

Economic analysis of the fisheries and aquaculture sector in Algeria, and growth prospects in the context of the blue economy

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Abstract:

The fisheries and aquaculture sector in Algeria has attracted significant attention since 2018, and these encouraging indicators were further confirmed by developments of what in 2022. The remarkable growth experienced can be attributed to several key factors that have contributed to the substantial increase in aquaculture production. This growth has been supported by a sectoral policy focused on promoting aquaculture, facilitating technology transfer, and implementing incentive measures. Moreover, the redirection of capital towards this sector, particularly after the recession in the public works sector, has accelerated growth and development. The data underscores this robust growth, with the sector generating 115,672 direct jobs and witnessing an impressive overall production increase of 11.13%, primarily driven by a substantial 21.43% rise in aquaculture. Export volumes surged by an exceptional 149.5%, accompanied by a 68.07% increase in value, while imports saw a decline of -23.43%. Turnover also saw a significant increase of 15.57%. By 2022, the sector had gained strategic recognition, constituting 5% of the entire agricultural sector, contributing 0.2% to GDP, and supporting over 145,000 jobs. The investment landscape has also played a crucial role, with approximately 10 billion DA invested in aquaculture alone, leading to remarkable growth of 67%. Aquaculture, currently representing 10% of the sector's total production, doubled within two years, demonstrating double-digit growth and aiming to achieve 33% by 2035 and 50% by 2050 through substantial investment. Despite these impressive numbers, challenges such as limited fish stocks necessitate stringent measures to ensure the sustainability of the fishery. Nevertheless, these advancements present significant opportunities for the sustainable development of the sector, showcasing promising prospects for further growth, job creation, and economic contribution. Moreover, the success of Algeria's fisheries and aquaculture sector aligns with the principles of the blue economy, emphasizing sustainable use and conservation of marine resources. The development of this sector within the blue economy framework is crucial for ensuring long-term environmental and economic viability, fostering innovation, and promoting responsible practices. This approach not only contributes to economic growth but also supports environmental conservation, making it imperative for the sector's continued success and contribution to a sustainable and prosperous future.

Keywords: Sustainability, Development, Growth, Maritime, Investment.

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ملخص:

اجتذب قطاع الصيد البحري وتربية الأحياء المائية في الجزائر اهتماما كبيرا منذ عام 2018، وتأكدت المؤشرات المشجعة من خلال تطوره في عام 2022. ويمكن أن يعزى النمو الملحوظ الذي شهده إلى العديد من العوامل الرئيسية التي ساهمت في الزيادة الكبيرة في إنتاج تربية الأحياء المائية. وقد تم دعم هذا النمو من خلال سياسة قطاعية تركز على ترقية تربية الأحياء المائية، وتسهيل نقل التكنولوجيا، وتنفيذ التدابير التحفيزية. علاوة على ذلك، فإن إعادة توجيه رأس المال نحو هذا القطاع، خاصة بعد الركود في قطاع الأشغال العامة، أدى إلى تسريع النمو والتنمية. وتؤكد البيانات هذا النمو القوي، حيث خلق القطاع 115,672 فرصة عمل مباشرة وشهد زيادة مذهلة في الإنتاج الإجمالي بنسبة 11.13%، مدفوعة في المقام الأول بارتفاع كبير بنسبة 21.43% في تربية الأحياء المائية. وارتفعت أحجام الصادرات بنسبة استثنائية بلغت 149.5%، مصحوبة بزيادة في القيمة بنسبة 68.07%، في حين شهدت الواردات انخفاضا بنسبة -23.43%. كما شهدت قيمة التداول زيادة كبيرة بنسبة 15.57%. وبحلول عام 2022، اكتسب القطاع اعترافا استراتيجيا من طرف الحكومة، ليشكل 5% من إجمالي القطاع الزراعي، ويساهم بنسبة 0.2% في الناتج المحلي الإجمالي، ويدعم أكثر من 145 ألف وظيفة. ولعب المشهد الاستثماري أيضا دورا حاسما، حيث تم استثمار ما يقرب من 10 مليار دج في تربية الأحياء المائية وحدها، مما أدى إلى نمو ملحوظ بنسبة 67%. وتمثل تربية الأحياء المائية حاليا 10% من إجمالي إنتاج القطاع، وقد تضاعفت في غضون عامين، مما يدل على نمو مزدوج الرقم ويهدف إلى تحقيق 33% بحلول عام 2035 و50% بحلول عام 2050 من خلال استثمارات كبيرة. وعلى الرغم من هذه الأرقام المثيرة للإعجاب، فإن التحديات مثل محدودية المخزونات السمكية الطبيعية تتطلب اتخاذ تدابير صارمة لضمان استدامة مصايد الأسماك. ومع ذلك، فإن هذه التطورات توفر فرصا كبيرة للتنمية المستدامة للقطاع، وتعرض آفاقا واعدة لمزيد من النمو، وخلق فرص العمل، والمساهمة الاقتصادية. علاوة على ذلك، فإن نجاح قطاع مصايد الأسماك وتربية الأحياء المائية في الجزائر يتماشى مع مبادئ الاقتصاد الأزرق، مع التركيز على الاستخدام المستدام والحفاظ على الموارد البحرية. ويعد تطوير هذا القطاع ضمن إطار الاقتصاد الأزرق أمرا بالغ الأهمية لضمان الجدوى البيئية والاقتصادية على المدى الطويل، وتعزيز الابتكار، وتشجيع الممارسات المسؤولة. ولا يساهم هذا النهج في النمو الاقتصادي فحسب، بل يدعم أيضا الحفاظ على البيئة، مما يجعل من الضروري استمرار نجاح القطاع والمساهمة في مستقبل مستدام.

