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Q: *Dr Essam, you have multi-country experience in Sub-Saharan Africa, (South, Southeast and East) Asia, Latin America and Europe. In which region of the world have you observed the most significant progress in aquaculture over the past decade, and what have been the factors that have been the main drivers in this process?*

A: In reflecting upon my experiences in various global regions, it's evident that Asia stands out for its significant progress in aquaculture over the past few decades. The key drivers of this growth have been well-aligned policies and the adoption of adaptable technologies, especially by small-scale operators.

Asian governments have implemented policies that effectively align incentives with sustainable aquaculture practices. These policies have not only promoted environmental stewardship but also ensured economic viability. By offering fiscal and other incentives, governments have encouraged investment in aquaculture, leading to its expansion and modernization. For example, China's 13th Five-Year Plan for the Development of National Fisheries outlined specific goals for sustainable and efficient aquaculture, emphasizing green development. This policy support, along with incentives for adopting eco-friendly practices, has been instrumental in modernizing China's aquaculture industry.

A crucial aspect of Asia's aquaculture success has been the development and dissemination of technologies that are easily adaptable by small-scale operators. These technologies include cost-effective feed management systems, simple yet effective disease control measures, and low-cost water quality management techniques. For example, Bangladesh has seen a significant adoption of simple pond aeration techniques and low-cost feed management systems among small-scale farmers, greatly increasing production efficiency and fish health. By making these technologies accessible, small-scale operators, who form the backbone of the industry in many Asian countries, have been able to increase their productivity and sustainability.

The growth in aquaculture has been further bolstered by a supportive financial ecosystem. Banks and microfinance institutions in Bangladesh, Malaysia and other places have played a crucial role by providing tailored financial products and services, ensuring that small-scale operators have access to necessary capital.

In short, the phenomenal growth of aquaculture in Asia can be attributed to the synergy between policy-driven incentives, investments, and the availability of adaptable technologies for small-scale operators. These factors have collectively created an environment where aquaculture can flourish sustainably, offering a model for other regions to emulate.



Credit: WorldFish

WorldFish has introduced a digital survey tool for tracking on-farm aquaculture systems performance and risk factors, including productivity, profitability, input use and farm management practices, fish epidemiology and environmental changes, using a smartphone.

Q: *FAO has declared priority areas for the transformation of Asian aquaculture, where digital technologies and intelligent systems, value chain efficiency, and addressing climate change impacts were highlighted (SOFIA 2022). Taking digital technologies as an example, WorldFish is reported to have developed several useful digital tools such as FishBase, FishScores and Lab-in-a-Backpack. Will there be other digital tools on the way, but more specifically for the artisanal sector?*

A: WorldFish, as a pioneer in this field, has indeed developed several innovative tools like FishBase, FishScores, among others, demonstrating our commitment to leveraging digital technology for sustainable and inclusive aquaculture. A couple of notable innovations include:

Climate Information Services for Fish Farmers in Bangladesh: Recognizing the challenges posed by climate change, particularly for small-scale fish farmers, WorldFish has been instrumental in developing climate information services in Bangladesh. These services, which have reached >100,000 fish farmers provide vital information on weather patterns, water conditions, and potential climate risks. By delivering this information through accessible digital platforms, these services have empowered small-scale fish farmers to make informed decisions, thereby enhancing their resilience to climate variability.

Lab-in-a-Backpack: Another innovative tool, the Lab-in-a-Backpack, exemplifies the kind of practical, field-oriented technology we aim to develop for the artisanal sector. This portable lab allows for on-site water quality analysis, disease diagnosis, and more, making advanced scientific tools accessible to small-scale fish farmers. This kind of innovation is not just about bringing technology to the field; it's about adapting it to meet the specific needs and constraints of small-scale fish farmers.

As we look towards the future, a key focus for WorldFish in transforming aquaculture lies in the strategic integration of our widely used databases into the choice architecture, complemented by the deployment of Artificial Intelligence (AI). Our goal is to develop user-friendly decision tools that can inform both policy and investment decisions in the sector.

Q: *This leads us to the next question. Recently WorldFish launched The Africa-Asia BlueTech Superhighway (AABS) Project, described as a “two-continent program to transform the lives of hundreds of thousands of stakeholders working across aquatic food systems in Africa and Asia.” One Project focus was stated as “to bridge data gaps in small-scale aquatic food systems”. How does WorldFish and its partners plan to build the necessary digital infrastructure and expertise from a local perspective in both continents, while leveraging local means and networks?*

A: The Africa-Asia BlueTech Superhighway project, initiated by WorldFish and supported by the UK's Foreign, Commonwealth & Development Office (FCDO), is set to make a profound impact in the realm of small-scale fisheries, particularly in Coastal East African countries—Kenya, Tanzania, and Mozambique. A critical component of this transformative initiative is the scaling of Peskas, an innovative open-source fisheries monitoring system, which has already shown promising results in Timor-Leste.

