HARNESSING MOROCCO'S COASTAL WEALTH:

A STRATEGIC REVIEW OF MARINE AQUACULTURE FOR JOB CREATION AND SUSTAINABLE GROWTH

SEPTEMBER 2025

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ACKNOWLEDGMENTS

The primary objective of this technical note is to analyze the current marine aquaculture sector in Morocco. It encompasses current marine aquaculture production by species and regions, existing policies and regulations, market dynamics and potentials, and environmental and social considerations. The aim is to provide recommendations to address performance constraints, overcome challenges, and promote sustainable development within this sector in Morocco.

This technical report was written by the World Bank team consisting of Najat El Moutchou (Aquaculture & Blue Economy Specialist), Martin Ochoa (Senior Environmental Specialist, SMAPE), and Nyaneba Nkrumah (Senior Natural Resources Management Specialist, SMAPE), based on a detailed marine aquaculture Sector Review report (available at Aquaculture Report_27012025_Finale.pdf), with inputs from Benoit Caillart (Senior Fisheries Specialist), Lorenzo Juarez (Senior Aquaculture Specialist), Pierre Failler (Senior Economist), and Antaya March (Blue Economy Specialist). Our thanks go to the two expert peer reviewers during the preparation of the Aquaculture Sector Review, Harrison Charo Karisa (Senior Fisheries Specialist, SENGL), and Christopher Ian Brett (Lead Agribusiness Specialist, SAGDR). We also express gratitude for technical inputs from Matthew Meredith (Lix/Cap) and guidance from Maria Sarraf (Practice Manager, Planet-MENA AP-Environment).

The completion of this Technical Note was made possible by the commitment and active participation of stakeholders. We are particularly grateful for the valuable contributions of Ms. Majida Maarouf (Director General of the National Agency for the Development of Aquaculture, ANDA), Mr. Mustafa Amzough (Head of Investement, Promotion and Studies Department, ANDA), and Mr. Amine Mansouri (Head of Study Service, ANDA).

Funding for this activity was provided by PROBLUE (https://www.worldbank.org/PROBLUE), a multi-donor trust fund administered by the World Bank that supports the sustainable and integrated development of marine and coastal resources in healthy oceans.

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ACRONYMS

AMI	Call for Expressions of Interest (Appel à Manifestation d'Intérêt)
ANDA	National Agency for the Development of Aquaculture
DDD	Department of Sustainable Development
MAD	Dirhams (Moroccan currency)
DPM	Department of Marine Fisheries
EIA	Environmental impact assessment
EMP	Environmental Monitoring Program
ESMP	Environmental and Social Management Framework Plan
EU	European Union
FAO	Food and Agriculture Organization
GAA BAP	Global Aquaculture Alliance Best Aquaculture Practices
IMTA	Integrated Multi-Trophic Aquaculture
INRH	National Institute of Fisheries Research
MEF	Ministry of Economy and Finance
MT	Metric Tons
ONSSA	National Office of Sanitary Safety of Food Products
R&D	Research and Development
RAS	Recirculating Aquaculture Systems
SEA	Strategic Environmental Assessment
SMEs	Small Medium Enterprises
UN	United Nations
WTO	World Trade Organization

Source: ANDA

EXECUTIVE SUMMARY

Morocco has significant potential to develop a thriving marine aquaculture sector by leveraging its extensive coastline, diverse marine ecosystems, and a growing market demand for sustainable seafood. While the sector remains in its preliminary stages, recent developments indicate strong momentum toward expansion. However, realizing the full economic, social, and environmental benefits of aquaculture requires targeted investments, strategic governance reforms, research and innovation, and enhanced private sector engagement.

This technical note provides a review of Morocco's marine[1] aquaculture sector, analyzing current production trends, regulatory frameworks, market dynamics, environmental and social considerations, and investment opportunities. It identifies key challenges and proposes strategic actions to unlock sustainable sector growth, ensuring alignment with Morocco's national blue economy strategy and international best practices.

Morocco's marine aquaculture sector is poised for expansion, with 3,644 metric tons produced in 2024, a fraction of the 300,000 metric tons[2] country's potential. The government has prioritized marine aquaculture as a key growth sector, with a a potential exceeding 300,000 metric tons (MT) of production and create 450,000 jobs across fisheries and aquaculture. The country benefits from pre-identified marine aquaculture zones, an evolving regulatory framework, and strategic trade agreements that position Morocco as a competitive player in the global seafood market. Current farming includes key marine species such as sea bream, sea bass, meagre, oysters, mussels, clams, seaweed, and shrimp, with emerging opportunities in seaweed farming and oysters and mussel production.

Despite this potential, the sector faces critical challenges, including limited private sector investment, fragmented regulatory processes, infrastructure gaps, and the need for a skilled workforce. Additionally, marine aquaculture development must balance environmental sustainability and social acceptance through responsible resource management and community engagement. The complexity of

1 Marine aquaculture involves the farming of aquatic species in saltwater environments, including coastal areas, offshore sites, and land-based sites. Marine aquaculture falls under the jurisdiction of the National Agency for the Development of Aquaculture (ANDA).

2 Potential is based on spatial zoning studies, technical assessments by ANDA, assumptions on species mix and farming system.

regulatory and institutional coordination remains a major barrier, as lengthy permitting processes and overlapping responsibilities slow investment and project implementation. The sector also struggles with financial limitations, such as insufficient tailored financial instruments which account for the one to two -year time frame it takes to raise a sale weight marine fish, high upfront costs, and a lack of risk-mitigation mechanisms.

Morocco also faces enabling infrastructure Constraints, particularly in hatcheries, feed mills (which are needed to scale aquafeed production), cold storage, and processing facilities, which limit production efficiency and scalability. Strengthening marine spatial planning, environmental impact assessments, monitoring seawater quality, and climate resilience strategies are essential for long-term sustainability. Sector competitiveness can improve with market and value chain integration, stronger seed and feed production, branding, and compliance with export market standards.

To accelerate the sustainable development of marine aquaculture, several strategic actions are required including strengthening governance and regulatory frameworks, streamlining licensing and permitting processes, enhancing coordination among regulatory agencies, and developing site selection guidelines for marine aquaculture. In addition, the sector would benefit from modernizing aquafeed regulations to harmonize with World Organization of Animal Health standards and aligning with Global Aquaculture Alliance Best Aquaculture Practices (GAA BAP) guidance to allow for a broader diversification of protein sources beyond fishmeal including rendered animal proteins, insect meal and seaweed-based proteins. Attracting private sector investment through innovative financing mechanisms such as an aquaculture investment fund, blue bonds, blended finance, and carbon credits would mobilize resources and provide financial incentives for new investments.

The development of sustainable value chains and improved market access will be key to ensuring Morocco's growth. Strengthening domestic seed and feed production, exploring alternative ingredients, improving branding, certification, and export compliance, and expanding international market linkages through strategic trade partnerships will increase Morocco's competitiveness in global seafood markets.

Research, capacity building, and technological innovation need to be prioritized to ensure long-term sustainability. Investing in training programs, scholarships, and knowledge exchanges will help develop a skilled workforce while supporting digital aquaculture technologies for farm management. In addition, environmental monitoring and biosecurity measures will enhance efficiency and resilience. Advancing research on climate-resilient species and sustainable farming practices will further improve the sector's adaptability.

Diversification of marine aquaculture production is another crucial pillar of Morocco's strategy. Scaling up seaweed farming and algae valorization will create opportunities for food, aquaculture feed, pharmaceutical, and bioenergy markets. Meanwhile, strengthening Integrated Multi-Trophic Aquaculture (IMTA) and sustainable shellfish farming will contribute to ecosystem-friendly production models. Robust environmental


Source: ANDA

monitoring and social impact assessments will be necessary to ensure sustainability while maintaining social acceptance.

Morocco has the potential to become a regional leader in sustainable marine aquaculture, contributing to food security, job creation, economic diversification, and marine ecosystem conservation. Achieving this vision will require initiative-taking policy reforms, investment in infrastructure, public-private partnerships, and scientific innovation. By implementing the strategic actions outlined in this technical note, Morocco can create an enabling environment for aquaculture growth, ensuring long-term sustainability, enhanced competitiveness, greater socio-economic benefits for coastal communities, and improved food security for the broader population.

