FOOD INNOVATORS NETWORK

WORLD ECONOMIC FORUM

In collaboration with
Boston Consulting Group

Investing in Blue Foods: Innovation and Partnerships for Impact

Food Innovators Network

WHITE PAPER

JANUARY 2026

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This material has been funded by UK International Development from the government of the United Kingdom. However, the views expressed do not necessarily reflect the UK government's official policies.

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Foreword

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The future of global food production depends on the ability to diversify production, while scaling-up innovation to strengthen resilience and nutrition, and to create livelihoods opportunities. This report is about blue foods – spanning fisheries, aquaculture and the aquatic value chain. When supported by the right technologies, policies and investment, blue foods can be one of the pathways towards meeting growing food demand while delivering economic opportunity and ecological resilience.

A deep dive into Africa highlights the tremendous potential of blue foods. If blue foods production were doubled – drawn from the continent's rivers, lakes and seas – it could unlock an additional $17 billion in GDP, reduce its protein gap by 25% compared to the global average, and generate millions of sustainable livelihoods. Furthermore, a meaningful growth in blue foods has the potential to ease pressure on land-based agriculture, which could help reduce agricultural emissions. Achieving this growth responsibly will be essential, to ensure that the expansion of Africa's blue foods sector empowers communities, creates jobs and livelihoods, and safeguards marine and freshwater ecosystems.

Despite this potential, high input costs, limited infrastructure and environmental pressures continue to hold the sector back. By simply meeting global averages across key loss drivers – inputs, waste and spoilage, disease risks and traceability losses – Africa could produce an additional 5 million tonnes of blue foods each year, a 40% increase on current output. The good news is that blue food innovation is within reach.

Across the continent and globally, innovators are already proving what is possible, from sustainable feed production to digital monitoring and circular waste solutions. Realizing this potential requires seeing blue foods not as a standalone endeavour but part of a holistic food system. The integration of aquatic and terrestrial food production – through shared infrastructure, circular resource flows and coordinated policies that transcend institutional boundaries – can create efficiencies across land and water, reduce waste, and strengthen nutrition security. When food systems are designed as interconnected networks and not separate value chains, the impact multiplies.

Through the Food Innovation Hubs, the World Economic Forum and partners are proposing a new cooperation model that enables stronger coordination across policy-makers, innovators, private sector and local communities. The model connects these actors to a global Food Innovators Network that can mobilize investment and support fit-for-purpose technology adoption in blue foods.

Africa's story is one of abundance, natural wealth, young talent and vast opportunity. Diversification and innovation will enable Africa to be a leader in unlocking the blue food opportunity that can feed its people, power its economies, create jobs, support women and youth, and strengthen its natural ecosystems – providing a model of inclusive and resilient growth.

Executive summary

Unlocking Africa's blue food potential for healthier people, stronger economies and a sustainable future.

Blue foods – fish, shellfish, crustaceans, seaweed and other aquatic organisms from marine, freshwater and brackish systems – are critical to feeding the world, sustaining livelihoods and protecting the planet. Globally, they provide nutrition for billions of people, support around 800 million jobs and generate hundreds of billions of dollars in value each year. However, realizing this opportunity will require growth that is both responsible and inclusive, with strong safeguards to protect aquatic ecosystems and communities.

Across Africa, blue foods already supply about 18% of total animal protein and underpin millions of livelihoods across fisheries, aquaculture, processing and trade. With demand for affordable, nutritious protein rising rapidly, the blue foods sector represents one of the fastest-growing opportunities for job creation and inclusive economic growth on the continent. If blue foods production in Africa were doubled to approximately 26 million tonnes per year, it could reduce the protein gap by around 25%, create roughly 3 million additional jobs and add an estimated $17 billion to GDP. Achieving this potential at scale will depend on growth that is well-managed, ensuring that productivity gains translate into improved livelihood opportunities, resilient value chains and long-term sustainability.

Blue foods systems face a complex web of challenges globally, many of which are amplified in Africa. Feed is often imported and costs are high, limited seed systems reduce productivity and losses remain heavy across the value chain. Around one-third of Africa's total fish production is lost to poor storage, transport and cold chain infrastructure. Disease outbreaks and limited biosecurity continue to limit yields, while illegal, unreported and unregulated fishing undermines sustainability and trust. Environmental pressures – from abandoned nets to oxygen-depleted lakes – are growing and, across the continent, the finance, skills and coordination needed to tackle these challenges are still emerging.

The good news is that Africa's innovators are already developing practical solutions, which can be amplified by learning from global experience. Across the value chain, innovation is helping producers cut costs, reduce waste and raise quality. Improved tilapia breeding, insect-based and methane-fermented feeds and oral vaccines are lowering input costs and disease risks. Tools for real-time monitoring and precision feeding are improving farm performance, while solar-powered dryers, AI-based fish grading and digital traceability platforms are reducing spoilage and opening new markets. Circular models – such as insect bioconversion of waste and nutrient recycling in multi-trophic aquaculture – are turning waste streams into value, improving resource efficiency and creating new revenue opportunities across blue food value chains.

However, innovation alone is not enough. Experience from other regions shows that transformation accelerates when governments, investors and communities align around shared goals. Norway, for example, linked aquaculture licences to innovation and environmental performance. The Netherlands used strategic planning and financing to scale up sustainable systems, while New Zealand's Moana Nui cluster is aligning local industry, Māori enterprises and government in building an inclusive blue economy.

Africa can chart its own transformation: innovation, supported by strong policy and collaboration across the ecosystem, can unlock the changes the continent seeks. Governments can lead by setting the right rules, investing in infrastructure and embedding training within public programmes. The private sector can bring efficiency, finance and market connections, while development partners can deploy patient capital to de-risk early innovation and strengthen local capacity. At the community level, cooperatives can anchor inclusive innovation approaches and technologies, ensuring that women, youth, persons with disabilities and migrants benefit as active participants. Platforms such as the World Economic Forum's Food Innovation Hubs Global Initiative can further connect these actors, help scale up solutions and align action.

By aligning these efforts around common priorities – nutrition, livelihoods and sustainability – blue foods can become one of Africa's most powerful levers for inclusive growth and ecosystem preservation, both terrestrial and marine.

Introduction

Blue foods offer one of the most practical and scalable solutions for Africa's priorities of economic growth, job creation and food security. When properly managed, blue foods can improve nutrition, create sources of livelihood, cut emissions and preserve ecosystems. Given Africa's water resources and its growing demand for affordable protein, the continent's blue foods systems hold vast untapped potential.

This white paper sets out a pathway for unlocking that potential. It draws on data, case studies and global best practice to demonstrate how targeted innovation, coupled with a stronger enabling environment, can transform Africa's blue foods landscape from fragmented activity into a coherent, investable system capable of scale.

The report is structured around the full blue foods value chain – inputs, production, processing, supply chain, circularity and waste – illustrating how innovation at each stage can raise productivity, reduce losses and improve environmental outcomes. It also highlights the foundational systems needed to sustain that innovation: finance, infrastructure, governance and human capacity.

Lessons from success-case countries show that progress depends not only on technology, but also on coordination – between governments, the private sector, development partners and communities. By aligning these actors around shared priorities, Africa can build a thriving blue foods economy that nourishes its people, protects its ecosystems and strengthens its position in the global food system.

1 The blue foods opportunity and its potential for Africa

Blue foods represent a powerful opportunity to deliver on global food system goals, with especially strong potential for Africa.

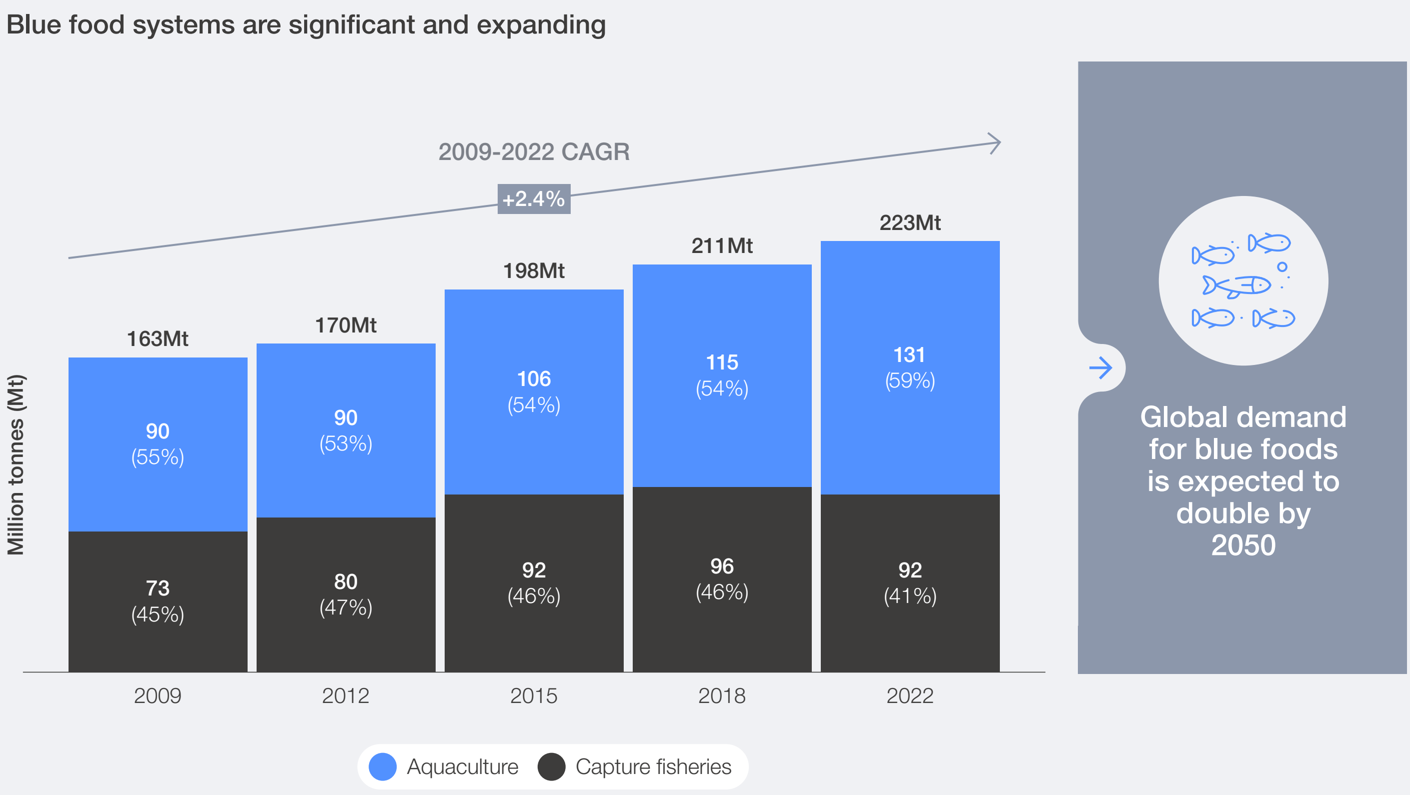
1.1 Blue food systems are significant and expanding