The expansion of Peskas to these East African nations is pivotal in addressing the perennial challenge of data gaps in small-scale fisheries. Historically, these fisheries have been under-represented in national and regional statistics, leading to a lack of informed policy and investment decisions. Peskas offers a robust solution to this issue by enabling the collection of accurate and comprehensive data on fishing activities, catch volumes, and fish stocks. Its successful implementation in



Tried successfully in Timor-Leste, Peskas is one of the most sophisticated data collection systems for small-scale fisheries in the world.

Timor-Leste. has demonstrated its potential to revolutionize data collection and management in small-scale fisheries.

In Kenya, Tanzania, and Mozambique, Peskas will be tailored to the local contexts, taking into account the unique environmental conditions and fishing practices of each region. This localization is crucial for the system's effectiveness and user adoption. By equipping local fishers and stakeholders with this tool, Peskas not only enhances data accuracy but also empowers these communities with the knowledge and insights necessary for sustainable fishery management.

Moreover, the role of Peskas in these countries extends beyond mere data collection; it represents a significant stride towards inclusive and participatory fisheries governance. By filling the data void, Peskas enables better representation of small-scale fisheries in policy dialogues and investment decisions, ensuring that these crucial sectors are no longer marginalized but rather recognized as vital contributors to national economies and community livelihoods.

Q: *You mentioned climate change as "the whale in the room" during your keynote speech at the World Seafood Congress 2023 held in Peniche, Portugal, in September 2023. As a fisheries scientist, you would have heard all the dire predictions regarding the future of aquatic food production systems, redistribution of fishery stocks in the oceans and islands disappearing below water. Earlier, in May 2023, you had delivered a presentation entitled "Towards climate-resilient aquatic food systems for shared prosperity" during the ICCCAD- IUB Distinguished Guest Lecture Series. For the benefit of our readers, could you highlight the salient points from your presentation?*

A: I have often emphasized the importance of shifting our perspective on climate change in aquatic food systems from doom-and-gloom to proactive solutions. Recognizing the severe impacts of climate change, including the redistribution of fishery stocks, ocean acidification and the threat to island nations, my focus is on harnessing science and innovation to enhance our ability to predict and respond to climate shocks, thereby identifying viable livelihood opportunities in this new reality.

The core message is one of resilience and adaptability. By improving predictive capabilities through advanced climate science and data analytics, we can better prepare for, and mitigate the risks posed by climate change. This approach opens up avenues for sustainable and viable livelihoods opportunities, even as we confront the challenges of changing aquatic ecosystems. The goal is to achieve shared prosperity, acknowledging that while we strive to mitigate greenhouse gas emissions, we must also develop strategies to live with the irreversible changes that have already occurred. This requires a collaborative effort, integrating policy, science, community engagement, and private sector innovation, to develop aquatic food systems that are resilient to both current and future climate impacts. Ultimately, my argument is that there is potential for not just surviving but thriving in the face of climate change, through innovative and adaptive strategies.

Q: *Still on the same topic, could you mention a few examples where WorldFish has worked to empower communities through climate-smart aquaculture?*

A: WorldFish has demonstrated a strong commitment to empowering communities through climate-smart aquaculture. One of our key initiatives is the Smart and Innovative Climate Information Services project focused on managing climate variability by providing critical climate information and advisories to fish farmers and other stakeholders in aquatic food systems. These services enable them to make informed decisions, enhancing their resilience to climate shocks and improving overall productivity.

Another is our project on Transforming Communities through Climate-Smart Innovations. This project involves the introduction and scaling of climate-resilient agricultural practices. These innovations are pivotal in boosting the productivity of aquatic food systems and enhancing the livelihoods of local communities, making them more resilient to the impacts of climate change.

Additionally, in Mali, our Rice-Fish Farming project represents an innovative approach to sustainable aquaculture. This integrated farming method combines rice and fish cultivation, offering multiple benefits such as improved food security, enhanced farm productivity, and better ecosystem health. It's an excellent example of adapting traditional practices to modern challenges and significantly contributes to the livelihoods and resilience of local communities.

Q: *Moving on to markets, one of your fields of interest is reported to be investigating the role and potential of implementing market-based instruments for sustainable financing of natural resources governance in the developing world. Would it be correct to say that sustainable finance markets can generate positive changes to address environmental, social and governance issues in developing countries? What are the prerequisites that must be in place in these countries?*

A: Sustainable finance markets hold immense potential for addressing environmental, social, and governance (ESG) challenges in developing countries, especially within sectors like aquaculture. However, the key to unlocking this potential lies in prioritizing 'financial inclusion' over mere financing. It's crucial that finance reaches and positively impacts those who need it most, such as small-scale fish farmers. This approach means focusing on the quality, suitability, and accessibility of financial services and products, ensuring they are tailored to meet the specific needs of these communities.