© iStock / Lukas Hodon – Aerial view of the Strait of Gibraltar (Morocco)

I. INTRODUCTION

The Blue Economy is a transformative approach to sustainable development that balances economic growth, job creation, and environmental conservation by harnessing ocean resources responsibly. It serves as a key pillar in diversifying the economy, strengthening food security, and generating employment, particularly in coastal communities. Morocco is actively investing in its blue economy and has developed a national blue economy strategy that stresses the importance of traditional sectors (fishing, tourism, and port activity) and recognizes the need to develop new sectors with high growth potential like aquaculture, ecotourism, marine biotechnology, shipbuilding and renewable energies.

Morocco possesses substantial assets for marine aquaculture expansion, including a long coastline, pre-identified marine aquaculture zones, diverse marine environments, committed institutions, strong domestic market demand, and favorable trade agreements that grant access to nearby markets. In addition, Morocco has existing port infrastructure and product distribution networks promoted by the country's important fisheries industry. Morocco's geographic proximity to European and African markets, coupled with an array of free trade agreements, further enhances its potential as an aquaculture hub.

Morocco's marine aquaculture sector is experiencing some growth, incorporating new species, and expanding in high-potential regions. Yet, despite a notable increase in value over 10 years, marine aquaculture in Morocco is still operating far below its potential. According to the National Agency for the Development of Aquaculture (ANDA), the country's inherent marine aquaculture capacity could be as high as 300,000 MT per year. Other countries in the region far exceed Morocco's 2024 marine aquaculture production of about 3,644 MT.

With marine aquaculture at its core, Morocco is looking to tap into new economic opportunities while reducing reliance on traditional fisheries which are increasingly constrained by resource depletion and environmental challenges. This technical note highlights the strategic role of marine aquaculture in boosting job generation, economic growth, and sustainable seafood production in Morocco. It emphasizes marine aquaculture's potential to contribute significantly to job generation, economic growth, food security and self-sufficiency.

In summary, this technical note highlights the role of marine aquaculture in boosting sustainable food production in Morocco (Section 2). It captures the efforts of the National Agency for the Development of Aquaculture (ANDA),

to lay the foundation for a sustainable marine aquaculture industry through planning and pilot projects. This note explores the institutional and regulatory foundations needed to unlock the full potential of the marine aquaculture sector (Section 3), and it also assesses the market potential for marine aquaculture products and outlines how to enhance competitiveness in the sector (Section 4). Sections 5 and 6, respectively, focus on the mobilization of private sector resources and environmental and social sustainability. The conclusions of the note (Section 7) capture the critical challenges, opportunities, and key recommendations for Morocco to develop its marine aquaculture potential.

Source: ANDA

Source: ANDA

Source: ANDA

II. MARINE AQUACULTURE'S POTENTIAL ROLE IN BOOSTING SUSTAINABLE SEAFOOD PRODUCTION IN MOROCCO

Morocco is a leading global seafood producer and exporter, ranked as Africa's number one seafood exporter to the European Union, Asia, and Africa and ranked among the top twenty seafood-exporting countries worldwide. Between 2018 and 2023, Morocco's seafood exports demonstrated strong and sustained growth in both value and volume, reinforcing the sector's role as a strategic economic pillar. Export volumes increased from 723,000 tons of seafood (mostly canned sardines and anchovies, frozen fish, fishmeal and fish oil) in 2018 to 846,000 MT in 2023, while the export value rose from 22.5 billion MAD to nearly 30.9 billion MAD, reflecting an average annual growth rate of 17% by volume and 37% by value[3].

Morocco's domestic seafood consumption is rising, driven by a growing population and an increased awareness of the health benefits of seafood. By 2025, Morocco's domestic seafood market is expected to reach $1.07 billion, with a projected annual growth of 6.3% from 2025 to 2030[4]. This highlights the need to increase local seafood production, and aquaculture can play a key role in reducing imports and stabilizing domestic supply. The sector is also important in terms of job creation. According to the Department of Marine Fisheries (DPM), in 2023 there were about 261,000 direct jobs, including 131,600 in coastal fishing, and 60,000 in artisanal fishing. Indirect jobs are estimated at 650,000.

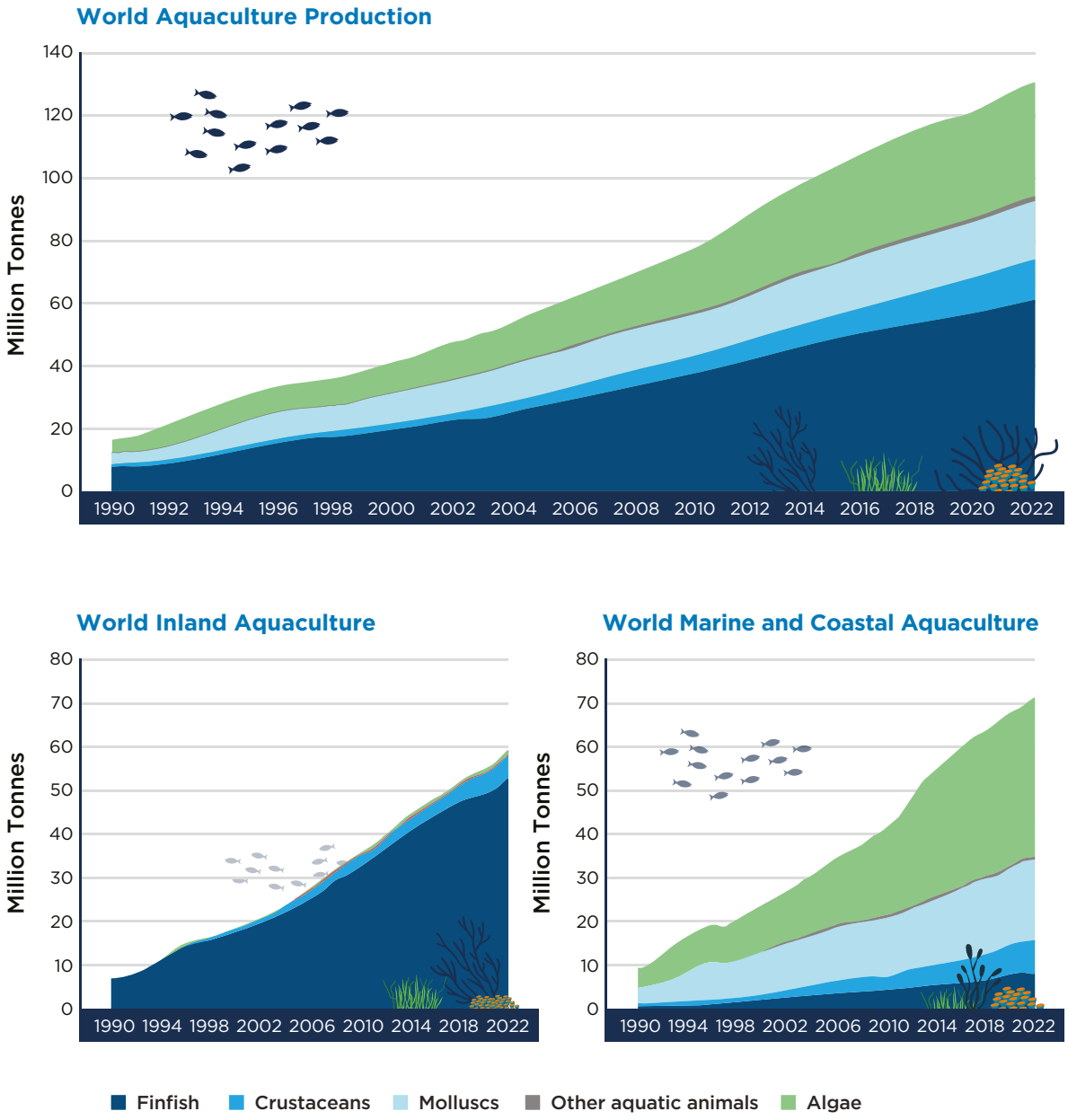
The global aquaculture sector is in its preliminary stages but growing, with new species being incorporated and expansion occurring in high-potential regions. In 2024, global aquaculture production reached a historic high of 130.9 million tons, valued at USD 312.8 billion, marking an increase of 8.1 million tons and USD 34.2 billion compared to 2020. This total included 94.4 million tons of aquatic animals (USD 295.7 billion), 36.5 million tons of algae (USD 17 billion), and 2,700 tons

3 Data source : DPM 2024 *"La Mer en Chiffres 2023"*.

4 Forecast based on Report Linker Research data, 2024.

of shells and pearls (USD 138.5 million)[5]. For the first time, farmed aquatic animal production (94.4 million tons) exceeded global capture fisheries output (91 million tons), surpassing historical capture levels recorded since 1950, except for 2018's peak of 96.5 million tons (FAO 2024) (see figure 1).