200
million tonnes
of blue foods produced globally, per year

Blue foods – fish, shellfish, crustaceans, seaweed and other aquatic organisms from marine, freshwater and brackish systems – include both aquaculture (farmed) and wild capture (harvested) sources. They are a critical and expanding pillar of the global food system, producing over 200 million tonnes (Mt) annually,[1] nourishing 3 billion people and supporting 800 million livelihoods,[2] with demand expected to double by 2050 (see Figure 1).[3]

Since 1960, per capita apparent fish consumption has more than doubled to about 20-21 kg per year on average,[4] driven by aquaculture – the world's fastest-growing food sector – now providing over half of global supply.[5] While wild fisheries have plateaued amid stock depletion, blue foods remain vital for food security, nutrition and income, especially in low- and middle-income countries where they are often the most affordable animal protein.

FIGURE 1 **Fisheries and aquaculture, global production (2009-2022)**



Note: Capture fisheries refer to the harvesting of wild, naturally occurring fish and other aquatic organisms from marine or freshwater environments.
Source: Stanford Center for Ocean Solutions, Food and Agriculture Organization (FAO).[6]

1.2 Globally and in Africa, blue foods offer powerful benefits

Blue foods are a major economic driver for developing countries, contributing $45 billion in net exports – more than any other agricultural commodity.

Food security and nutrition

Blue foods provide the global population with about 15%[7] of their total animal protein supply, as well as essential micronutrients such as omega-3 fatty acids, vitamin B12, calcium and iron. They are typically around 30% cheaper than other protein sources,[8] making them more accessible for low-income consumers. In Africa, they supply about 18%[9] of total animal protein intake, rising to more than 50% in some countries, such as Sierra Leone (52.6%).[10]

Livelihoods

Globally, blue food systems employ about 60 million[11] people and support the livelihoods of about 800 million people,[12] many of whom work in small-scale fisheries, aquaculture, processing and trade. These jobs sustain rural and coastal communities where few alternatives exist. In Africa, the sector supports 12.3 million jobs[13] – more than one-third of Ghana's population. Women represent roughly 60%[14] of post-harvest workers, especially in processing and trade, highlighting the sector's role in gender-inclusive employment.

Economic contribution

Blue foods are a major economic driver for developing countries, contributing $45 billion[15] in net exports – more than any other agricultural commodity. Global production has a first-sale value of about $500 billion[16] and represents a $1.5 trillion[17] investment opportunity by 2050. The sector drives demand for and investment in the production of aquaculture feed, such as fishmeal or soy-based feed. It also supports cold-chain logistics, vessel repair and market services. In Africa, it generates about $24 billion in GDP,[18] exceeding the GDP of several African economies including Benin. As aquaculture and wild fisheries expand, blue foods are becoming integral to food strategies, public health programmes and rural development.

Sustainability

Blue foods produce over 80%[19] fewer greenhouse gas (GHG) emissions than than other protein sources and require less freshwater and land usage. In Africa, blue foods strengthen dietary resilience where adverse climatic events such as sporadic rainfall and drought can reduce crop yields by up to 30%.[20] Blue foods' diversity makes food systems more stable, as each different aquatic species responds uniquely to these climate factors. When sustainably managed, blue foods also provide ecological benefits, such as carbon sequestration through shellfish reefs and mangrove aquaculture.

> **Integrating blue foods into Africa's agricultural agenda will accelerate progress towards food security, climate resilience and inclusive rural development, ensuring that smallholders, women and youth benefit from this vital sector.**
>
> Alice Ruhweza, President, AGRA

1.3 Closing Africa's protein gap through blue foods

Doubling annual blue food production in Africa to 26 million tonnes (Mt) by 2050 could close Africa's protein supply gap with the rest of the world, unlock an estimated $17 billion in GDP and provide up to 3.3 million new jobs. This section explores the impacts of such a transformation of Africa's blue food ambition in greater detail.

Improved nutrition at scale

Africa's average daily supply of protein per person is 65 grammes, compared to the global average of 91 grammes, according to FAO data (see Figure 2).[21] To close this gap entirely would require taking Africa's current annual supply of all proteins from 33.9 Mt up to 47.5 Mt – an increase of around 40% or an additional 13.6 Mt of protein supply each year.

Blue foods offer a vital means of helping to close this protein gap. Every 100g of blue foods production supplies around 25g of protein. So doubling blue foods production in Africa – from the current 13.1 Mt to 26.2 Mt – would add ~3.3 Mt of protein supply to Africa's food systems. This in turn would reduce the continent's 13.6 Mt protein gap with the rest of the world by around 25%.[22]

Blue foods play a complementary role within Africa's broader protein landscape. Blue foods provide quality protein, while delivering a richer profile of essential micronutrients such as omega-3s, selenium, iodine and vitamins A, B12 and D.

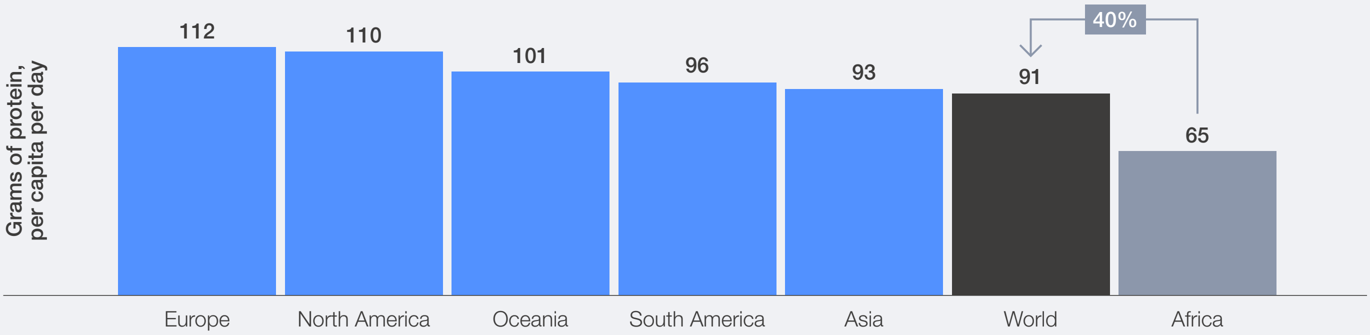
Doubling blue food production is one of several ways to close Africa's protein supply gap. Another way is through greater efficiencies in processing. For example, up to 50%[23] of fish is discarded during conventional processing – despite heads, bones and skin being among the most nutrient-rich parts. Converting these byproducts into food can increase protein supply without increasing harvests.