To effectively implement sustainable finance in developing countries, several prerequisites are essential. First, robust regulatory frameworks are needed to foster responsible lending and investment practices aligned with ESG criteria. Enhancing financial literacy among small-scale operators is also vital, equipping them with the knowledge to access and utilize financial services effectively. Furthermore, financial products must be accessible and tailored to local needs, ensuring relevance and practicality for small-scale fish farmers. Finally, forging strong partnerships among governments, financial institutions, NGOs, and community groups is critical. These collaborations can facilitate the development of inclusive financial products and ensure effective channeling of resources towards sustainable practices.

In essence, the transformation of natural resource governance through sustainable finance hinges not just on the availability of funds but on ensuring these funds are accessible, affordable, and relevant to those at the grassroots level. By emphasizing financial inclusion, developing countries can leverage sustainable finance as a powerful tool to drive meaningful change in addressing ESG issues.

Q: *WorldFish has been successful in developing new production technologies, including at the small-producer level. Have there been, or will there be, innovations related to bridging the gap between producer and the end-consumer to make the supply chain more inclusive and in the process, each party being able to trade directly in aquatic foods?*

A: WorldFish has made significant strides in developing new production technologies, even at the small-producer level. A key aspect of our approach is recognizing that impactful innovations should be community-led.

A prime example of this is our project involving solar freezers in the Solomon Islands. These solar-powered freezers are a simple yet highly effective technology that has revolutionized the way local fishers store their catch. By extending the shelf life of fish, these freezers have opened new markets for small-scale fishers and reduced post-harvest losses, thereby increasing incomes and ensuring a more stable supply of fish for local communities.

This initiative demonstrates how even relatively low-tech solutions can bridge critical gaps in the supply chain. By providing small-scale producers with the tools and technologies to preserve their catch, we are not only enhancing their capacity to meet consumer demand but also ensuring that these producers can participate more effectively and directly in the marketplace.



Credit: WorldFish

When is a freezer more than just somewhere to store food? When it's solar-powered and spearheading women's economic change in the Solomon Islands.

Q: *What are your thoughts on a shared and sustainable blue economy, defined in World Bank terms as the "sustainable use of ocean resources to benefit economies, livelihoods, and ocean ecosystem health". What, in real terms, would a sustainable blue economy look like, and under what conditions is it most likely to develop?*

A: From a WorldFish perspective, while the World Bank's definition of a 'sustainable blue economy' is a step in the right direction, it perhaps doesn't fully encapsulate the depth of transformation required. The sustainable use of ocean resources for economic growth, livelihood enhancement, and ecosystem health is a crucial goal. However, true

sustainability in the blue economy extends beyond mere resource use to include regenerative practices and deep-rooted social inclusion.

In real terms, a sustainable blue economy as envisioned by WorldFish would be one where aquatic resources are not just sustainably exploited but are actively regenerated and restored. This means moving beyond maintaining current levels of marine health to enhancing them. Initiatives like rebuilding fish stocks, restoring coral reefs, and protecting mangroves are integral to this vision. Moreover, social inclusivity should be at the core of the blue economy. It's vital that this economic model supports not only large-scale commercial ventures but also uplifts small-scale fishers and coastal communities, often the most vulnerable and marginalized groups.

For such a model to develop, robust governance frameworks are necessary, ones that ensure equitable resource-sharing and prioritize long-term ecological health over short-term gains. Additionally, community-led management and decision-making processes are key, as they bring local knowledge and needs into focus. Leveraging technological innovation for sustainable practices and fostering international cooperation for ocean conservation are also critical components.

In essence, WorldFish advocates for a blue economy that is not just about sustainable utilization of ocean resources as per the World Bank's definition, but one that is regenerative, equitable, and inclusive, ensuring the prosperity of both the oceans and the communities that depend on them.

Q: *WorldFish is organizing the 21st International Institute of Fisheries Economics & Trade (IIFET 2024) Conference next July in Penang with the theme "Aquatic Food Systems in the Blue Economy". Would you like to say some words on the Conference so that readers can decide on their participation?*

A: This edition of the biennial conference is being held in Asia for the first time since 2008 and in collaboration with Malaysia's Department of Fisheries, offering a unique opportunity for participants from the West to learn and network with stakeholders in the Asia-Pacific region, the biggest producer of fish in the world..

The Conference will focus on the intersection of fisheries and aquaculture economics and trade with major global challenges we are facing today, such as food system sustainability, rising economic and social inequality, the climate crisis and the fallout from, and possibility of future pandemics - all pertinent in shaping a resilient blue economy that delivers on its promise for healthy people, healthy planet and shared prosperity.

In addition to sessions proposed by IIFET members and sessions that reflect key research arenas of IIFET members, this year's IIFET will have four novel sub-themes, expanding discussions into sustainable and equitable economic development via aquatic food systems, alongside traditional research areas. It promises to be a rich exchange of ideas and I strongly encourage readers, researchers, policymakers, and industry stakeholders to join us at the conference.

More information on the conference can be found [here](#).