FIGURE 1: World Aquaculture Production, 1991–2022[6]



5 FAO. 2024. FishStat: Global production by production source 1950–2022.

6 SOURCE: FAO. 2024. FishStat: Global production by production source 1950–2022.

Global production of marine and coastal aquaculture reached 71.1 million tons in 2022, including 35.3 million tons of aquatic animals and 36.4 million tons of algae. Table 1 presents data on marine and coastal aquaculture production in 2022, disaggregated by region and by main species group. Cage culture in the sea contributes around 65 percent of the total world production of finfish farmed in marine and coastal aquaculture combined.

TABLE 1. **World marine and coastal aquaculture production by region and main species group, 2022**[7]

	Africa	Latin America and the Caribbean	Northern America	Asia	Europe	Oceania	World	Share of species group in total (%)
Total Marine and coastal aquaculture	**375,666**	**3,230,438**	**387,375**	**64,604,238**	**3,005,703**	**242,128**	**71,845,550**	
Marine and coastal aquaculture – all aquatic animals	**187,271**	**3,209,198**	**386,635**	**28,351,877**	**2,975,714**	**229,493**	**35,340,190**	**100**
Region Share (%)	**0.5**	**9.1**	**1.1**	**80.2**	**8.4**	**0.6**	**100**	
Finfish	169,787	1,088,564	134,942	4,702,468	2,365,259	112,742	8,573,763	24.3
Crustaceans	8,959	1,621,429	2,035	5,947	142,687	11,111	7,591,363	21.5
Mollusks	8,407	499,117	249,658	17,245,928	598,672	105,640	18,707,422	52.9
Other aquatic animals	118	88	0	456,339	11,096	0	467,642	1.3
Total aquaculture – algae[8]	**188,395**	**21,240**	**740**	**36,252,361**	**29,989**	**12,635**	**36,505,360**	**100**
Region Share (%)	**0.5**	**0.1**	**0.0**	**99.3**	**0.1**	**0.0**	**100**	
In land aquaculture – micro-algae	172	2,156	n/a[9]	100,130	295	n/a	102,753	0.3
Marine and coastal aquaculture – seaweeds	188,223	19,084	740	36,152,231	29,694	12,635	36,402,607	99.7

7 FAO. 2024. FishStat: Global production by production source 1950–2022.

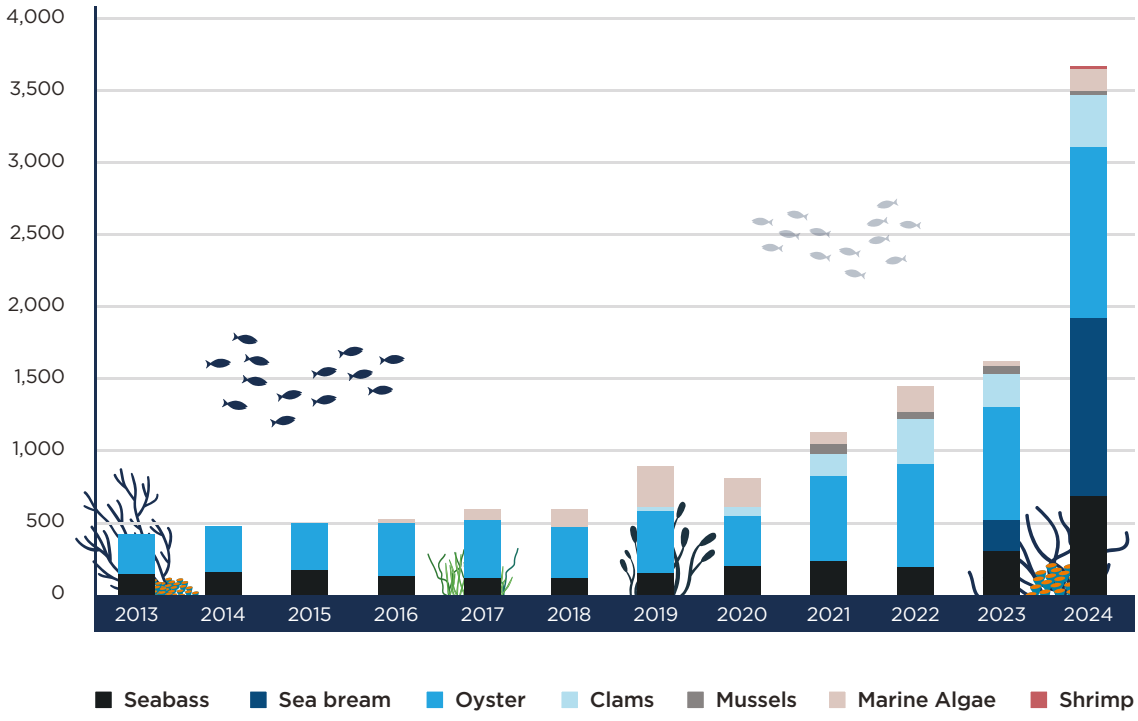
8 Data on algae expressed in wet weight.

9 No production or production data unavailable.

According to ANDA, **the country's inherent marine aquaculture capacity could be as high as 300,000 tons per year.** Morocco has significant assets for marine aquaculture expansion, including diverse pre-identified areas for marine aquaculture development, a skilled workforce, favorable trade agreements, significant internal demand, existing port infrastructure, and a suitable climate in the Mediterranean and Atlantic coasts that can support the farming of various marine species (e.g., sea bream, sea bass, meagre, oysters, clams, mussels, seaweed, and shrimp).

In 2024, annual marine aquaculture production reached 3,644 metrics tons, a small fraction of the country's potential. Between 2013 and 2018, Morocco's marine aquaculture production remained relatively stable, with only a modest increase of approximately 20%. However, from 2018 to 2021, production saw a more significant rise of around 100%, reflecting the introduction of new species and increased investments in the sector. The most notable surge occurred between 2021 and 2024, with production increasing by approximately 200%, driven by the expansion of high-value species such as seabass and seabreams, mussels, and marine algae **(see figure 2)**. Overall, between 2013 and 2024, Morocco's marine aquaculture sector experienced an impressive growth of nearly 620%.

FIGURE 2: Trends in Moroccan Marine Aquaculture Production (Metric Tons) 2013–2024[10]