FIGURE 2 **Potential impact of blue foods on Africa's protein gap**

Doubling blue food production can reduce Africa's protein supply gap by ~25% – the most viable solution on cost, quality and cultural fit

Africa lags other regions in per capita protein supply at **~40% below** global average

Average daily per capita protein supply (g) - all proteins

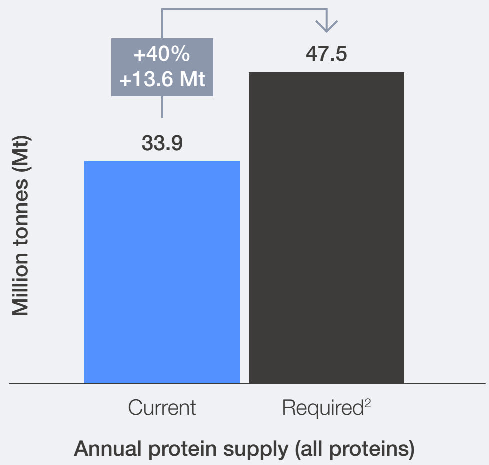


By 2032, Africa may be only continent where per capita blue foods consumption declines, as production growth is expected to lag population growth[1]

40% uplift in annual protein supply needed to match global average

Africa's annual protein supply (Mt)

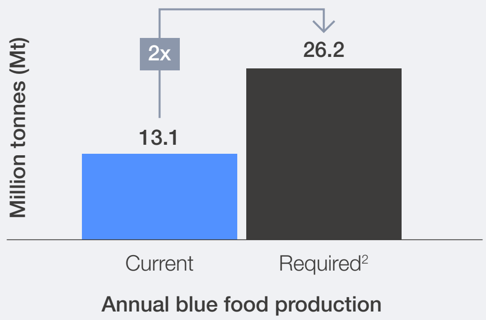
13.6 Mt increase in protein supply needed to close gap with global per capita supply



Doubling blue food production can reduce the protein gap by ~25%

Africa's annual blue food production (Mt)

13.1 Mt increase in blue food production » **3.3 Mt increase in protein supply** (**~25%** of 13.6 Mt protein shortfall)[3]



Blue foods and protein supply

Nutrition: deliver comparable high-quality protein to beef but include essential omega-3s that beef lacks

Adoption: more culturally embedded in African diets; beef often reserved for occasional or ceremonial use

Cost: ~30% cheaper than conventional beef protein

Notes: 1. FAO projections. **2.** Annual protein supply needed by Africa to match global average daily per capita protein supply. **3.** Assumes 25g of protein *supply* per 100g of blue food *production*, based on nutrient profile of Nile tilapia (Africa's most consumed fish). For detailed calculations, see Appendix A1.

Sources: FAO, Our World in Data, World Bank, FoodStruct, BCG analysis.[24]

> Shifting protein supply towards blue foods would strengthen climate and biodiversity outcomes, while improving the resilience of Africa's food systems.

Economic, social and environmental impacts

The ambition of doubling of blue food production, alongside improving value-chain efficiencies, could bring substantial benefits to economies, jobs and the environment:

Boost to GDP: It could raise the blue foods sector's GDP contribution to $48 billion by 2050, contributing an additional $17 billion to GDP, based on capacity growth projections by the UN's Food and Agriculture Organization.[25] These gains would stem not only from greater production but also from stronger domestic supply chains, reduced losses and expanded regional trade.

Job creation: This blue foods ambition could create about 3.3 million new jobs in Africa,[26] particularly in aquaculture, processing, logistics and input supply. Women and young people would be major beneficiaries. Women already comprise ~60%[27] of the blue foods post-harvest workforce, but they are constrained by limited access to training and low value-add processing which drives low returns. Meanwhile, ~60% of Africa's population is under 25 years old, providing a future-ready workforce for the industry.[28]

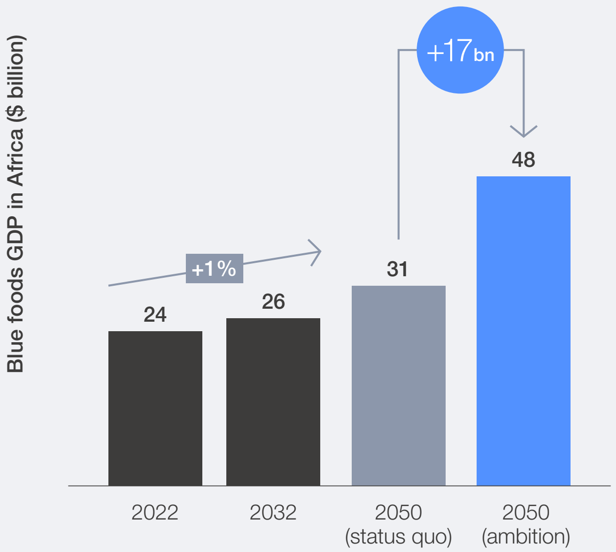
Sustainability: Greater diversification of protein sources through blue foods could ease pressure on land-based agriculture, reduce Africa's agricultural emissions and strengthen food-system resilience. For example, beef production across large parts of Africa caused an estimated 215,000 hectares of deforestation per year between 2005 and 2013[29]. Blue foods offer an opportunity for Africa to complement its terrestrial protein production with sustainable aquatic foods that support better nutrition, climate and biodiversity outcomes.

FIGURE 3 **Potential socio-economic impacts of increase in blue foods production**

Doubling blue foods production could boost GDP and create new jobs

Economic: **$17 billion increase in GDP** by 2050 vs. current FAO projections

Based on current FAO projections, blue foods production in Africa will grow at **1% CAGR from 2022-2032,** reaching **$31 billion GDP by 2050**



Africa's "blue foods ambition" for 2050:

Double production to 26.2 Mt

Double GDP to $48 billion

Social: **3.3 million additional jobs** by 2050 vs. status quo

+3.3 million

additional jobs vs. status quo

By 2050, status quo growth yields 13.6 million jobs (+1.3 million vs. today)

"Blue foods ambition" yields 16.9 million jobs (+4.6 million vs. today)

Creating an **additional 3.3 million jobs** vs. status quo

Note: For methodologies and calculations, see: Appendix A2 (Economic data) and Appendix A3 (Social data).

Sources: FAO, World Bank, Statista, BCG analysis.[30]

2 Challenges facing blue food systems

Lifting industry performance to global averages across key challenge areas – input costs, waste, disease and illegal fishing – could deliver a 40% boost to Africa's blue food supply.

2.1 Challenges limiting blue foods' ability to scale up are amplified in Africa

The global blue food sector faces a series of challenges that are amplified in the context of Africa. These include feed costs, waste, disease, illegal fishing, governance and environmental pressures.

Input challenges

In Africa, feed constraints drive aquaculture production costs 10-20% higher than global averages, with feed accounting for 70-80%[31] of total costs compared with about 60%[32] globally. High costs are driven by dependence on conventional fish feed, which is imported due to limited local feed production capacity and consists of soymeal (also essential for human consumption) and fishmeal (extracted from wild capture fish).

Smallholder farmers, who may struggle to afford imported feed, often use low-grade local feed with poor feed-to-body mass conversion ratios (2.5 vs. 1.5 global average for tilapia),[33,34] leading to longer grow-out periods, when fish take more time to reach harvest size. Limited access to both good quality feed and healthy fish fingerlings (young fish used to stock farms)[35] means lower productivity. These inefficiencies, along with the dependence on imported inputs, continues to limit Africa's competitiveness and growth across the blue foods sector.

High levels of loss and waste

Africa loses one-third of its blue food output before it reaches consumers.

Africa loses one-third[36] of its blue food output before it reaches consumers. Inefficient cold chains, transport and processing capacity make spoilage and waste the largest sources of loss. These shortcomings affect nutrition and incomes, highlighting the urgent need for investment in infrastructure and value-chain coordination to capture the full potential of production gains.

Disease outbreaks and health risks

Disease remains a critical vulnerability, due to limited biosecurity and health management systems. The ISKNV (infectious spleen and kidney necrosis virus) outbreak on Lake Volta, for instance, has caused mortality rates of 60-90%[37] in some farms. Globally, aquaculture disease costs are estimated at $6 billion annually,[38] but the lack of diagnostic capacity and certified seed systems makes the impact far more severe in Africa. Strengthening surveillance, veterinary networks and seed quality are key factors in reducing these losses.

Governance and traceability gaps

Strengthening Africa's fisheries governance presents an important opportunity to build transparency and competitiveness. About 36% of tuna and shrimp fishing from 2016 to 2021 was potentially illegal – nearly double the 20% global average.[39] Inefficient monitoring, vessel tracking and catch documentation reduce transparency and erode market confidence, costing the region hundreds of millions in lost export value.[40] Globally, illegal, unreported and unregulated (IUU) fishing causes $10-20 billion in annual losses,[41] underscoring the importance of tighter regulation and traceability systems in Africa's context.

> Simply reaching global average performance across the challenges described above could boost Africa's blue food supply by around 5 million tonnes – a 40% increase on current production.