الكلمات المفتاحية: الاستدامة، التنمية، النمو، البحري، الاستثمار.

1. Introduction :

The agency (ANDI²) has identified nine strategic sectors with the potential to create added value, including renewable energy, agriculture, industry, tourism, fisheries, health, transport, and mining. Most of these areas are directly or indirectly linked to the sea. The fisheries sector is highlighted as one of the four investment opportunities in Algeria. There is an opportunity to develop chains of activities related to fishing and aquaculture, such as pescatourism and breeding tropical species that benefit from the discharge of hot water from electricity production facilities. Additionally, there's potential for manufacturing industrial salts using concentrated water from desalination stations. These initiatives optimize resources, provide environmental solutions for sustainable development, stimulate growth, and generate sub-activities within the value chain.

The issue of sustainability in the economic context is a very important dimension. Algeria is involved in the realization of the sustainable development goals (SDGS) for 2030 which were adopted by the United Nations organization in September 2015 (Ministère de l'environnement et des énergies renouvelables, 2023)., a number of institutions and other stakeholders have taken steps to plan for 2030. In this sense, a number of encouraging results have been observed, in particular the appropriation of the SDGs by the various stakeholders, the incorporation Sustainable Development Goals (SDGs) in national development programs and their execution, the establishment of institutional monitoring and evaluation mechanisms as well as tools

for the implementation of the 2030 Agenda. (Comité Algérien interministériel, 2019).

As part of this dynamic of sustainable development, and among the geographical areas in Algeria with strong socio-economic diversity, the sea represents a resource and a development opportunity to achieve the objectives of sustainable development, in particular through objective 14³. However, investments related to the sea remain relatively low and fall short of being a significant driver of national economic growth. Within this context, marine aquaculture stands out, showing satisfactory growth over the past five years and holding considerable development potential, as outlined in a national strategy for 2030. Nevertheless, intersectoral support is notably lacking to accelerate the realization of this plan. More than 500 validated projects have yet to be launched due to various administrative and financial obstacles.

Since the oil price collapse in 2014, coupled with a downturn in the public works sectors and imposed import restrictions, some capital has shifted towards investment in fishing and aquaculture. Unfortunately, this momentum has failed to yield significant results due to the lack of financial support and an integrated national strategy within the framework of an interconnected concept like the blue economy.

Algeria, actively engaged in the global and African initiatives for the development of the blue economy, possesses a significant opportunity to achieve substantial growth by serving as a hub for commerce and technology transfer between continents. The Sustainable Blue Economy Conference held in Nairobi in November 2008, themed

² National Investment Development Agency.
www.andi.dz

³ Conserve and sustainably use the oceans.