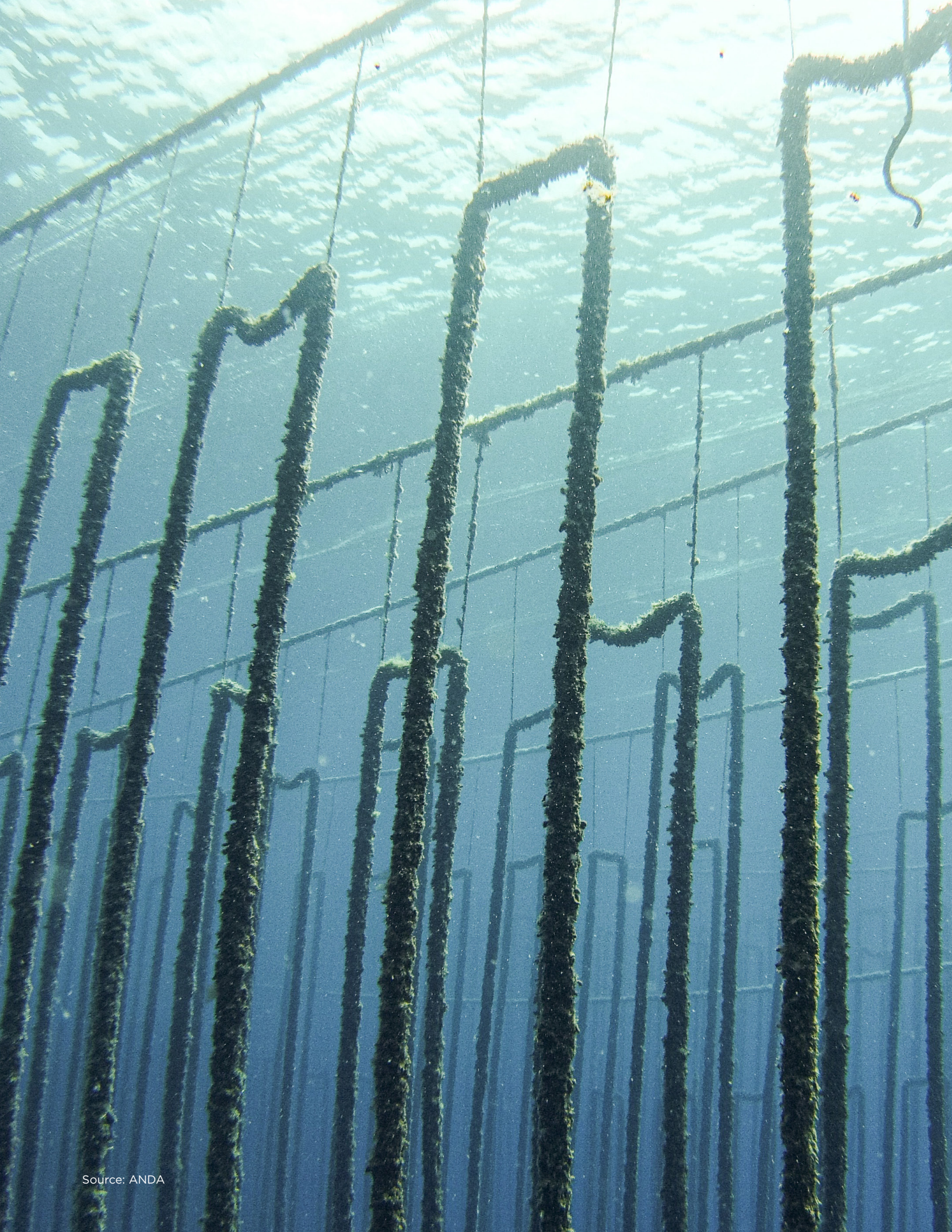


10 Source: Official data from ANDA 2024.

The government has identified marine aquaculture as a sector with high growth potential, with production potential of 300,000 tons. This is part of an effort to boost the national economy. The portfolio consists of more than 300 projects[11] with a target production capacity of 200,000 tons including 183 aquaculture farms currently in operation, aiming for an annual production of more than 70,000 tons (ANDA, 2025). These initiatives alone are expected to generate approximately 5,000 direct jobs and 10,000 indirect jobs, significantly enhancing employment opportunities in coastal regions (ANDA, 2025). The overall fisheries sector is expected to create 450,000 direct and indirect jobs.

Source: ANDA

11 Private investors.



Source: ANDA

III. STRENGTHENING MOROCCO'S MARINE AQUACULTURE GOVERNANCE: INSTITUTIONAL AND REGULATORY NEEDS TO BOOST GROWTH

Marine aquaculture is one of Morocco's Halieutis Strategy's key pillars. This ten-year strategy, launched in 2009, outlined the vision for sustainable marine aquaculture development from 2010 to 2020. The strategy lays out a vision for increasing sustainable marine aquaculture production. The government created ANDA in 2011 as part of the strategy recommendations. ANDA's mission is to lead the development of the marine aquaculture sector, implement regulations, policies, and plans for the sustainable development of marine aquaculture, and be responsive to the directives of the Ministry of Agriculture, Maritime Fisheries, Rural Development, and Water and Forests, its supervisory agency.

Today, the marine aquaculture sector operates within a structured institutional and regulatory framework that includes key national and regional entities responsible for governance, investment promotion, environmental management, and research. At the national level, agencies such as ANDA, Department of Marine Fisheries (DPM), National Institute of Fisheries Research (INRH), National Office of Sanitary Safety of Food Products (ONSSA), and the Ministry of Economy and Finance (MEF) play critical roles in licensing, policy enforcement, research, and financial oversight, while regional delegations of DPM, regional ANDA offices, investment centers, and local environmental authorities ensure policies are adapted to local contexts and facilitate private sector engagement. ANDA oversees licensing and regulatory compliance, working alongside DPM to integrate aquaculture into fisheries policies. Meanwhile, ONSSA enforces health and safety standards, ensuring that marine aquaculture products comply with domestic and international requirements. Environmental regulations, managed by the Department of Sustainable Development (DDD), mandate Environmental Impact Assessments (EIA) and marine spatial planning to minimize ecological risks.

Source: ANDA

The regulatory framework, while designed to ensure sustainability, food safety, and sectoral growth, presents some challenges. Access to land for marine aquaculture development is a major barrier. Investors struggle with lengthy, multi-step licensing procedures due to overlapping institutional mandates and a lack of a centralized approval system. Zoning and marine spatial planning frameworks remain fragmented, leading to conflicts between marine aquaculture, fisheries, tourism, and conservation efforts. In addition to complex administrative procedures, Morocco faces infrastructure limitations, financing gaps, and environmental risk management challenges that hinder the expansion of the sector. For example, in terms of infrastructure limitations, Morocco requires landing sites, hatcheries, feed mills, cold chain logistics, and processing facilities to scale up production.

To overcome these obstacles, policy enhancements should concentrate on simplifying regulatory procedures, boosting regional institutional capabilities, formulating specialized financial strategies like blue finance instruments, introducing digitalized licensing systems, and providing focused regulatory and technical support for SMEs. Even if these measures were perfectly implemented, access to locally produced and high quality aquafeed will quickly become a major barrier to implementation. Raising hundreds of thousands of tons of fish protein will require dramatic increases in aquafeed production and a modernized

feed regulation framework that allows for a broader range of protein sources as a feed ingredient to bring down the cost of production. Current aquaculture feed regulations do not have regulatory clarity for the inclusion of other sustainable sources of proven protein ingredients including rendered animal proteins and insect meal such as soldier fly. Investing in landing sites, hatcheries, cold chain logistics, and processing facilities will also be essential to improving the sector. Strengthening the capacity for research and development (R&D) to boost innovation, increasing collaboration between academia, INRH, ANDA, and the private sector will be important to advancing feed production innovations, introducing climate-resilient species, and implementing sustainable farming techniques in a safe marine environment. To accelerate the development of the sector, there is a need to increase public-private collaboration and reduce the heavy reliance on government support for marine aquaculture investments. With these reforms, the sector can flourish significantly, contributing to national food security, job creation, and export growth.

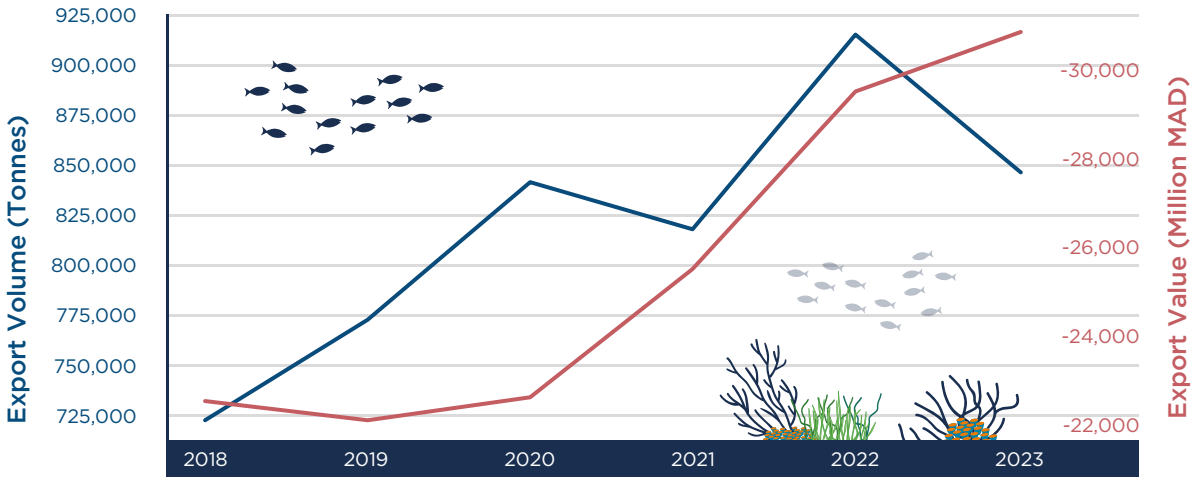
Source: ANDA

IV. ENHANCING COMPETITIVENESS IN AN EXPANDING SEAFOOD MARKET

Morocco's seafood sector plays a crucial role in addressing the international demand for seafood products. Figure 3 shows that between 2018 and 2023 export volumes of seafood increased from 723,000 tons in 2018 to 846,400 tons in 2023 while the export value rose from 22.5 billion MAD to nearly 30.9 billion MAD, reflecting an average annual growth rate of 17% by volume and 37% by value during the same period[12].

Morocco has solidified its position as the world's largest exporter of canned sardines and semi-preserved anchovies, and the leading exporter of octopus. Between 2018 and 2023, sardine sales grew 9% in volume while frozen sardines grew by 43% and fishmeal and oil by 36%. Canned sardines represent Morocco's main export item, followed by high-value frozen products and a growing share of crustaceans and shellfish. This product mix underscores Morocco's existing processing industry and its ability to move up the value chain while maintaining a focus on a few strategic species and markets (see Figure 4).