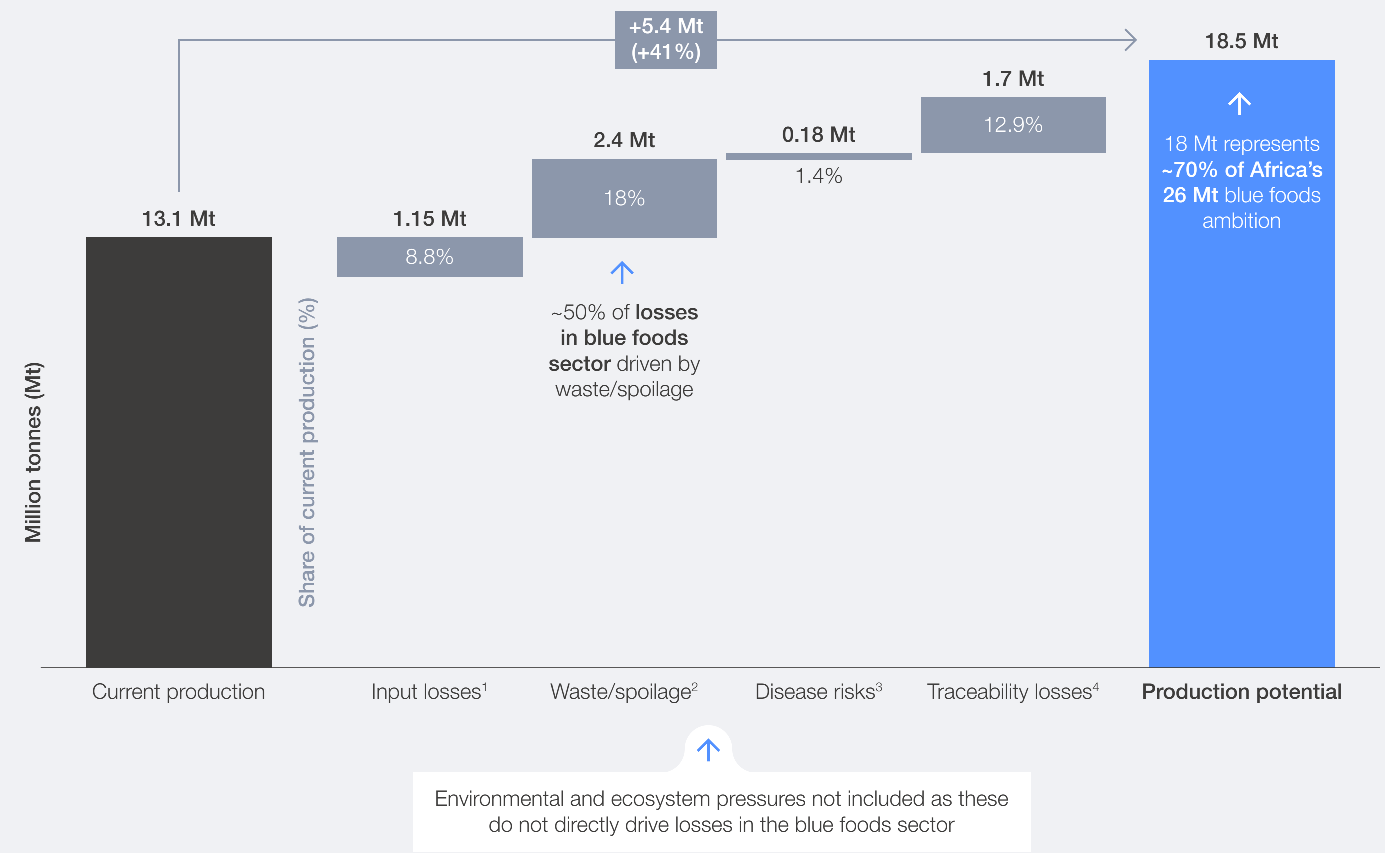
Environmental pressures

Africa's aquatic ecosystems face intensifying pressures from pollution and unsustainable practices. Inland, declining dissolved oxygen levels – driven by pollutants and nutrient runoff from land-based agriculture that cause algal blooms – have triggered mass fish deaths, such as in Lake Victoria. At sea, bottom trawling (a fishing method that drags heavy nets across the seabed) stirs up an estimated 22 billion tonnes of sediment annually,[42] degrading seabeds, destroying habitats and releasing stored carbon. Ghost gears (lost or abandoned fishing nets, lines or traps) make up around 10% of global marine debris and continue to capture and kill marine life unintentionally.[43] In addition, the continent's mangroves – about 20% of the global total[44] – remain under threat from conversion and pollution. These cumulative stresses increase costs for fisheries, aquaculture and coastal economies, making environmental management an urgent priority.

It is critical to address these loss drivers in Africa's blue foods sector. Simply reaching global average performance across the challenges described above could boost Africa's blue food supply by around 5 million tonnes – a 40% increase on current production. This would deliver ~70% of the ambition, highlighted in Chapter 1, to double Africa's blue food output.

FIGURE 4 **Africa's opportunity to boost blue foods production by reducing key losses (Mt)**

Addressing key losses within blue foods sector can increase blue foods production by ~40%



Notes: 1. Input losses put 2.5 Mt of aquaculture production at risk. **2.** ~33% of total aqua production in Africa lost due to lack of cold chain and critical infrastructure vs. 15% for global average lost. **3.** 9% of produce lost due to diseases vs ~1.5% for global average. 4.~36% lost annually in Africa due to illegal and unreported fishing vs 20% globally. For detailed calculations and methodology, see Appendix A4

Source: See endnote.[45]

2.2 Blue food challenges compounded by a limited enabling environment

Improvements in access to capital, infrastructure and training will be needed to accelerate the industry's productivity and competitiveness.

The blue food sector's growth depends on supporting systems such as finance, infrastructure, value chains and skills, particularly in environmental management. While these systems are evolving in Africa, improvements in access to capital, infrastructure and training will be needed to accelerate the industry's productivity and competitiveness.

Capital and infrastructure gaps

About 85%[46] of Africa's blue food sector consists of smallholders with limited access to affordable finance. High upfront costs and poor rural infrastructure – especially unreliable electricity and water – restrict modernization and trap farmers in low-input, low-output cycles.

Fragmented ecosystems and value chains

The actors in Africa's blue food systems – fishers, farmers, processors, input suppliers and traders – are geographically dispersed with limited connections. Fragmented regulatory processes increase costs, reduce efficiency and block access to premium markets.

Skills and capacity constraints

Limited technical capacity is a major bottleneck. Many producers lack access to the training and extension services needed to manage feed, water quality and disease. Post-harvest actors face similar challenges in handling and processing. Without sustained capacity building, productivity and quality remain low.

3 Risks of unmanaged growth and the imperative for safeguards

Unmanaged growth in blue foods carries real risks that could undermine long-term gains.

3.1 As Africa scales up blue foods, safeguards are needed

The expansion of Africa's blue foods industry brings risks that need careful management, including:

- Biodiversity loss from overfishing
- Ecological disruption from poorly managed aquaculture
- Social displacement and loss of consumer trust

Biodiversity loss from overfishing

Unregulated capture fishing (wild harvest from oceans, lakes and rivers) can deplete already stressed stocks. Many of Africa's coastal ecosystems face rising pressure from industrial fleets and limited monitoring. Strong safeguards across the continent are needed to ensure that vulnerable stocks and livelihoods can sustain expanding harvests.

Ecological disruption from poorly managed aquaculture

Aquaculture can ease pressure on wild fisheries but, if mismanaged, can create ecological disruptions. Past experiences, such as the introduction of non-native species in Lake Victoria, underline the importance of science-based risk assessment. Unsustainable siting, feed practices and waste disposal also degrade water quality, harm wetlands and mangroves, and heighten disease risks.

These effects have social consequences too: women and children may spend more time securing clean water, increasing exposure to disease and reducing productivity.

Social displacement and loss of consumer trust

Rapid, unplanned expansion can displace small-scale fishers, restricting access to traditional fishing zones and markets. This deepens poverty and inequality, particularly for women and youth involved in processing and trade. At the same time, many consumers perceive farmed fish as inferior to wild-caught – raising doubts over taste, safety and cultural acceptability. Without greater transparency, certification and consistent product quality, these perceptions could slow adoption and weaken trust in aquaculture as a sustainable food.

Environmental safeguards

Protect and regenerate critical ecosystems

The expansion and development of aquaculture and fisheries need to safeguard biodiversity, actively regenerate fish stock and marine ecosystems, and strengthen climate resilience. For example, seaweed farming can sequester carbon, when well managed. Rather than avoiding sensitive habitats such as mangroves and coral reefs, investments can help regenerate and protect them – as long as any development recognizes these ecosystems as living infrastructure that sustains coastal fisheries and provides key ecosystem services. Africa holds about 20%[47] of the world's mangroves, making their protection and restoration a continental priority.

Prevent ecological disruption

It is essential that the introduction of non-native species is well regulated through science-based risk assessments. Without such controls, aquaculture can cause severe ecological imbalance. For example, the introduction of the non-native Nile perch to Lake Victoria drove many native species to extinction. Likewise, destructive capture methods such as bottom trawling can devastate seabed habitats and release vast amounts of stored carbon. Strong governance, biosecurity and regionally harmonized policies are essential to prevent similar outcomes.

> Africa holds about 20% of the world's mangroves, making their protection and restoration a continental priority.

> **Africa has an extraordinary opportunity to harness the rich diversity and nutrition of blue foods, but realizing this promise demands new knowledge, innovative solutions and concerted action from governments, investors and communities alike.**
>
> Jim Leape, Co-Director, Stanford Center for Ocean Solutions; William and Eva Price Senior Fellow at the Woods Institute for the Environment

Balance with cultural preferences

Where wild-caught fish remain central to diets and tradition, aquaculture can complement rather than replace sustainable capture fisheries. Respecting these preferences builds consumer trust and supports cultural acceptance while reinforcing food security and stability in coastal livelihoods.

Social safeguards

Strengthen capture fisheries governance

Wild fisheries remain central to Africa's blue food supply. Sustainable scaling-up requires science-based management – including quotas, closed seasons and bans on destructive gear – along with proper disposal or recycling of old fishing gear. Tackling illegal, unreported and unregulated (IUU) fishing by domestic and foreign fleets is equally vital, as IUU undermines sustainability and livelihoods.

Effective governance safeguards biodiversity, secures incomes for small-scale fishers and ensures equitable access to fishing grounds and catch allocation. By prioritizing small producers who serve domestic markets, export growth can be balanced with goals for local nutrition.

Design innovation for inclusion

True transformation depends on innovation built with small-scale producers, not just for them. These fishers and farmers form the majority of Africa's blue food workforce. Embedding their perspectives in programme design ensures that new technologies and policies reflect their realities, strengthen adoption and translate economic growth into tangible community benefits.