'The Blue Economy and the 2030 Agenda for Sustainable Development,' explored emerging technologies applicable to oceans, seas, lakes, and rivers. This conference tackled challenges, opportunities, priorities, and potential partnerships. Recognizing this development potential, the African Union (AU) included it in its Agenda 2063 as a key goal and priority area for the upcoming decade, emphasizing the exploitation of Africa's vast potential as a central aspiration for a thriving continent.

The Algerian blue economy strategy SNEB 2030 takes into consideration port infrastructure, fishing and aquaculture as the main axes to meet economic, environmental and social commitments (Ministère de la Pêche et des Productions Halieutiques, 2021). The sectors of maritime activity in Algeria are mainly focused on the exploitation of marine and aquatic resources, currently include coastal fishing, aquaculture, commercial transport, port services, tourism, and recently desalination and production energy with offshore prospecting attempts (Union Européenne, 2018). The blue economy approach emphasizes the interconnectedness between maritime activities and other sectors, acknowledging emerging and promising sectors for the future by enhancing their integration with other areas of economic activity. It recognizes these related sectors as integral components of an integrated ecosystem services framework, leveraging both biological and non-biological resources. (Vierros Marjo, 2017).

The aim of this study is to conduct a comprehensive analysis of the present state of the fishing and aquaculture sector, emphasizing their economic significance

and their contribution to the national economy. Furthermore, a SWOT analysis will be conducted to assess the tangible accomplishments of the past two decades. This approach seeks to pinpoint growth prospects within the sector, particularly within the framework of the blue economy.

2. Methods:

The methodology employed in this study is founded on a meticulous understanding of Algeria's fishing and aquaculture sector, with the primary goal of providing readers with a clear assessment of the reliability and validity of the data and analysis presented. To ensure precision and accuracy, an investigative approach was adopted, involving the systematic collection of data from pertinent administrative institutions. This comprehensive process included conducting surveys and interviews with key stakeholders to gather firsthand insights and perspectives, thus significantly enhancing the robustness of the research and ensuring a well-rounded approach.

In addition to this, a thorough retrospective analysis of data spanning from 2000 to 2022 was conducted. This extensive temporal analysis not only provided a comprehensive overview but also enabled the identification of long-term trends and developments within the sector. By contextualizing current dynamics within a broader timeframe, this historical analysis significantly contributed to the credibility of the findings. Furthermore, an in-depth examination of recent policy implementations was undertaken, serving as a crucial component in understanding the trajectory of governmental interventions. This analysis drew upon national reports and insights from reputable international institutions, thereby further strengthening

the reliability of the study's informational foundation.

To augment the depth of analysis, a comprehensive SWOT (Strengths, Weaknesses, Opportunities, and Threats) assessment was conducted. This strategic evaluation helped identify the industry's inherent strengths, weaknesses, opportunities, and threats, providing a structured framework for evaluating the sector's competitive landscape and strategic outlook. Moreover, the study incorporated insights from development initiatives and the current status of the fishing sector in Mediterranean countries, enriching the analytical framework with comparative perspectives and regional dynamics.

Furthermore, the study consists of analyzing the recent demand for investment and its impact on the realization of new projects within the sector. This analysis aimed to assess the effectiveness of sectoral policies that include various incentive measures, thus offering insights into the sector's growth potential. Additionally, the efficiency of investments was evaluated by monitoring the evolution of production, serving as the final objective and impact indicator. Through these rigorous analyses, the study reliably identified the real determinants of the sector's development, providing valuable insights for informed decision-making.

Moreover, the study acknowledged the significance of analyzing the sector's interconnections with other maritime activities. This comprehensive analysis was crucial in recommending a sound strategy adapted to the context of the blue economy, ensuring sustainable development and optimal utilization of marine resources. By

integrating these diverse analyses and perspectives, the study aimed to offer a holistic, comprehensive, and robust assessment of Algeria's fishing and aquaculture sector, thereby contributing valuable insights for policymakers and industry stakeholders alike.

3. Results and discussion:

3.1 Sectoral economic assessment:

The fisheries and aquaculture sector has shown promising economic ⁴ indicators since 2018 (ONS, 2022), characterized by 115,672 direct jobs and several hundred thousand jobs generated by value chains, has witnessed significant growth, with an overall increase of 11.13% in production, including a remarkable 21.43% growth in aquaculture. Exports have surged by 149.5% in volume and 68.07% in value, while imports have decreased by -23.43%, accompanied by a 15.57% increase in turnover.