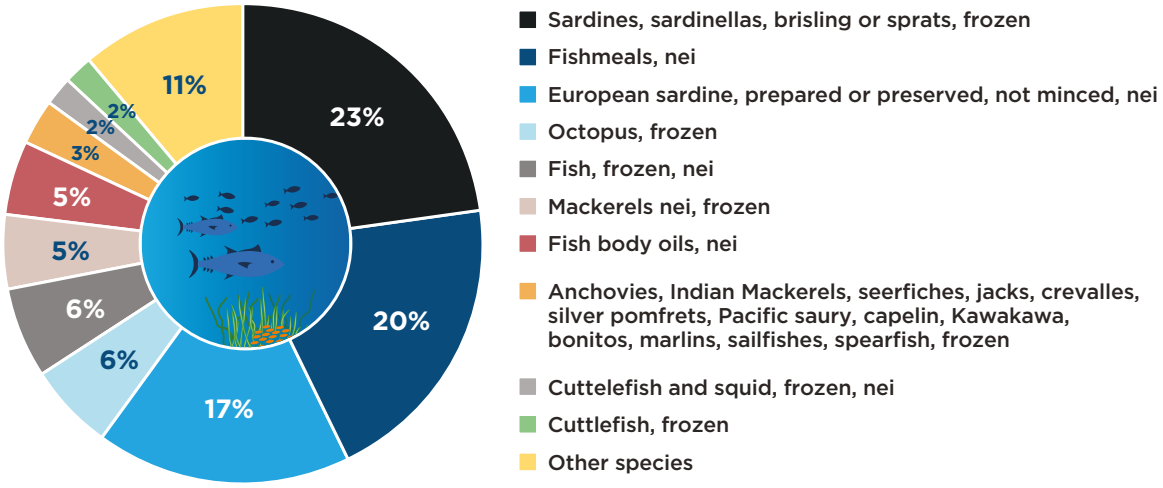
FIGURE 3: Morocco seafood export trends (2018–2023)



12 Data source : DPM 2024 *"La Mer en Chiffres 2023"*

Morocco exports seafood to 130 countries, with the EU consuming 58% of its exports, followed by Africa (15%), non-EU Europe (9%), the Americas (9%), and Asia (6.5%). This diverse market reach highlights Morocco's global competitiveness and strong presence in international fisheries markets.

FIGURE 4: Product composition in Morocco's export of aquatic products in 2022



Source: FAO 2024.

Morocco's seafood sector not only fuels international markets but also plays a vital role in meeting domestic food needs. Morocco's seafood supply in 2019 demonstrated a relatively balanced utilization between exports and domestic consumption. Total domestic production reached 1.46 million MT, of which 148,498 tons were allocated for non-food uses such as fishmeal and fish oil. The remaining food-grade supply was almost evenly split, with 745,179 tons exported and 679,589 tons consumed domestically. This challenges the common perception that Morocco's seafood sector is primarily export-oriented, revealing instead a dual focus on meeting both international market demands and national food security needs. Additionally, 1the country imported 113,346 tons of seafood, reflecting consumer demand for species not locally available or produced in sufficient quantities[13].

Domestic markets for seafood products are expanding. Morocco's domestic demand for fish and seafood has experienced substantial growth over the past two decades. Between 1999 and 2019, per capita consumption increased from 7.9 kg to 18.7 kg, reflecting an annual growth rate of 4.4%, which surpasses sub-regional, regional, and global averages. By 2019, Morocco had the second-highest per capita seafood consumption in North Africa following Egypt and ranked 14th highest for per capita consumption in the entire African continent[14].

13 Data source: FAO. 2023. Fishery and Aquaculture Statistics. Food balance sheets of fish and fishery products 1961–2019 (FishStatJ; www.fao.org/fishery/en/statistics/software/fishstatj).

14 FAO,2024.

Looking ahead, domestic market projections show that Morocco's population will grow from 38 million in 2025 to 41 million in 2035 and 43 million by 2050. To maintain the current per capita fish consumption rate of 18 kg/year[15], this demographic growth alone will require an additional 100,000 tons of fish by 2035 and 140,000 tons by 2050[16] **(Table 2)**. These estimates are based on stable consumption trends observed globally over the past decade. In Africa, average fish consumption has declined from 10 to 9 kg per capita per year, and in North Africa from 15 to 13.5 kg. Europe has experienced a marginal drop from 22.3 to 21.9 kg, while Asia has seen an increase from 20.7 to 24.6 kg. Globally, the average has risen slightly from 18.5 to 20.2 kg, primarily due to growth in Asia. Given that fishery catches in Morocco are expected to remain relatively stable, fluctuating around 650,000 tons annually, the additional demand generated by population growth will need to be met through increased aquaculture production or imports. Moreover, if fish consumption in Morocco were to rise 10% by 2035 and 20% by 2050, reaching 20 kg and 22 kg per capita respectively, the supply gap would widen significantly, requiring an estimated 170,000 tons more by 2035 and 300,000 tons more by 2050 **(Table 2)**.

TABLE 2. **Population and Projected Fish Demand (Constant vs. Growing Consumption)**[17]

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Population (million)	32	35	37	38	40	41	42	43	43
Constant Fish supply quantity (kg/capita/yr)	14.3	20.2	16.0	18.2	18.2	18.2	18.2	18.2	18.2
Increased Fish supply quantity (kg/capita/yr)	14.3	20.2	16.0	18.2	19.0	20.0	20.5	21.0	22.0
Domestic supply quantity* (000 t)	469	706	592	654	654	654	654	654	654
Domestic supply gap qty (000 t) (constant cons.)				700	728	751	769	782	792
Domestic supply gap qty (000 t) (growing cons.)				700	759	826	864	901	956
Need from Aquaculture (000 t) (constant cons.)				46	74	96	114	128	138
Need from Aquaculture (growing cons.)				46	105	172	210	247	302

*: 656 000 tons as 5 years average; constant from 2025 to 2050

15 Average from the last 5-year period 2018–2022. All figures are given in "live weight equivalent". This allows the definition of the fish supply available calculating as follow: the total quantity of fish and fishery products produced in a country added to the total quantity imported and adjusted to any change in stocks minus exports and minus non-food uses.

16 These figures are in line with FAO forecast for Moroccan Fish apparent consumption in 2030; see: https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://openknowledge.fao.org/server/api/core/bitstreams/b8099b25-3eba-496b-8e0e-b3dbfb951b05/content

17 FAO. 2024. FishStat: Global production by production source 1950–2022.

Considering variation of fish supply from the capture fisheries (around 650,000 t as mentioned above), supply from aquaculture should be between 50 000 t and 200 000 t from 2025 to 2050 with a constant consumption, and between 120 000 t to 350 000 t with an increase in fish consumption. The decrease of meat production due to the intensification of adverse climate conditions in the future will furthermore exacerbate the pressure on fish production to maintain the protein and nutritional supply quantity at about 6 g/capita/day[18] (at the current rate). This may further exacerbate the need for fish supply to provide enough animal proteins[19].

International demand for marine aquaculture products is also expanding. While capture fisheries contribute to meeting population-driven demand, marine aquaculture offers significant potential to complement the domestic supply market with species such as mussels and fish, and to support the development of niche markets, such as premium seafood products and value-added exports.