Advance gender equity and include people with disabilities

Women are key players in post-harvest and processing but remain underrepresented in leadership and decision-making. People with disabilities also face barriers to access and participation. Equitable scaling-up means ensuring women and people with disabilities gain equal access to finance, training and leadership roles across the value chain, empowering them as active decision-makers rather than passive participants.

Empower youth participation

Africa's young population presents a demographic advantage. Making blue food systems attractive to young people requires support for entrepreneurship, targeted training and digital integration. Engaging young people injects innovation, energy and continuity into the sector's future workforce.

Manage impacts on food production

As aquaculture expands, rising demand for feed – especially maize, soy and wheat – can compete with human food consumption and drive up prices. Poorly governed input growth could strain food systems, while effective oversight can stimulate local crop production, reduce waste and strengthen food security.

Strengthen cooperatives and community organizations

Fishers' and farmers' cooperatives are essential to inclusive growth. Stronger organizations enhance collective bargaining, access to finance and co-management of resources. Empowered cooperatives also act as social safety nets and platforms for community voices, making them vital pillars of equitable blue food systems.

4 Innovation can unlock blue foods' potential

Innovation in business models, technology and product development can unlock blue foods' potential – high-level, multistakeholder action is vital to drive scale.

4.1 Three categories of innovation play critical roles

Business and operating -model innovation

New enterprise models are lowering entry barriers and enabling scale where traditional approaches have struggled. Examples include: service platforms that combine farmer training with input delivery; shared infrastructure systems for cold storage or transport; and embedded digital payments that reduce transaction costs.

These models strengthen value chains, improve access to finance and link producers directly to markets. By integrating commercial efficiency with inclusion goals, they enable greater participation by women, youth, people with disabilities and migrants in emerging blue-food economies.

Technology innovation

Advances in digital and physical tools are improving precision and predictability across aquatic production. Remote-sensing supports stock assessment and site selection, while real time water quality monitoring and mobile diagnostics help detect and manage risks. Cold chain technologies reduce post-harvest losses and extend shelf life. Integrated digital platforms now connect input supply, farm management, finance, logistics and marketing, giving small producers tools to make better decisions and access higher value markets.

Technology innovation is enhancing efficiency, transparency and traceability across supply chains.

Product innovation

Blue foods are diversifying through new product development. Underused species and processed by-products are being turned into high value ingredients for nutraceuticals, feeds and specialty markets. Climate-smart feed alternatives such as insect- and algae-based proteins reduce reliance on fishmeal and soy while cutting environmental impact. Shelf-stable products like smoked or dried fish and ready-to-eat formats expand consumer reach and export opportunities.

These innovations make blue foods more affordable, accessible and culturally adaptable, while opening new roles for women, youth, people with disabilities and migrants across the value chain.

> **The blue food sector is pivotal for enhancing nutrition, strengthening economies and driving industrial growth towards a resilient future. The forthcoming Food Innovation Hub Ghana will foster new opportunities for collaboration and innovation, creating an enabling environment to attract investment and unlock the full potential of our blue food ecosystem.**
>
> Emelia Arthur, Minister for Fisheries and Aquaculture, Ghana

FIGURE 5 Thriving global innovation can boost Africa's blue foods future (Part 1)

Blue foods value chain

Innovation topics

Inputs	Production	Processing
1. Alternative & sustainable inputs Developing novel protein sources that reduce dependence on wild fish stocks or land-intensive inputs. Including high-protein insect and microbial feed ingredients (e.g. BSFL,1 methane-fermented protein) and emerging blue protein production systems (e.g. lab-grown fish).	**1. Precision feeding & nutrient delivery** Systems and tools that optimize when, how much and how efficiently feed is delivered to reduce waste and improve FCR[4] (e.g. IoT acoustic feeders, AI-vision sensors).	**1. Manufacturing efficiency & automation technologies** Solutions that enhance speed and labour efficiency and manage species variability (e.g. water-jet cutters, robotic filleting, auto-packing arms, modular tray systems).
2. Improved seed & genetic material Enhancing fish performance through improved broodstock, selective breeding and genetically resilient strains (e.g. CRISPR[2]-modified salmon with resistance to ISA[3] virus).	**2. Water quality & environmental conditioning** Approaches to actively manage hatchery or grow-out water conditions, including microbial environments, oxygen and Ph (e.g. probiotics, aeration systems, water parameter stabilizers).	**2. Grading & quality consistency tools** Systems that ensure consistent, objective product grading and detect defects to reduce rejections and protect brand trust (e.g. AI-based visual inspection systems).
3 Seed security & access systems Ensuring reliable, year-round access to elite broodstock or fry (e.g. cryopreservation, gene banks or distributed hatchery models).	**3. Farm infrastructure & system design** Engineering, siting and design of production environment to improve control, scalability and ecological footprint (e.g. offshore cages, modular tanks).	**3. Energy-efficient cooking & preservation** Advanced curing, drying and cooking techniques that retain quality while reducing energy, water use and processing time (e.g. sous-vide, sensor-controlled kilns).
4. Improved health inputs Designing feeds, additives and input handling systems that improve disease resistance and minimize pathogen transmission (e.g. oral vaccines, probiotics, sterilized input systems).	**4. On-farm monitoring & biomass control** Tools and systems to track fish growth, size and harvest timing — enabling better feed planning, reduced stress and higher yield accuracy (e.g. machine vision grading, real-time biomass estimation).	
	5. Labour-saving & automation technologies Solutions that reduce manual labour in feeding, grading and handling — improving productivity and reducing injury/stress to fish (e.g. automated graders, robot packing arms).	

Innovation archetype: Technology Business model Product

Notes: 1. BSFL = black soldier fly larvae. **2.** CRISPR = clustered regularly interspaced short palindromic repeats. **3.** ISA = infectious salmon anaemia **4.** FCR = food conversion ratio. **5.** Some innovation topics cut across multiple archetypes.

Source: BCG analysis.

FIGURE 6 | **Thriving global innovation can boost Africa's blue foods future (Part 2)**

Blue foods value chain

Innovation topics

Supply chain	Circularity/Waste
1. End-to-end traceability & compliance platforms Digital and physical systems that verify product origin, legality and handling integrity — addressing IUU, fraud and market access barriers (e.g. blockchain traceability, QR-backed certification, satellite scoring).	**1. By-product & co-product valorization** Turning fish trimmings, skins, shells and offcuts into high-value outputs, such as protein, collagen, oil or biomaterials (e.g. insect bioconversion, collagen recovery, chitosan from shells).
2. Cold chain optimization & resilience Solutions that extend shelf life and prevent spoilage through improved preservation methods, smarter monitoring and adaptive temperature control (e.g. supercooling, HPP,[1] IoT reefer tracking, smart oxygen pallets).	**2. Circular packaging & low-waste alternatives** Replacing fossil-derived or single-use materials with compostable, reusable or bio-based options that reduce pollution and lifecycle emissions (e.g. seaweed-lined takeaway boxes, reusable crates).
3. Logistics coordination & embedded services Digital and service-layer innovations that streamline B2B delivery, optimize routes and embed financial/logistics tools into cold chain movement (e.g. control tower platforms, bundled freight & credit models).	**3. Circular feed & nutrient recycling systems** Developing closed-loop systems that convert waste streams, such as nutrient-rich effluent, into productive inputs like feed, reducing losses and external input reliance (e.g. on-farm insect farming, IMTA,[2] algal bioreactors).
4. Micro-distribution & aggregation infrastructure Affordable storage, grading and aggregation hubs that extend cold chain and market access to smallholder producers in remote regions (e.g. solar micro-cold rooms, mobile QA stations, rural aggregation points).	**4. Gear recovery & marine plastics circularity** Preventing and recovering ghost gear while repurposing waste plastics into usable materials (e.g. biodegradable nets, smart gear tags, ghost net-to-textile loops).

Innovation archetype: Technology · Business model · Product

Notes: **1.** HPP = high-pressure processing. **2.** IMTA = integrated multitrophic aquaculture.
Source: BCG analysis.

4.2 Innovators are already rethinking key challenges – with potential applications for Africa

While Africa's blue food systems face persistent barriers – including costly inputs, limited infrastructure and fragmented markets – there is a growing body of practical solutions proving that these challenges can be overcome. Around the world, innovators are rethinking how fish are bred and fed, how farms are managed, how products are processed and preserved, and how waste is turned into value. These approaches are not just abstract technologies: some are already demonstrating tangible gains in productivity, resilience and inclusivity, with strong potential for adaptation in African contexts.

In Africa, feed accounts for up to 70% of aquaculture costs.

Innovation in inputs

Overcoming inefficiencies in seed, feed and health systems

At the input stage, producers face high costs, low yields and inefficient systems caused by outdated feed formulations, poor seed quality and limited health management. In Africa, feed accounts for up to 70%[48] of aquaculture costs, while – as described above – low-quality fingerlings and long grow-out cycles reduce efficiency. Disease outbreaks from unregulated seed and poor handling can devastate entire harvests. Emerging solutions are tackling these issues through better genetics, improved feed and stronger biosecurity (see Case study 1).

CASE STUDY 1

Product innovation for inputs

1. **Methane-fermented protein feed by Calysta (China)[49]**
Global aquaculture depends heavily on fishmeal and soy, both environmentally intensive. Calysta's FeedKind uses methane fermentation to produce single-cell protein without land or freshwater. Current production, which totals 20,000 tonnes per year, uses 77-98% less water and virtually no land compared with traditional proteins.