This sector plays a pivotal role in stimulating maritime economic development. Its significance within the framework of the blue economy is underscored by its symbiotic relationship with various sectors, particularly in environmental preservation and aquatic ecosystem management. Furthermore, its expansion contributes to growth in other sectors by creating opportunities in tourism, services, transformations, nautical recreation, and more. (ANNANE, 2024)

Designated as a strategic sector in the new investment law of 2022, the fisheries and aquaculture industry is poised to further drive economic progress and sustainability (SGG Algérie, 2022), represents 5% of the overall agricultural sector (according to

⁴ Data source: Ministry of Fisheries - ONS

ONS statistics which include agriculture and fishing), contributing 0.2% to GDP and employing over 145,000 people⁵ directly and indirectly, generating a gross added value of more than \$600 million annually. Comprising sea fishing, aquaculture, and associated industries integrated into upstream and downstream value chains, the fisheries sector plays a vital role in the blue economy. Despite limited fish stocks posing challenges for medium-term growth, domestic coastal fishing remains a significant driver, sustaining over 142,000 jobs along the coastal strip with an annual production of approximately 100,000 tones. To ensure the sustainability of this activity, rigorous measures for stock regeneration and restoration are imperative.

Furthermore, aquaculture is experiencing rapid growth, with a 67% increase in 2022. Completed projects are poised to boost production by over 200% by the end of 2024. Investment opportunities across the aquaculture value chain, from inputs to processing, packaging, and marketing, position this sector as a critical driver for blue economy growth. Moreover, it serves as a catalyst for coastal tourism, catering services, and port activities.

In the context of Algeria's fisheries and aquaculture sector, the impacts of climate change are becoming increasingly worrisome. The Mediterranean Sea, which borders Algeria's coastline, is undergoing significant changes due to rising sea temperatures attributed to climate change. These warming waters have profound effects on the distribution and abundance of marine species, including fish crucial for the fishing industry and aquaculture operations

in the region. As fish species migrate to cooler waters or face habitat loss, traditional fishing practices must adapt to these shifts. (ANNANE, 2024)

To address these challenges, proactive and adaptive management strategies are imperative. This includes revising fishing practices to align with the changing distribution of fish species, implementing measures to reduce bycatch and overfishing, and enhancing stock assessment methods to accurately gauge the health of fish populations. Additionally, promoting sustainable aquaculture techniques that are resilient to fluctuating environmental conditions is crucial. This may involve using closed-system aquaculture methods, incorporating natural ecosystem processes into aquaculture designs, and employing technologies to monitor water quality and mitigate pollution.

Furthermore, fostering collaboration with international partners and engaging with scientific research institutions can yield valuable insights and innovative solutions. Collaborative efforts can involve knowledge sharing on climate change impacts, best practices in sustainable fisheries and aquaculture management, and joint research projects to develop climate-resilient strategies. By leveraging expertise and resources from global partners, Algeria can strengthen its capacity to adapt to climate change challenges effectively.

It is essential to emphasize the importance of investing in education and capacity building within the fisheries and aquaculture sectors. Training programs on climate-smart practices, sustainable