An analysis from the International Trade Centre[20] highlights significant export opportunities for Moroccan marine aquaculture, focusing on key products such as seaweed, mussels, oysters, fish and shellfish, shrimp, and agar-agar. For example, seaweed exports present a substantial untapped potential, with China, Italy, and Spain identified as high-potential markets. China alone could absorb an additional $1.5 million worth of Moroccan seaweed exports, while Italy and France also exhibit significant unrealized demand potential. Oyster exports hold strong potential in France, Hong Kong, China, and Spain, with France alone showing an unrealized potential of $1.1 million. Fish and shellfish exports to France, Italy, and Spain could also expand, with Spain presenting an opportunity for additional exports worth $377 million. Furthermore, agar-agar exports to France, Japan, and Spain indicate significant growth potential, with France alone having $3.2 million in unrealized export value[21]. There is a strong opportunity to export shrimp, particularly frozen, prepared, and live shrimp. The global market for farmed

18 2024 FAO food balance data; see: https://www.fao.org/faostat/en/#data/FBS

19 A study was launched by ANDA in 2022 to develop a better understanding of the local market of aquaculture products and their positioning. The objective of the study was to identify market opportunities for aquaculture products and assess their potential demand from consumers, seafood professionals, and other stakeholders in the aquaculture product marketing value chain (World Bank 2024). This study was conducted on a sample of 809 persons representative of the Moroccan population, using face-to-face interviews with a questionnaire. The study revealed that oysters are the most recognized aquaculture species among Moroccan consumers. Approximately half of the interviewees were familiar with mussels, with a significant proportion having consumed them. Despite high satisfaction with the quality of aquaculture products, there was a desire for reductions in price and for increased availability (World Bank 2024). Most consumers purchase fish and seafood primarily from markets and farmed products are commonly consumed at home. Moroccan consumers show a favorable inclination toward aquaculture products, especially oysters, mussels, sea bass, and sea bream. The study revealed that fresh finfish is the most demanded seafood product, with a preference for sizes ranging from 250g to 500g. Live shellfish was also in high demand and consumed in various forms. Packaging preferences were not strongly specified by consumers interviewed (World Bank 2024). In this study 150 retail fishmongers were interviewed in 18 cities across Morocco, and 13% expressed a preference for aquaculture products (World Bank 2024). The fishmongers selling aquaculture products viewed customer demand, control over distribution, and product quality as key advantages motivating them to offer such products (World Bank 2024). The fishmongers also believed that a decrease in market prices and effective communication could increase the number of buyers and sales of aquaculture products (Figure 4, World Bank 2024).

20 A joint agency of the World Trade Organization (WTO) and the United Nations (UN), Export Potential 2024 database.

21 Source: Based on ITC Export Potential Map 2024.

Source: ANDA

shrimp is overwhelmingly dominated by Asia and South America. The French market is saturated with low-priced Ecuadorian shrimp, however preserved shrimp exports to France could reach $36 million. Morocco currently produces wild-caught shrimp that is much better valued on the market, yet its exports stand at only $5,000 in this category, suggesting that this is a potential opportunity for an expansion in marine aquaculture.

These findings highlight Morocco's significant untapped marine aquaculture production potential, where strategic investments, increased production capacity, and stronger market positioning could drive substantial growth in domestic and international seafood trade. As capture fisheries stagnate and global seafood demand continues to rise, marine aquaculture emerges as the most viable solution to meet both domestic consumption needs and export market opportunities. To fully capitalize on this opportunity, strategic investments, infrastructure development, capacity building, and regulatory improvements are essential to enhance Morocco's competitiveness in both domestic and international markets, ensuring sustainable growth and long-term market positioning.

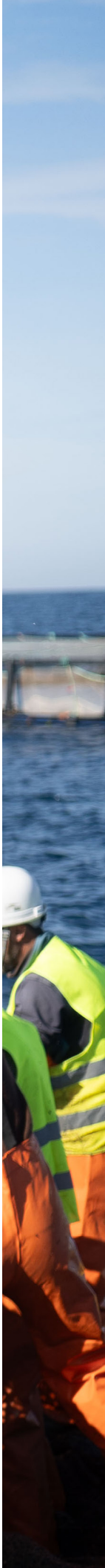
Although analyses of domestic demand and export opportunities provide a broad perspective on growth potential, they remain preliminary benchmarks based on natural resource availability. A comprehensive and systematic assessment is necessary to evaluate the suitability, accessibility, and sustainability of Morocco's marine aquaculture resources, ensuring sustainable long-term expansion and competitiveness in global markets.

Source: ANDA

V. THE INSTITUTIONAL FRAMEWORK FOR PRIVATE SECTOR MOBILIZATION IN MARINE AQUACULTURE DEVELOPMENT

Morocco has made considerable progress in fostering an investment-friendly environment for private sector participation in marine aquaculture. Key regulatory frameworks, such as the Investment Charter (Law Framework No. 03-22), provide incentives such as expedited administrative procedures and financial incentives to attract both national and foreign direct investment. Additionally, Morocco has implemented marine spatial planning, research programs, strategic environmental assessments, monitoring networks to track sea water quality, and regional development plans to streamline marine aquaculture site selection and mitigate environmental risks.

Despite these advancements, policy frameworks dedicated to aquaculture financing remain limited at both the national and international levels. Significant aquaculture development over the past decade has been facilitated through external finance support, upwards of almost 7 billion Moroccan Dirhams ($700 million). Sustainable long-term development requires greater private sector mobilization. Current financing efforts include international cooperation and loans, such as those from the World Bank and the Islamic Development Bank, which have been directed toward blue economy development, with a portion allocated to marine aquaculture. Public-private initiatives, including fourteen calls for expressions of interest, have also resulted in investments exceeding 6.8 billion Moroccan dirhams ($680 million). In terms of government expenditure, small marine aquaculture projects have also received dedicated funding, with 129 million Moroccan dirhams ($12.9 million) allocated by ANDA and the Department of Marine Fisheries to foster entrepreneurship. Additionally, the Intelaka Program[22] offers guaranteed loans backed by public financial institutions, supporting nearly 60,000 SME projects with a total investment of thirty-nine billion Moroccan dirhams ($3.9 billion).



22 The Intelaka Program is a financing initiative launched by the Moroccan government in February 2020, aimed at supporting entrepreneurship and small business development in Morocco.

Source: ANDA

To strengthen the confidence of investors, ANDA is developing regional marine aquaculture plans that provide a geo-spatial mapping of designated marine aquaculture zones validated by local authorities. These pre-approved sites reduce administrative burdens, lower site-selection costs, and accelerate project implementation, making marine aquaculture investment more attractive. In parallel, demonstration and training stations, developed by a collaboration between FAO, ANDA and INRH, aim to enhance technical skills and knowledge transfer within the sector.

Unlocking Morocco's marine aquaculture potential requires targeted financial support in four key areas: sector valorization, regulatory and monitoring frameworks, integration into the broader blue economy, and partnership development. Sector valorization requires efforts to diversify species, enhance efficiency of production methods, improve seed and feed production, advance genetic breeding programs, integrate digital technologies, and expand support services (e.g., veterinary care, disease control, monitoring of the quality of marine waters and research). Strengthening the regulatory and monitoring framework is also necessary to enhance sector growth, with a particular focus on data reporting, traceability, food safety certification, and adapting legislation for emerging technologies.

The integration of marine aquaculture into the broader blue economy is essential for ensuring economic, social, and environmental sustainability. Scaling up operations, implementing climate adaptation measures, adopting circular economy principles such as integrated multi-trophic aquaculture, strengthening linkages with other blue economy sectors (e.g., fisheries, tourism, naval industry, maritime transport, etc.) and ensuring policy coherence will be critical. At the same time, partnerships play a vital role in accelerating development. Academia and research institutions facilitate knowledge transfer and innovation, financial institutions provide tailored financing solutions, public institutions offer regulatory support, and the private sector drives production and value chain participation. Effective collaboration among these stakeholders is crucial to addressing sectoral challenges and unlocking financing opportunities.

While Morocco benefits from a growing base of general aquaculture knowledge, there remains a shortage of the specialized technical expertise required to scale up marine aquaculture operations. There is a critical need for trained professionals in hatchery management, aquatic animal health and pathology, feed formulation, water quality management, and climate-resilient farming systems. Addressing these gaps will require targeted training programs, professional certification tracks, and collaboration with international academic and research institutions to build a pipeline of specialized talent for the sector.

To support the growing financial needs for marine aquaculture growth, Morocco can leverage various financing mechanisms, including blue bonds and debt swaps for climate adaptation. Priority investment areas include hatchery and feed production for species like fish and shrimp, as well as infrastructure development. Blended finance can be used for integrating marine aquaculture into the broader blue economy and financing research and development efforts. Providing working capital financing for feed supply chains is of particular importance. Marine species need between one to two years to reach sale weight meaning that new aquaculture farms will have an exceptionally long "cash-out" period to bridge until they can begin to generate revenue and liquidity. Specialized tools supporting aquafeed access will be critical to catalyzing market growth. Public-private partnerships offer an opportunity to facilitate investment in shared aquaculture infrastructure and technology development, while fintech and blue tokens (digital credits) could enhance access to financial services and reduce transaction costs for small-scale operators. Risk mitigation instruments, such as dedicated marine aquaculture insurance schemes and performance-based financing models, will also play a role in ensuring long-term sector resilience. Detailed financing mechanisms are listed in Table 3.