2. **Black soldier fly larvae and circular bio-inputs by Agrimercarb (Ghana)[50,51]**
Ghana's aquaculture industry faces high feed costs and dependence on imported fishmeal, while vast quantities of organic waste remain underutilized. Agrimercarb converts local organic waste into high-quality animal and aquafeed in a process using black soldier fly larvae (BSFL),[52] while producing biochar,[53] organic fertilizer and ecofuel briquettes[54] from by-products.

Through its "Yibiboa I" project, the company engages rural women in waste collection and decentralized BSF rearing, integrating frass (insect compost) into crop systems to close nutrient loops. This model reduces feed cost pressures, creates new circular revenue streams and empowers communities – demonstrating how insect-based feed innovation can deliver both environmental and socioeconomic impacts in Ghana.

Low feed conversion, poor water quality and labour-intensive methods remain key bottlenecks, especially in smallholder systems.

Innovation in production

Improving productivity and sustainability through better feeding, water quality and on-farm infrastructure

Production is where efficiency gains in blue foods are won or lost. Farms globally face pressure to reduce waste, improve survival rates and operate sustainably while managing high input costs. Low feed conversion, poor water quality and labour-intensive methods remain key bottlenecks, especially in smallholder systems. Production innovations are addressing these challenges through precision feeding, real-time monitoring and scalable infrastructure that lower costs, reduce losses and boost yields. These technologies, tested from Norway to Indonesia, can be adapted to Africa's aquaculture realities (see Case study 2).

CASE STUDY 2

Technology innovation for production

1 **AI-powered fish monitoring by Dominion Solutions (South Africa)**[55,56]
Disease and environmental stress often cause sudden losses in aquaculture. Smallholder and mid-scale farmers struggle to detect early warning signs, such as abnormal fish behaviour or water quality deterioration. Dominion Solutions has created AquaBrain Net, an AI-powered system using IoT sensors and cameras to monitor fish movement, gill activity and water conditions in real time. The system analyses data to detect stress or disease indicators and alerts farmers via a mobile dashboard for quick response.

In pilot trials across South Africa, AquaBrain Net reduced feed waste and mortality, helping farmers adjust aeration, isolate affected fish and stabilize water conditions. It is particularly effective for small-scale farms with limited diagnostic support.

2 **Improved tilapia hatchery systems by WorldFish (Egypt and Bangladesh)**[57]
Hatcheries in low- and middle-income countries often produce variable-quality seed due to limited broodstock selection and inconsistent rearing practices. WorldFish partnered with national hatchery networks to standardize breeding, fertilization and fry-rearing protocols. The programme provided training, standard operating procedures and performance monitoring systems.

As a result, fingerling survival rates rose by 30-50% and growth variability declined. In Bangladesh, farmers using certified fingerlings achieved up to 40% higher yields than those relying on uncertified hatcheries.

Processing is vital for preserving the economic and nutritional value of blue foods.

Innovation in processing

Boosting yield and product quality through smarter transformation methods

Processing is vital for preserving the economic and nutritional value of blue foods, yet inefficiencies continue to cause major losses globally. In some industrial settings, up to 40% of biomass is lost during trimming, while inconsistent quality control and short shelf lives limit profitability and market confidence. In Africa and other emerging regions, processing capacity is often limited or labour-intensive, further increasing loss and reducing access to premium markets.

Innovations are helping improve yield, consistency and product quality through automation, precision tools and low-impact transformation techniques that reduce waste and increase value (see Case study 3).

CASE STUDY 3

Technology innovation for processing

1 **AI-based fish grading by Maritech (Norway)**[58]
Manual grading errors cause rejections, delays and consumer distrust, particularly where export quality standards are strict. Maritech's automated grading system uses AI-driven cameras and sensors to evaluate fish by weight, fat content, colour and texture, while integrated traceability modules allow issue tracking along supply chains. The system increases grading accuracy, consistency and compliance with market standards while reducing labour costs and unlocking premium prices.

2 **Smart solar dryers by NutriFish project (Uganda)**[59,60]
Traditional sun drying, common in Africa, causes nutrient loss, contamination and spoilage, reducing product safety and market potential. The NutriFish project introduced low-cost, solar-powered dryers with controlled airflow and temperature management for small-scale processors, often located near landing sites to minimize post-harvest loss. The innovation improved food safety and shelf life, reduced contamination and enabled production of high-quality dried fish suitable for formal markets, increasing incomes, especially among women-led processors.

Up to 35% of aquatic food value is lost globally before reaching consumers.

Innovation in supply chains

Tackling fragmentation, spoilage and traceability gaps to improve efficiency and market access

Inefficient supply chains remain a bottleneck across blue food systems, particularly in Africa and other emerging markets. Fragmented logistics, unreliable transport and limited cold storage lead to major post-harvest losses, with up to 35% of aquatic food value lost globally before reaching consumers.

Small-scale producers also struggle with poor traceability, limited buyer connections and inadequate working capital. These challenges reduce profitability and restrict access to export and premium markets that demand verified sourcing.

Innovations in this space are reducing spoilage, improving traceability, expanding cold storage and building last-mile logistics suited to remote and smallholder contexts. Bundled digital tools, IoT tracking and decentralized infrastructure are helping increase efficiency, affordability and inclusion across the value chain (see Case study 4).

CASE STUDY 4

Technology and business model innovation for supply chains

1 **Solar-powered cold rooms by ColdHubs (Nigeria)**[61]
In many African regions, poor electricity supply and lack of cold storage cause high post-harvest spoilage. ColdHubs deploys solar-powered, walk-in cold rooms at landing sites and local markets, where users pay daily storage fees. This decentralized model provides affordable refrigeration without grid dependency.

ColdHubs has cut spoilage by more than 50%, improved food safety and increased incomes, particularly for women-led processors. It operates across Nigeria and is recognized as a scalable, climate-resilient storage solution for perishable blue foods.

2 **Control tower logistics platform by FishLog (Indonesia)**[62]
Disjointed logistics and poor coordination across fragmented value chains lead to high transport costs and delivery delays for small and medium enterprises. FishLog's control tower platform integrates transport management, inventory visibility and logistics data into one digital system. It also offers embedded finance tools, including working capital, insurance and contract tracking, to help smaller operators participate more effectively. The platform improves delivery reliability, reduces waste and increases inclusion by connecting producers and traders through transparent, finance-enabled logistics coordination.

Up to 50% of fish biomass is discarded and nutrient-rich effluents often go untreated, leading to pollution and lost value.

Innovation in circularity and waste

Closing loops and unlocking new value through smarter waste utilization, nutrient cycling and eco-friendly inputs

Fish processing and farming generate large volumes of waste. Up to 50% of fish biomass is discarded and nutrient-rich effluents often go untreated, leading to pollution and lost value. Packaging adds to the sector's plastic and carbon footprint through widespread use of polystyrene and single-use plastics, many of which are now restricted in export markets.

Innovation is increasingly focused on circular models that recover waste, recycle nutrients and replace harmful materials with regenerative alternatives. From fish trimmings upcycled into protein and collagen to closed-loop water and nutrient systems, these approaches help producers cut loss, reduce emissions and create new revenue streams.

In Africa, where waste management and infrastructure are limited, locally adapted solutions such as insect-based waste conversion and mobile nutrient reuse show strong potential (see Case study 5).

CASE STUDY 5

Product and technology innovation for circularity and waste

1. **Insect bioconversion of fish waste by Entobel (Vietnam)**[63]

Conventional processing discards heads, bones and offcuts that still hold 30-70% of nutritional value, while organic waste often pollutes local environments. Entobel uses black soldier fly larvae (BSFL) to convert fish trimmings and food waste into high-quality insect protein and oil, with residual frass used as fertilizer.

The process recovers 65-75% of organic biomass as usable inputs and significantly reduces environmental impacts. With simple rearing systems suitable for low-resource settings, this model offers scalable, circular waste solutions for Africa.

2. **Smart gear recovery and circular nets by Blue Ocean Gear (USA)**[64]

Lost or abandoned fishing gear makes up about 10% of global marine plastic pollution and continues to trap marine life for years. Blue Ocean Gear developed smart buoys with GPS tracking that alert fishers to lost gear for quick recovery. Retrieved nets are recycled into nylon or biodegradable alternatives, reducing ghost fishing (lost or abandoned fishing gear that continues to catch and kill marine animals unintentionally), marine pollution and equipment loss. With suitable adaptation, this technology could strengthen gear management for small-scale fleets in West Africa.

4.3 Global examples offer promise for Africa's blue food transformation

Food Innovation Hubs can catalyse Africa's blue food transformation – connecting governments, investors and entrepreneurs to global networks.

High-level, multi-stakeholder action is essential to drive scale

While proven innovations show measurable impact, large-scale transformation requires coordinated, multi-stakeholder collaboration that links policy, investment and industry. The World Economic Forum has been advancing such collaboration globally through the Food Innovation Hubs Global Initiative, a model further explored in the Forum's report *Mainstreaming Food Innovation: A Roadmap for Stakeholders*, developed in collaboration with BCG.

The Food Innovation Hubs are cooperation models that bring together public and private actors, civil society, innovators and other stakeholders to form unusual partnerships that can de-risk innovation and align financing, infrastructure and policy support. For Africa, the hubs represent a platform to catalyse blue food transformation – connecting governments, investors and entrepreneurs to global networks of knowledge, technology and capital while tailoring solutions to local needs. This model offers a ready framework for the kind of system-wide cooperation needed to unlock the continent's blue foods potential.