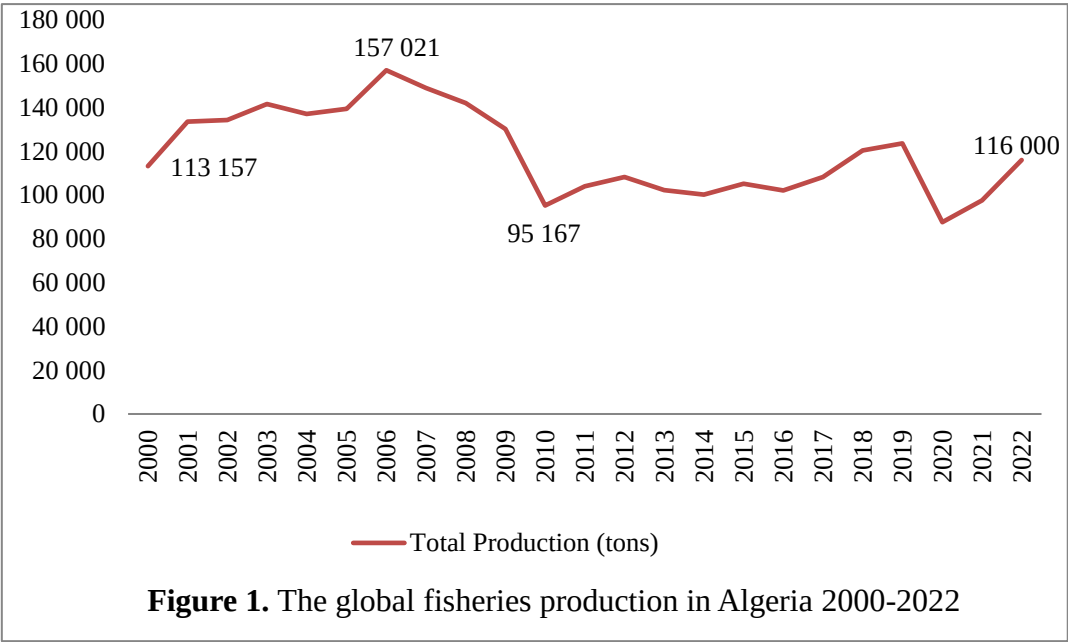
⁵ Ex-Ministry of Agriculture, Rural Development and Fisheries and Ministry of Fisheries and Fisheries Production

resource management, and ecosystem conservation can empower fishers, aquaculture farmers, and relevant stakeholders to navigate the complexities of climate change. Additionally, integrating climate resilience into policy frameworks and regulatory mechanisms can provide a structured approach to address climate change impacts at both local and national levels.

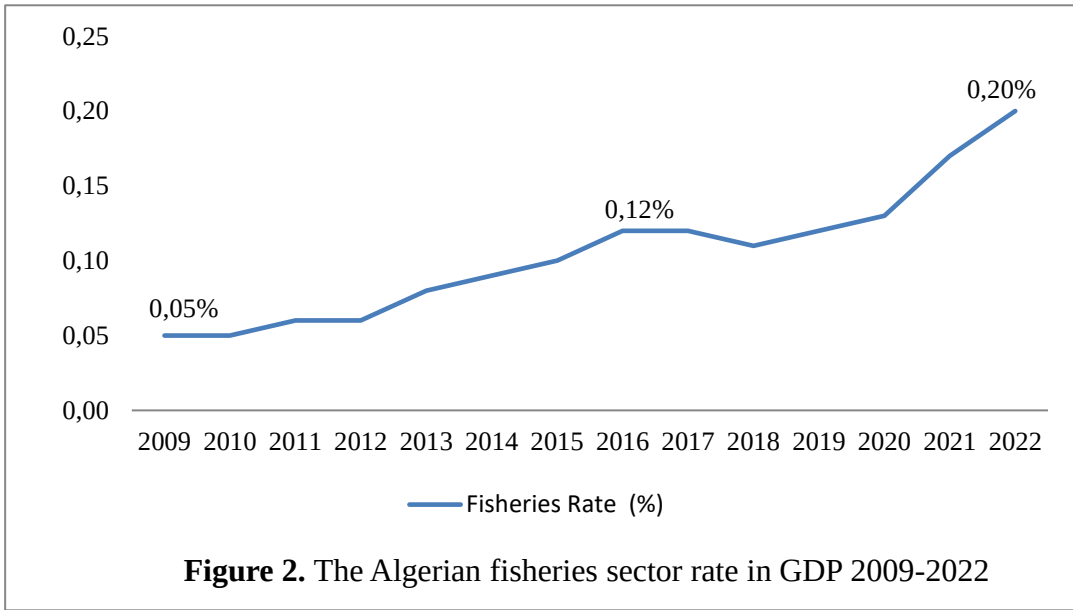
While climate change presents formidable

challenges to Algeria's fisheries and aquaculture sector, proactive adaptation measures, collaborative partnerships, and investments in sustainable practices can pave the way for a resilient and thriving marine industry in the face of environmental changes.