TABLE 3. **Potential financing mechanisms suited to financing needs in the marine aquaculture sector based on industry needs.**

Category	Financing needs	Potential financing mechanisms
Valorization of the marine aquaculture sector	Diversification of production through the integration of new species	Blue bonds, Fiscal policy, risk mitigation products
	Increasing seed and feed production and facilities	Blue bonds, debt swaps
	Development of superior genetic varieties through breeding cooperatives and programs	Blended finance
	Increasing the provisioning of support services, such as veterinary services, financing institutions and instruments, disease control centers, monitoring seawater quality, biosecurity facilitators, demonstration centers, and research programs	Blended finance, debt swaps, blue bonds
	Development of accessible risk mitigation through financing products like insurance	Fiscal policy
	Digital technology development for marine aquaculture	Blue tokens and fintech.
Strengthening the regulatory and monitoring framework for marine aquaculture development	Supporting the monitoring and reporting of marine aquaculture data	Fiscal policy
	Integrating traceability, transparency, and food safety into the marine aquaculture sector	Debt swaps, blue bonds
	Certification and branding of marine aquaculture products	Blue bonds
	Developing legislation in anticipation of emerging technologies	Blended finance
Integrating marine aquaculture into the blue economy and climate change	Integrating climate change mitigation and adaptation into marine aquaculture development	Debt swaps, blue bonds, risk financing
	Putting blue and circular economy principles into practice (IMTA, and regenerative marine aquaculture)	Blue bonds, debt swaps
	Value chain integration and blue economy development	Blended finance, debt swaps
	Development of coherent policy, governance frameworks and development agendas	Fiscal policy

Category	Financing needs	Potential financing mechanisms
Development of partnerships	Facilitating partnerships between academia, research, and training institutions for knowledge exchanges	Fiscal policy, blended finance
	Supporting the development of financial instruments and partnerships among financial institutions	Blue bonds, debt swaps
	Supporting public sector stakeholders for marine aquaculture development	Fiscal policy (blue levy)
	Facilitating private sector partnerships for development	PPPs, blue tokens and fintech
New entrants into industry from the fishery	Access to start-up finance and support	Dedicated transition fund, blue levy
	Aquaculture feed financing mechanism	Guarantee funds, blended finance type facility

Source: ANDA

VI. BALANCING ENVIRONMENTAL AND SOCIAL RISK MANAGEMENT IN MOROCCO'S MARINE AQUACULTURE DEVELOPMENT

Poorly managed marine and freshwater[23] aquaculture can seriously harm ocean ecosystems. For example, excess feed materials in marine aquaculture can lead to algal blooms, eutrophication and dead spots in the marine environment. Fecal matter and other waste from these systems also contribute to marine pollution. Chemical pollution from the hormones and parasiticides further contaminate oceans, and parasites from penned fish can infect wild populations. Escaped cultured fish may crossbreed with wild populations, destroying gene pools, or may out-compete native wild stocks for food and breeding sites. In addition, nets and other physical infrastructure in the water can disturb and inadvertently trap marine wildlife such as whales, dolphins, seals, and others[24].

The ecological impact of near shore marine aquaculture has been well documented, but the ecological impact of open ocean aquaculture has been far less studied. Due to the expense of maintaining these systems in open waters, breeding focuses on the larger carnivorous fish species, using smaller pelagic fish species as feed. This type of production, due to its expense, is destined for high value markets. While it is said that these systems pose less of an ecological risk due to the dilution effect and ocean currents, it is argued that open ocean cultivation has a higher risk for crossbreeding between wild and farmed populations. This is because cages are at the mercy of severe ocean storms, which break apart, leading to large scale escapes. In addition, cages often contain fish eggs, which are then released into the ocean. The use of wild pelagic fish as feed also depletes the food chain at a most essential level, as most pelagic fish feed on zooplankton which in turn feed on phytoplankton, keeping the ecosystem in balance.

The negative impacts of marine aquaculture are not contained to ocean-related impacts. There can be far reaching economic and social

23 Some freshwater systems are on rivers that terminate at the sea

24 Price and Morris 2013.

consequences, through unintended harm on artisanal community-led fisheries, which rely on healthy wild fish populations and marine ecosystems. Marine aquaculture also impacts poorer communities' access to cheap protein, as they often rely on smaller pelagic fish as they are cheaper to purchase. As such, it is important that the costs and benefits of marine-based aquaculture are fully assessed prior to its expansion. On the one hand there are the obvious positives- higher economic growth from aquaculture and greater quantities of high-quality protein for growing populations, restaurants, etc., but on the other hand there are the environmental and social costs, which need to be professionally managed.

The requirement for an Environmental Impact Assessment for the establishment of a marine aquaculture venture differs widely among countries. Morocco has made great strides to protect its promising aquaculture industry. In July 2022, Law No. 84.21 on marine aquaculture was adopted, and Law n°12-03 of the Kingdom of Morocco on Environmental Impact Assessments (EIA) describes the content and procedure for the aquaculture industry to conduct EIAs. Morocco also used a tiered environmental assessment system for aquaculture development, starting with a Strategic Environmental Assessment (SEA) for regional-level site assessments, followed by specific Environmental Impact Assessments (EIAs) conducted for each aquaculture plan. These assessments include baseline studies, impact assessments, mitigation measures in the form of Environmental and Social Management Plans (ESMP), and Environmental Monitoring Programs (EMPs).

Each EIA is required to analyze the environmental impacts of aquaculture on water quality, benthic habitats, and marine life. Sustainable practices such as fallowing and Integrated Multitrophic Aquaculture (IMTA) practices are emphasized to mitigate negative environmental impacts.

The ESMP expands on the social dimension of aquaculture projects, emphasizing the importance of community involvement through public consultations. Public consultations are conducted to ensure the social acceptability of aquaculture projects, engaging local communities in the decision-making process.

Key recommendations to strengthen environmental and social risk management for marine aquaculture include the following:

- Promote the use of sustainable marine aquaculture practices, such as fallowing and Integrated Multitrophic Aquaculture (IMTA), to minimize environmental impacts.
- Encourage research and development of new sustainable practices and technologies to further reduce the ecological footprint of aquaculture.
- Continue to refine and implement comprehensive EIAs for all marine aquaculture projects, ensuring thorough baseline studies and impact assessments.
- Strengthen the Environmental Monitoring Programs (EMPs) to ensure ongoing compliance and effectiveness of mitigation measures.

- Further develop the Environmental and Social Management Plans (ESMPs) to enhance community involvement and address social dimensions more effectively.

- Implement strategies to ensure that local communities benefit from marine aquaculture projects, fostering social acceptance and support.

- Improve public consultations by increasing the frequency and depth of public consultations to ensure that all stakeholders, particularly local communities, are adequately informed and involved in the decision-making process.

- Use feedback from public consultations to make necessary adjustments to marine aquaculture plans, ensuring they meet community needs and expectations.

- Establish environmental standards particular to marine aquaculture including the establishment of national effluent guidelines for biological, nutrient, and chemical pollution from coastal and offshore fish farms.

- Ensure that there are penalties, fines, and restoration requirements for companies that violate environmental standards, including liability for escaped fish and poorly controlled pathogen outbreaks.

- Establish requirements for identifying escaped fish by source, prohibiting the use of genetically modified fish in ocean cages.

- Establish a monitoring framework for monitoring effluents and other pollution from industry, as well as the health of wild populations that may be impacted.

For improved Environmental Monitoring, it is highly recommended that Morocco implements a robust monitoring system to track the environmental impacts of marine aquaculture on water quality, benthic habitats, marine life, but also how changes in the environment affect aquaculture operations, such as fish health, growth rates, productivity, or farm infrastructure, and develops and enforces regulations to ensure that aquaculture operations adhere to environmental standards and best practices.

By focusing on these findings and recommendations, Morocco can enhance the sustainability and social acceptability of its aquaculture sector, ensuring long-term benefits for both the environment and local communities.

Source: ANDA

VII. STRATEGIC ACTIONS FOR SCALING UP SUSTAINABLE MARINE AQUACULTURE IN MOROCCO

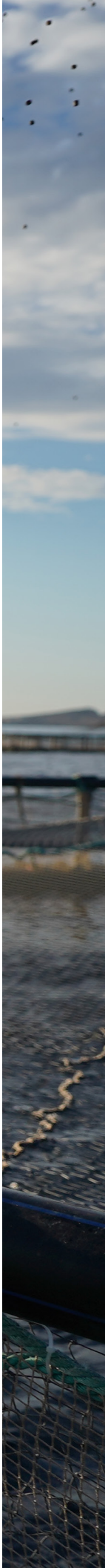
Morocco's marine aquaculture sector is at a pivotal moment, with the potential to play a transformative role in food security, job creation, and economic diversification. While the sector has seen progress in regulatory frameworks, market integration, and environmental management, realizing its full potential requires a strategic and coordinated approach that prioritizes governance, scientific knowledge, private sector engagement, capacity building, and environmental sustainability.

