue economy” (Troell et al. 2014; Farmery et al. 2021⁷) and may require trade-offs between terrestrial food production and capture fisheries/aquaculture. While aquatic or blue foods have the potential to deliver future sustainable food systems that are highly nutritious⁸, blue food ‘growth’ must avoid the mistakes of land-based food production. These include over-intensification, inequities throughout the value chain, unnecessary waste and ‘captured’ markets. The current emphasis on production of food systems rather than efficiencies (e.g. waste reduction and recycling) and equitable distribution of benefits (as well as burdens), has created weak assumptions that growth and availability in the blue economy will lead to increasing blue food production, and thus improved food and nutrition security. If policy development for blue foods doesn’t acknowledge and address these issues, blue food contributions to reducing hunger and malnutrition, and to meeting the Sustainable Development Goals, will be sub-optimal.

The central challenge in managing common aquatic resources, such as fish, invertebrates and plants, rests in the divergence between the interests of individuals and the interests of the collective or commercial groups, generating incentives for the overexploitation of resources, inequitable access (particularly for under-represented groups such as women, Indigenous communities, ethnic minorities and the poor), and loss of rights and benefits as long value chains dilute distribution. To resolve such problems requires innovative, participatory and inclusive processes, and ultimately better alignment between individual

³ FAO (1995) Code of Conduct for Responsible Fisheries. Rome, Italy.

⁴ FAO (2017) The 2030 Agenda and the SDGs: The challenge for aquaculture development and management, by John Hambrey. FAO Fisheries and Aquaculture Circular No. 1141, Rome, Italy.

⁵ <https://www.bluefood.earth/about-the-bfa>

⁶ <https://futureseas2030.org>

⁷ Farmery, A.K., Allison, E.H., Andrew, N.L., Troell, M., Voyer, M., Campbell, B., Eriksson, H., Fabinyi, M., Song, A.M., Steenbergen, D. (2021) Blind spots in visions of a “blue economy” could undermine the ocean's contribution to eliminating hunger and malnutrition. *One Earth*, 4(1), 28-38.

⁸ Rice, J. C., and Garcia, S. M. (2011) Fisheries, food security, climate change, and biodiversity: characteristics of the sector and perspectives on emerging issues. *ICES Journal of Marine Science*, doi:10.1093/icesjms/fsr041.



interests and that of the wider development community. A number of barriers to sustainable aquatic food systems include:

- Difficulty in detecting changes in species, habitats and ecological communities due to largely 'invisible' complex interconnected underwater ecosystems, species mobility, and large areas.
- Disconnect between centralized policies focused on development and local needs focused on food security, small-scale livelihoods and good nutrition.
- Entrenched practices based on historic profit-driven (male-dominated) fishing, harvesting and fish-farming practices.
- Undervalued ecosystem goods and services where extracted or farmed aquatic products are not costed to include ecological degradation (or restoration).
- Under-representation of marginalized groups in decision-making and inequitable distribution of resources and benefits as well as exposure to harms, which is particularly problematic as 90% of fishers globally are artisanal, supporting food security and poverty alleviation.

Taking a broader food-system approach beyond production that also consider efficiencies, equity, affordability, and consumption will refocus the blue food agenda on making production and consumption more equitable and sustainable while increasing access and affordability for those who need it most.

2.4 Why is addressing that problem important for achieving the goal of your ACAI?

Action Track 3 aims to optimize environmental resource use in food production, processing and distribution, thereby reducing biodiversity loss, pollution, water use, soil degradation and greenhouse gas emissions. Marine habitat degradation is a critical factor in the decline of wild capture fisheries due to land-based pollution and development (e.g. removal of coastal nursery habitats), destructive fishing practices and also in terms of an expanding coastal aquaculture footprint (e.g. space and resources – feed, power, water). Incorporating habitat and stock condition, and restoration (the considers the uncertainty of climate change) into transformational changes that are adaptive and facilitate increased food production while minimizing impacts on ecosystems and biodiversity will deliver both food security and environmental benefits.

2.5 How can this solution address that problem?

The up-scaling of blue foods to meet the nutrition challenges of accelerated human population growth depends on being able to produce more with less and equitable distribution. More access to blue foods for vulnerable groups, greater nutritional value of blue foods, while producing less waste and fewer environmental impacts. This requires a paradigm shift that learns from the mistakes of long-established land-based agricultural food systems, where policy at the highest level needs to focus on transformational change that takes a broader food-system approach to rebalance the distribution of benefits, promotes and costs sustainable practices, and minimizes social and environmental impacts and harmful practices. Importantly, the need to include and empower under-represented groups, such as small-scale fishers and fish farmers, women, traditional owners, Indigenous communities and the poor, in decision-making as agents in achieving sustainability, food security and poverty alleviation is critical to this solution. Empowering under-represented and marginalized groups by supporting equitable access to and opportunities in the fisheries and aquaculture sector can support decentralized and less industrialised food systems. As part of this solution, empowering under-represented groups needs to be supported by (1) adequate policy/governance frameworks, (2) funding mechanisms, and (3) monitoring and evaluation of efforts and commitment.