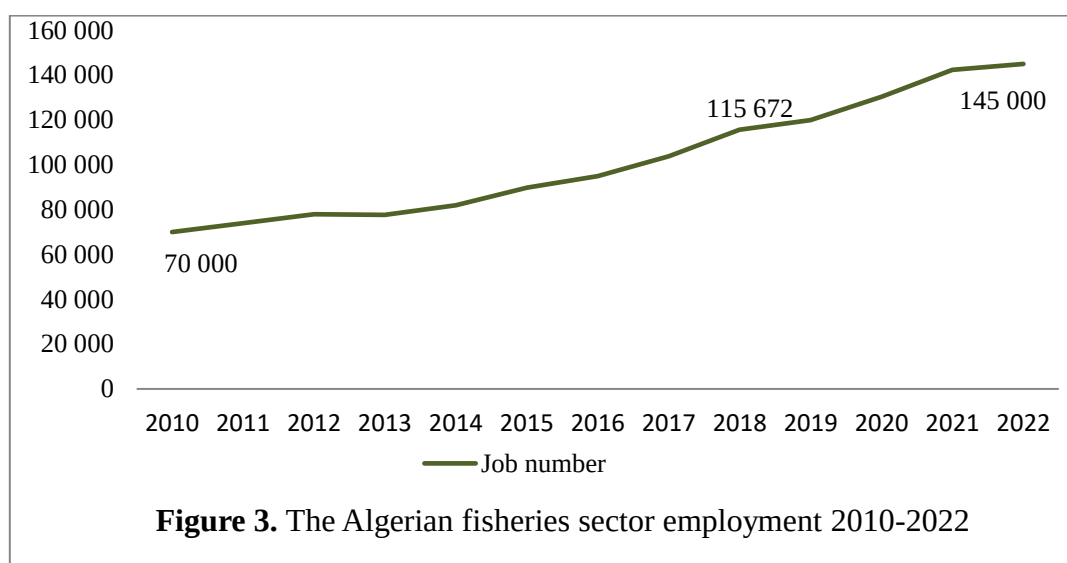
The graphs below depict the trends of fisheries and aquaculture indicators over the past decades (Figure1, Figure2, and Figure3):



Data source: Ministry of Fishing and Fisheries Productions



Data source: Calculated using data of Ministry of Fishing and Fisheries Productions