Global examples show how multi-stakeholder alignment can accelerate sector-wide change. Below are three case studies from China, Indonesia and New Zealand that illustrate the strategic impact of such collaboration.

CASE STUDY 6

China – collaboration elevates tilapia to a strategic sector [65,66,67]

Context	Tilapia were introduced to China in the 1950s and historically produced at small scale with little strategic importance. Reform began in the 1980s when the sector saw rapid growth.
Actions	– In the 2010s, central government integrated tilapia into food-security and export policy. – Research and development institutes (e.g. Chinese Academy of Fishery Sciences) partnered with hatcheries to introduce GIFT (genetically improved farmed tilapia) strains. – Local governments funded training, feed and infrastructure. – Private sector scaled up processing and exports.
Impacts	– Despite having led global tilapia production for a while, strategic priority boosted China's tilapia output to about 1.8 million tonnes in 2019 (~30% of global output that year),[68] one of the highest amounts ever produced by a country. – The sector shifted from small-scale to highly commercial operations.

CASE STUDY 7

Indonesia – multi-stakeholder investment and policy support accelerate aquaculture growth [69,70,71]

Context	In the early 2000s, Indonesia's aquaculture sector was predominantly small-scale and under-performed, using only ~7% of its potential area (the land and water suitable for ponds, coastal lagoons and marine farming sites). Productivity and export competitiveness were low despite vast coastal resources.
Actions	– Indonesia's government prioritized five "champion species" (shrimp, tilapia, catfish, seaweed, lobster) through a national aquaculture roadmap and invested in hatcheries, feed mills and farmer credit schemes. – Private firms drove annual investments of ~$170 million (as of 2023) with commercial farms, feed mills and processing plants. Investments financed new farm construction, processing facilities and technology adoption. – Concessional finance partners such as the Asian Development Bank (ADB), World Bank, United Nations and others partnered with government to provide patient capital. ADB invested ~$90 million in loans to support infrastructure development for shrimp aquaculture across seven provinces.
Impacts	– Aquaculture output grew 15x between 2000 and 2021, making Indonesia the world's second-largest producer. – Exports rose 300% and the sector now supports about 4 million jobs. – Expansion of sustainable shrimp and seaweed farming reduced pressure on wild fisheries and promoted coastal ecosystem recovery.

CASE STUDY 8

New Zealand – Moana Nui cluster drives inclusive blue economy growth[72]

Context	New Zealand sought to build an inclusive and regenerative blue economy while enhancing Māori participation.
Actions	– In 2022, the Moana Nui Blue Economy Cluster was launched in Nelson-Tasman as a public-private innovation platform. It expanded from nine to 28 partners in one year, including Māori enterprises, seafood firms and universities. – Local government supported the cluster through coordinated infrastructure and skills programmes. – The cluster focused on regenerative aquaculture, conservation technology and youth workforce development. – National inclusion policies embedded Māori leadership in aquaculture and fisheries management.
Impacts	– Around 400 marine-related businesses now collaborate through the cluster. – Māori control about 50% of the national fishing quota, while new ventures win regenerative aquaculture and by-products have emerged. – The initiative is helping build a skilled maritime workforce and strengthen community ownership.

Success depends on coordinating actions across five priority dimensions

At a global level, success in scaling-up blue foods has largely depended on coordinating actions across five priority dimensions. These offer lessons for how transformation can be achieved in Africa:

1. **Strategic policy commitment and prioritization**: Clear national strategies are essential to position blue foods as more than subsistence-level activities.

2. **Targeted capital to de-risk early investment**: Scaling-up requires upfront public and blended investment to lower the barriers to entry for producers and service providers.

3. **Regulatory clarity and streamlined implementation**: Rapid adoption is enabled by clear licencing rules, environmental safeguards and consistent standards that give confidence to investors and producers.

4. **Skills development and business readiness support**: Training programmes are essential not only to improve farm productivity, but also to prepare farmers and entrepreneurs to operate commercially.

5. **Structured platforms for incubation and ecosystem coordination**: Driving scale requires spaces to connect actors, incubate early-stage solutions and accelerate adoption.

Collaboration between government, business, development partners and communities is critical to deliver blue foods at scale

In addition to these lessons, delivering blue foods at scale in Africa will require collaboration across government, private sector, development partners and local communities – their distinct roles are outlined below. This collaboration needs to happen not within silos but around common objectives.

Global examples show that real progress in blue foods depends on shared objectives that align policy, investment, innovation and inclusion. Coordinated multi-stakeholder action turns fragmented initiatives into ecosystems capable of scale. Equally critical is funder coordination – from foundations and multilaterals to commercial financiers – to ensure that governments have the tools, capacity and finance needed for sustainable growth across policy, infrastructure, skills and markets.

1 Government: creating supportive policies that guide growth

– Governments can create the foundation for blue food development through clear regulation, supportive licencing and environmental safeguards that balance productivity with sustainability.

Delivering blue foods at scale in Africa will require collaboration across government, private sector, development partners and local communities.

- Public investment in cold chains, rural transport and infrastructure can reduce spoilage and expand markets

- Extension services and seed or feed distribution programmes can improve access to inputs and skills.

- Governments can build competitiveness through tax incentives, procurement schemes and market facilitation that strengthen local value chains.

- Training can be embedded into all public programmes, integrating aquaculture education within hatchery, feed or extension initiatives so that farmers receive hands-on guidance.

- Local research institutions and regional authorities can adapt these programmes to be gender-responsive and tailored to smallholder realities.

2 Private sector: driving investment and operational excellence

- The private sector brings efficiency and scale through logistics, cold chain and seaport operations that cut post-harvest losses and improve traceability.

- Large farms and anchor firms act as hubs for market access and innovation, attracting processors, service providers and financiers.

- Downstream players, including wholesalers, retailers and supermarkets, shape consumer demand for responsibly sourced products, promote transparency and reward regenerative, low-impact production.

- Financial institutions can design products aligned with aquaculture cycles, using patient capital, inventory-backed lending and risk-sharing tools to expand micro, small and medium enterprise participation. Given harvest periods of 9-12 months, repayment schedules can be structured for flexibility and aquaculture-specific assets (e.g. cages) can serve as collateral.

- Companies across the value chain can embed training within their services, using dealer networks, apprenticeships and field demonstrations to strengthen farm management and adoption of best practices.

3 Development partners and concessional funders: catalysing innovation and coordination

- Civil society and development partners can pilot new solutions, de-risk early investments and align funding across the ecosystem. By building capacity for women, youth, persons with disabilities and migrants they create proof points that private investors can scale up.

- Concessional funders – including foundations, multilaterals and bilaterals – can provide concessional or grant capital to strengthen policy frameworks, public capacity and shared infrastructure.

- Alignment between commercial investors, concessional finance and governments ensures that finance spans the entire development cycle, from early pilots to long-term expansion.

- Moving beyond isolated grants to partnerships that embed empowerment and training within viable business models will enable pilots to scale up sustainably.

4 Local communities: anchoring implementation and inclusion

- Fishing and aquaculture cooperatives form the backbone of Africa's blue food systems. They provide labour, sustain supply chains and bring vital local knowledge.

- Community cooperatives help enforce local regulations on gear use, seasonal bans and carrying capacity, working with authorities to protect ecosystems.

- Cooperatives are key channels for inclusion, enabling participation by women, youth, persons with disabilities, migrants and smallholders.

- By engaging directly with community cooperatives, governments and development partners can extend training, scale up innovation and build resilience in ways that are equitable and grounded in community ownership.

Conclusion

Africa's blue food sector holds immense potential to deliver better nutrition, create millions of jobs and strengthen climate resilience. Doubling blue foods production in Africa today could unlock an additional $17 billion in GDP and reduce Africa's protein gap by ~25% compared to the global average. Furthermore, a meaningful growth in blue foods has the potential to ease pressure on land-based agriculture.

However, realizing this opportunity requires more than individual projects or technologies. It demands coordinated, system-wide effort, which couples innovation across the entire value chain with a strong enabling environment that makes those innovations stick.

Two critical conditions are needed to unlock blue foods at scale in Africa

1. **Innovation in products, technology and business models**

   Africa can focus on applying innovation to specific bottlenecks across its full blue foods value chain:

   - **Inputs**: Lowering feed costs, improving seed quality and alternative feedstocks, and enhancing aquatic animal health systems to boost productivity and reduce vulnerability to disease.
   - **Production**: Expanding access to reliable water, power and farm infrastructure, while strengthening farm management and technical know-how, and promoting the use of low-impact fishing gear and practices to enhance sustainability in capture fisheries.
   - **Processing**: Increasing access to affordable, energy-efficient cold storage and local processing facilities to curb post-harvest losses and raise product quality.
   - **Supply chain**: Building better logistics, market linkages and transparent traceability systems to connect smallholders to stable buyers and premium markets.
   - **Circularity and waste**: Converting waste into usable products and improving environmental management to reduce pollution and create new income streams. Together, these innovations can transform fragmented production into a modern, efficient and sustainable blue foods economy that reflects Africa's realities and strengths.

2. **Robust enabling environment**

   Innovation can only thrive where the broader system supports it. Africa's blue food growth depends on coordinated policies, investment and partnerships that create stability and opportunity.