Strengthening marine aquaculture planning and management will facilitate private sector participation through streamlined permitting processes and improved site selection guidelines. At the same time, fostering an environment conducive to increased private investment—through innovative financing mechanisms such as blue bonds, blended finance, and carbon credits—will provide much-needed capital for sustainable sector expansion.

Developing a robust value chain and market strategy will be critical to enhancing the sector's profitability and resilience. Investments in seed and feed sector development, efficient stock management, and new marine aquaculture product promotion will strengthen Morocco's competitiveness both domestically and internationally. Expanding market access through improved branding and adherence to relevant certification schemes, value addition, and compliance with international trade standards will unlock significant economic opportunities for Moroccan marine aquaculture producers.

Enable access to low-cost and high-performing aquaculture feed, produced in Morocco: Aquaculture feed can be up to 80% of the operating costs element of raising farmed fish. The Moroccan feed industry will need to dramatically scale up its production to meet the anticipated hundreds of thousands of new tons of aqua feed production required to meet the ambitions of the aquaculture sector. There are three areas to address:

- Encourage existing feed mills to add new lines of production dedicated to aquaculture feed.



Source: ANDA

- Modernize feed regulation in line with the World Organization of Animal Health Standards and Global Aquaculture Alliance Best Aquaculture Practices (GAA BAP) which allow for rendered animal protein inclusion in aquaculture feed.

- Establish a feed financing mechanism which addresses the substantial working capital requirements to feed marine species.

To ensure long-term sustainability, capacity building and research and development (R&D) will be integral. Strengthening educational programs, fostering international knowledge exchanges, and investing in research-driven technological advancements will support industry innovation and operational efficiency. Furthermore, adopting digital technologies for farm management, environmental monitoring, and biosecurity will improve productivity and resilience in the face of climate challenges.

Diversification of marine aquaculture production remains a cornerstone of Morocco's future strategy. Targeted investments in seaweed and shellfish farming, sustainable shrimp aquaculture, and Integrated Multi-Trophic Aquaculture (IMTA) will not only enhance sector resilience but also contribute to broader blue economy objectives. Leveraging the potential of emerging species and innovative production methods will allow Morocco to meet the growing global demand for sustainable seafood while maintaining environmental integrity.

The following table **(table 4)** presents a summary of priority action areas and proposed activities, outlining the implementation timelines and levels of

urgency. By executing these strategic actions effectively, Morocco can solidify its position as a regional leader in sustainable aquaculture, supporting economic growth while safeguarding marine ecosystems and local livelihoods.

TABLE 4. Summary of priority action areas and proposed activities

Priority action areas	Proposed activities	Timeline (Short term[25], medium term[26], long term[27])
Governance		
Enhancing the effectiveness of marine aquaculture planning and management	• Mobilize the required land to support investors, aligned with the specific needs and regional development plans. • Simplify the permitting processes and minimize the time frames and the number of agencies involved in obtaining and maintaining permits (one-stop-shop approach).	Short term
Developing guidelines for site selection of land-based marine aquaculture considering technical, environmental, and social criteria	• Develop guidelines for site selection considering technical, environmental, and social criteria aligned with FAO Guidelines for Sustainable Aquaculture Development and the World Bank's Global Aquabusiness Investment Guide to fit the country's environmental, social, and institutional realities.	Short term
Fostering an environment to increase private investment by developing innovative finance and insurance services	• Create an aquaculture investment fund. • Implement market-based mechanisms such as carbon credits, nitrogen credits, blue bonds (blended finance), and blue finance. • Elaborate a strategy to attract international blue-green investment from private investors.	Short term
Value chain and market		
Defining a development strategy for the feed sector: A key element for enhancing value chain integration and profitability	• Develop short- and medium-term strategies for the feed sector. • Define emerging ingredients for cost-efficient fish feed formulation minimizing use of fish proteins. • Implement good, efficient feeding practices in marine aquaculture farms and good stock management practices.	Short term
Ensuring availability of seeds and fingerlings at competitive costs from marine fish and shellfish hatcheries	• Explore partnerships with research institutions for continuous improvement. • Support the development of private fish and shellfish hatcheries. • Conduct market research to determine competitive pricing strategies. • Maintain high genetic standards of seed and fingerling quality. • Obtain relevant certifications.	Short term

25 2025–2026.

26 2026–2028.

27 2028–2030.

Priority action areas	Proposed activities	Timeline (Short term[25], medium term[26], long term[27])
Conducting comprehensive value chain studies and diversification schemes for competitive scaling and international markets: Strategic assessment for marine aquaculture growth in Morocco	• Conduct diversification schemes considering all aspects of the seafood value chain. • Examine market feasibility, scalability, and international competitiveness. • Examine the growing field of biotechnology for potential development of nonfood marine aquaculture products and markets.	Short term
Conducting a detailed private sector analysis	• Provide a comprehensive perspective of the current level of private investment dynamic in the marine aquaculture sector. • Provide insights into the landscape of private sector involvement, including identifying domestic small and medium enterprises (SMEs) and large-scale national or international companies operating across various segments of the marine aquaculture value chain. • Showcase successful private sector initiatives. • Include high-level case studies of private sector initiatives, including good practices for Small Medium Enterprises (SMEs).	Medium term
Fostering sustainable growth: Unlocking market potential through strategic initiatives	• National market: » Implement effective communication and marketing strategies. » Establish marine aquaculture products in domestic wholesale markets and in distribution hypermarkets. » organize retail networks. » Increase the visibility of marine aquaculture products among the public. • International market: » Focus on promotional activities and quality improvement measures. » Strengthen trade relationships, ensure compliance with market regulations, and align with consumers' ethical and religious preferences. • Explore innovative marketing approaches and active participation in relevant trade events. • Invest in branding / certification of marine aquaculture products.	Long term
Using data-driven methodologies and considering market trends and regulatory factors	• Project future resource needs and sustain the current export and domestic growth. • Include various resource requirements, such as feed production capacity, seed and hatchery capacity, and human resources.	Long term
Capacity building and R&D		
Enhancing capacity building in the marine aquaculture sector: A focus on education, research, and labor market dynamics	• Enhance and expand educational initiatives. • Establish national and international scholarships, training centers and programs, internships, and mentorships. • Conduct a study to estimate the demand for specialized marine aquaculture labor.	Medium term

Priority action areas	Proposed activities	Timeline (Short term[25], medium term[26], long term[27])
Continued research and technology development in shellfish farming	• Support continued research and technology development in marine shellfish aquaculture. • Support novel farming systems of native species.	Medium term
Addressing environmental impact through modeling of marine aquaculture activities	• Provide quantitative site assessments and evaluate potential change using a cost-effective approach. • Support decision-making for environmental regulations and management of finfish and shellfish aquaculture.	Long term
Enhancing efficiency, sustainability, and ecosystem approach through digital technologies	• Integrate digital technologies into various aspects of Morocco's marine aquaculture including business planning, site selection, farm stock management, environmental monitoring, risk prevention, biosecurity, and the intelligent automation of feeding and other routine farm activities. • Support technical and financial feasibility, enhance governance frameworks, and harmonize rules and standards.	Long term
Diversification		
Promoting seaweed farming and algae valorization: Prioritizing innovation and market demands	• Define potential species and market opportunities. • Evaluate the feasibility and scalability of large-scale farming. • Develop a roadmap for the diversification of seaweed farming. • Support innovative seaweed farming techniques. • Develop a business model for algae valorization units.	Short term
Advancing knowledge in shrimp market and farming processes	• Develop a comprehensive understanding of the sector, considering the challenges posed by global overproduction, including factors such as supply and demand dynamics, market trends, and strategies. • Integrate existing knowledge and the experiences of other countries. • Provide specialized training sessions covering best practices in shrimp farming. • Host workshops on water quality management, disease prevention, and sustainable farming methods. • Support technology integration to improve monitoring, feed management, and overall farm automation and implement digital solutions for data-driven decision-making. • Provide training on sustainable shrimp aquaculture practices to meet global certification standards.	Short term
Promoting Integrated Multitrophic Aquaculture (IMTA): Enhancing diversification and sustainability of marine aquaculture	• Invest in substantial infrastructure and equipment for the integration of multiple species.	Long term

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HARNESSING MOROCCO'S COASTAL WEALTH:

A STRATEGIC REVIEW OF MARINE AQUACULTURE FOR JOB CREATION AND SUSTAINABLE GROWTH

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