2.6 Why does this solution align to the definition and criteria for a ‘game changing solution’ developed by the Summit?

The UN Food Summit provides the opportunity to re-focus global leaders on transformational change that takes a broader food-system approach to rebalance the distribution of benefits, promotes and costs sustainable practices, and minimizes social and environmental impacts and harmful practices. Within the blue foods production system, it is small-scale fishers, including women and ethnic minorities, who feed the majority of communities vulnerable to malnutrition and hunger. This ‘game changing and systemic solution’ is feasible, based on evidence and best practice, and would shift the underlying globalization and industrialized structures that shape aquatic food systems. It can be scaled up globally, and has application across the entire aquatic food system and value chain.

2.7 What is the existing evidence supporting the argument that this solution will work, or at least that it will achieve the initial outcomes described above?

Many global programs have documented the significant inequalities within aquatic food systems, brought about by, for example, trade and climate change (FAO, 2021 COFI declaration for Sustainable Fisheries and Aquaculture, many global Sustainable Development Goals, The Blue Foods Assessment and Future Seas). These programs and initiatives have placed a spotlight on aquatic or blue foods and their connections with addressing malnutrition, hunger and links to terrestrial food systems in a way that wholistic food system decisions are needed. Consistently, the available evidence supports the need for equitable distribution of aquatic resources and benefits, engaging strongly with and empowering under-represented groups, and delivering whole life-cycle solutions that cost inputs as well as outputs, such as pollution and by-catch, into market value.

2.8 What is the current and/or likely political support for this idea?

This solution is consistent with global SDGs 2, 3, 10, 12, 14, as well as the 2021 COFI declaration for Sustainable Fisheries and Aquaculture (<http://www.fao.org/3/ne472en/ne472en.pdf>) includes the following:

...Recognizing further that women [and marginalized groups] are critical to all Sustainable Development Goals, in particular as agents in achieving food security and improved nutrition in poor and vulnerable households, and the fisheries and aquaculture sector’s potential for growth in opportunities...

Critically, many international initiatives are working towards this type of solution, and political acceptance will grow as they deliver additional knowledge and research to support the benefits of incorporating blue foods into broader food-systems policy underpinned by transformational change in equitable distribution, life-cycle costing and waste minimisation.

2.9 Are there certain contexts for which this solution is particularly well suited, or, conversely, contexts for which it is not well-suited at all?

With 90% of fishers globally involved in artisanal fishing and many vulnerable populations and marginalized groups engaging in fish farming to support food security and poverty alleviation, developing countries and countries with a high to very high dependence on blue food are well-suited for this solution. For example, while Europe produces a significant amount of blue foods, their dependence on aquatic food systems for jobs and nutrition is relatively low. Conversely, sub-Saharan Africa produces far less blue foods but has a very high dependence on aquatic food systems for jobs and nutrition – and these are being exported offshore. These contexts will be particularly amenable to incorporating blue foods into broader food-systems policy, and moving toward diverse production systems to support social outcomes in addition to economic ones.



There is an opportunity to promote reciprocal learning and sharing of knowledge to ensure that new solutions and technologies are implemented with consideration of the context. Including existing local knowledge and the factors required to ensure the approach will be appropriate and beneficial for local communities in the long-term. Therefore, while the framework described is generic, solutions will be site specific and should focus on identifying local attributes for blue food production and products⁹.

2.10 Who are the key stakeholders to be further involved in the process of developing and refining the solution idea?

The concept for this solution was developed by a group of specialists working around the world to motivate international efforts aimed at improving ocean health and sustainable development of the oceans, and represent a range of expertise. Their ongoing involvement would be well-supplemented by the involvement of other key stakeholders, such as Action Tracks 1 and 4, leaders/representatives of under-represented groups (e.g. small-scale actors, marginalised groups, Indigenous communities), and policy experts, particularly from member states. It is important to ensure that people are part of this solution and that it promotes broader integrated management and cooperation¹⁰.

⁹ For example, Bell, J.D., Ratner, B.D., Stobutzki, I. and Oliver. J (2006) Addressing the coral reef crisis in developing countries. *Ocean & Coastal Management* 49, 976–985.

¹⁰ Stephenson RL et al. (2019) A practical framework for implementing and evaluating integrated management of marine activities. *Ocean & Coastal Management* 177:127-138
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