   - **Policy and prioritization**: Governments can integrate blue foods into national food security, climate and investment strategies, backed by clear regulatory frameworks.
   - **Finance and investment**: Affordable, patient capital and blended finance are critical to expand infrastructure, inputs and services for small-scale producers.
   - **Capacity and skills**: Scaled-up training and extension services will help producers and processors adopt and maintain new practices.
   - **Collaboration and coordination**: Platforms that connect public institutions, investors and communities can accelerate innovation, reduce duplication and ensure inclusion.

What needs to happen next

Africa's blue food transformation will depend on how effectively it is integrated into broader food, agriculture and rural development priorities. Countries can assess local blue food potential and embed it within national food system pathways developed through the UN Food Systems Summit and COP28 processes. This approach ensures that blue foods complement agriculture.

Scaling-up this transformation requires an ecosystem model that connects policy, innovation and investment. The World Economic Forum's Food Innovation Hubs provide a platform to help countries identify high-impact opportunities, mobilize finance and scale up innovation through the Food Innovators Network, a global community connecting partners and initiatives worldwide. Through its *source–shape–scale* framework, the Hubs can support sourcing innovation, shaping enabling environments and scaling-up market-based solutions – turning Africa into a marketplace for blue food innovation that bridges oceans, agriculture and food systems.

Above all, delivering blue foods at scale in Africa will require collaboration between multiple partners around common objectives:

– **Governments** can align blue food priorities with agricultural strategies, invest in infrastructure and create incentives for sustainable practices.

– **Private sector** players can invest in scalable models, expand market access and drive responsible production, supported by research and innovation.

– **Development partners and financiers** can de-risk investments, strengthen institutions and fill funding gaps.

– **Communities and cooperatives** are key to inclusion, ensuring women, youth, persons with disabilities and migrants benefit fully across the value chain.

By breaking silos and linking innovation, investment and implementation through regional hubs, Africa can turn blue foods into a catalyst for sustainable growth and shared prosperity.

Appendix: Methodologies

APPENDIX A1 Calculating impact of increased blue foods production on Africa's protein gap (Figure 2)

No.	Metrics	Value	Data source
1	Average daily per capita protein consumption for Africa (2022)	~65g/day	Daily per capita protein supply, 1961 to 2022
2	Average daily per capita protein consumption for World (2022)	~91g/day	Daily per capita protein supply, 1961 to 2022
3	Africa population (2022)	~1.4 bn people	World Bank Population Data
4	Number of days in a year	365 days	N/A
5	Total annual protein consumption in Africa	~33.9 m tonnes	1 x 3 x 4
6	Required annual protein consumption in Africa to attain parity with global average per capita consumption	~47.5 m tonnes	(2 ÷ 1) x 5
7	Shortfall in annual protein consumption in Africa	~13.6 m tonnes	6 – 5
8	Current blue foods production in Africa (2022)	~13.1 m tonnes	Food and Agriculture Organization of the United Nations
9	Blue foods production at 2x current capacity	~26.2 m tonnes	8 x2
10	Protein percentage in unit mass of blue foods produced	25%	Food structure (using tilapia nutrient profile, as it is most widely consumed in Africa)
11	**Reduction in protein consumption gap at 2x blue foods capacity**	**24%**	((9 – 8) x 10) ÷ 7

APPENDIX A2 | Calculating estimated increase in GDP (Figure 3)

No.	Metrics	Value	Data source
1	Current blue foods production in Africa (2022)	~13.1 m tonnes	Food and Agriculture Organization of the United Nations
2	FAO's projected blue foods production in Africa (2032)	~14.2 m tonnes	The State of World Fisheries and Aquaculture 2024
3	Estimated CAGR for blue foods production over 10-year period (2022–2032), based on FAO projection	~1%	N/A
4	Blue foods contribution to GDP (2022)	$24 bn	World Bank (dated estimate but most widely used across multiple recent reports)
5	Projected blue foods contribution to GDP (2032)	$26 bn	Based on same 1% CAGR; assumes increase in GDP from blue foods will match increase in production
6	Projected blue foods contribution to GDP (2050)	$31 bn	Based on same 1% CAGR; assumes increase in GDP from blue foods will match increase in production
7	**"Ambition"** (production **doubled** to reduce protein gap by ~25%): Blue foods' contribution to GDP by 2050	$48 bn	4 x2 Assumes potential for 2x increase in GDP from 2022-50 to match 2x increase in production
8	**Increment in ambitious scenario vs. current projections for GDP growth**	**$17 bn**	**7 – 6**

APPENDIX A3 | Calculating estimated increase in number of jobs (Figure 3)

No.	Metrics	Value	Data source
9	Current number of jobs in blue foods sector	12.3 m	World Bank (dated estimate but most widely used across multiple recent reports)
10	GDP to jobs multiplier for agriculture sector in Africa	0.19 m jobs per $ billion increase in GDP	Assumption based on range of increments in agriculture GDP in Africa versus increments in jobs from 2019-23
11	Estimated increase in GDP by 2050 based on current FAO CAGR on production	$7 bn	6 – 4 see Appendix A2 figure
12	Estimated number of jobs by 2050 based on current FAO CAGR on production	13.6 m jobs	(10 x 11) + 9
13	**"Ambition"**: Estimated number of jobs in blue foods sector by 2050 if production is doubled to reduce protein gap by ~25%	16.9 m jobs	((7 – 4) x 10) + 9 see Appendix A2 figure
14	**Increment in ambitious scenario vs. current projections for number of jobs in blue foods sector**	**$3.3 m jobs**	**13 – 12**

Calculating blue foods production potential (Figure 4)

No.	Metrics	Value	Data source
1	Current blue foods production in Africa (2022)	~13.1 m tonnes	Food and Agriculture Organization of the United Nations
2	Current aquaculture production in Africa (2022)	~2.5 m tonnes	FAO Fisheries & Aquaculture - Statistical Query Panel: input losses apply only to aquaculture, not fisheries
3	Africa average FCR (tilapia used as reference – most widely consumed in Africa)	2.5	Responsible Seafood Advocate; On-farm feed management practices for Nile tilapia in Egypt
4	Global average FCR (tilapia used as reference – most widely consumed in Africa)	1.35	Responsible Seafood Advocate; On-farm feed management practices for Nile tilapia in Egypt
5	Loss in percentage terms (Africa vs. global)	46%	4 ÷ 3
6	**Potential increase in blue foods output if input losses match global average**	**1.15 m tonnes**	5 x 2
7	**Potential increase in blue foods output if input losses match global average in percentage terms**	**8.8%**	6 ÷ 1
8	Amount lost to waste and spoilage in Africa (%)	33%	Aquaculture fish and fisheries volume
9	Amount lost to waste and spoilage globally (%)	15%	Investigating Global Aquatic Food Loss and Waste 2024, World Economic Forum
10	**Potential increase in blue foods output if waste and spoilage losses match global average (Mt)**	**~2.4 m tonnes**	((8 – 9) x 1)

Calculating blue foods production potential (Figure 4 continued)

No.	Metrics	Value	Data source
11	Amount of blue foods production in Africa vulnerable to disease risks	~2.5 m tonnes	2 Disease risks relevant for aquaculture where they can drive mortality during grow-out cycles
12	Estimated loss factor due to diseases in Africa	9.2%	*Aquaculture* journal: Recorded mortality rate in Egypt (Egypt accounts for ~70% of Africa aquaculture output)
13	Estimated losses due to disease risks in Africa	0.2 m tonnes	12 x 11
14	Estimated losses globally due to disease	2.0%	WorldFish: Diseases account for $6 bn vs. first sale value of ~$300 bn in aquaculture production (2022)
15	Loss in percentage terms (Africa vs. global)	7.2%	12 – 14
16	**Potential increase in blue foods output if losses from disease risks match global average (Mt)**	**0.18 m tonnes**	15 x 11
17	Amount of blue foods production in Africa vulnerable to losses due to traceability	10.6 m tonnes	1 – 2 Traceability affects capture fisheries due to illegal fishing; affects aquaculture as well from standardization & market access but not major loss driver of production tonnage
18	Estimated loss factor due to traceability in Africa	36%	WWF: Estimated based on loss figures across Kenya, Madagascar, Mozambique, South Africa, Tanzania
19	Estimated loss factor due to traceability globally	20%	The Pew Charitable Trusts
20	**Potential increase in blue foods output if traceability losses match global average (Mt)**	**1.7 m tonnes**	((18 – 19) x 17)

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Acknowledgements

The World Economic Forum and BCG would like to extend their gratitude to the following organizations for their valuable contributions to this report. The paper does not necessarily reflect the views of these organizations. Expert advice is purely consultative in nature and does not imply any association with the takeaways or conclusions presented within this paper.

African Union Development Agency (AUDA-NEPAD)

African Women Fish Processors and Traders Network (AWFISHNET)

Alliance for a Green Revolution in Africa (AGRA)

Aqua-Spark

Aquatic Blue Food Coalition

CLASP NGO

Conservation International

Environmental Defense Fund

Farmerline

FutureFish

Gates Foundation

Gatsby Africa

Hatch Blue

Inclusive Markets Impact Area

Innovafeed

IPB University

Journey Foods

Kivu Choice

NatureDots

Owl RE

Planet Tracker

Regal Springs

Rongbient Biotech

Samaking

Shanghai Ocean University

Stanford University

The Hunger Project

Thought For Food Foundation

Wageningen University and Research

Wanda Fish

World Resources Institute

WorldFish

Xiamen University

Production

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