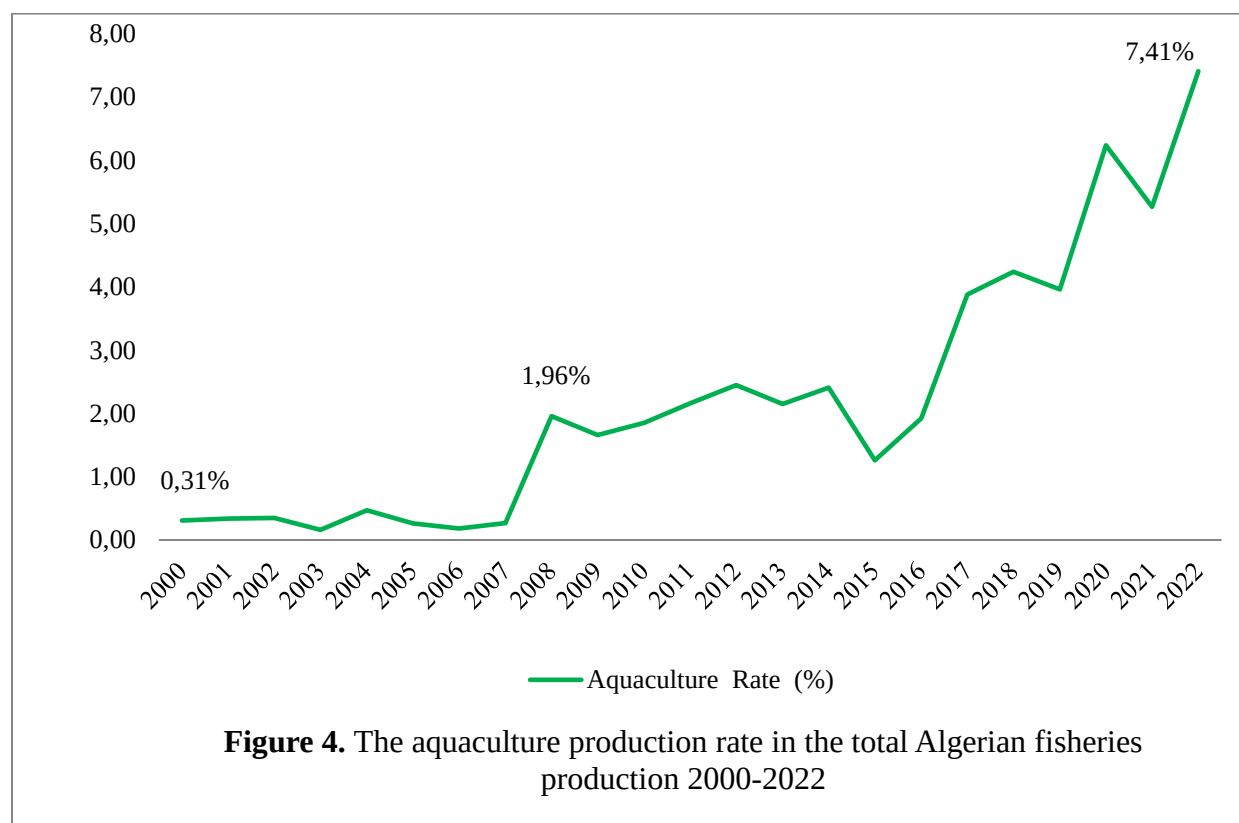


Data source: National statistics office and Ministry of Fishing and Fisheries Productions

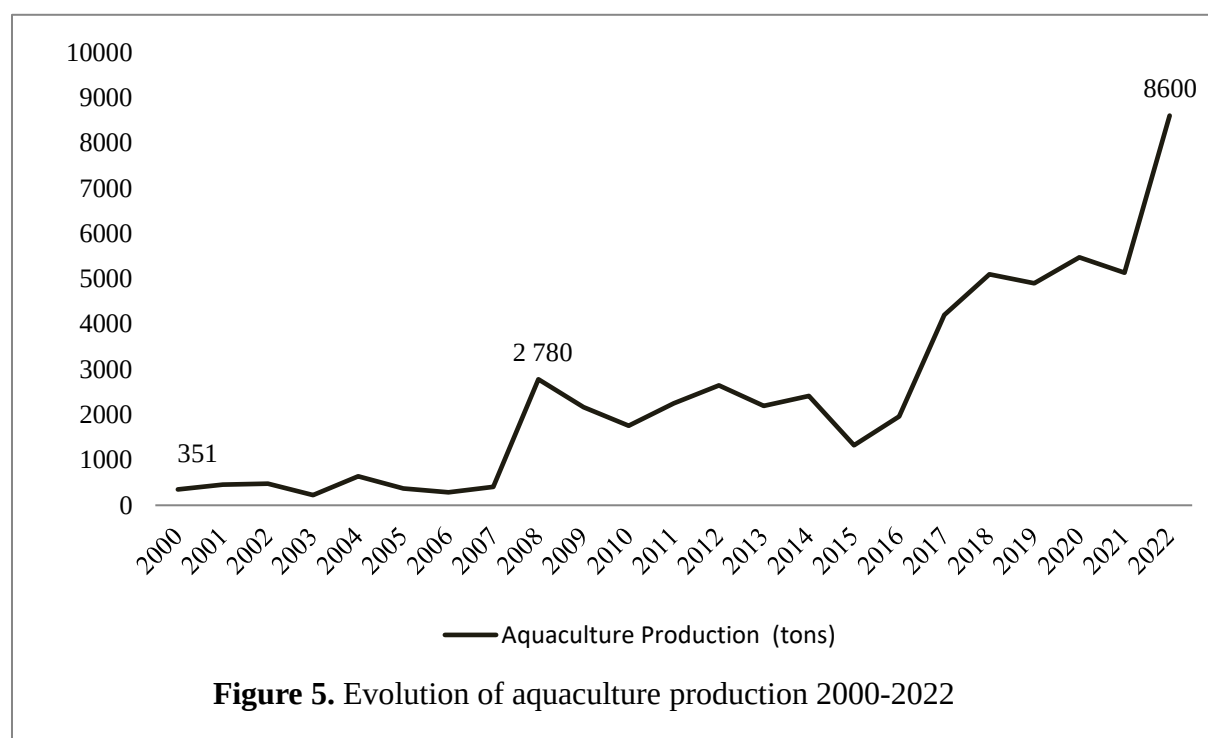
Upon examining the overall production of the fishing and aquaculture sector, with a particular focus on segments connected to the sea, it becomes evident that sustainable and substantial growth has not been achieved in the previous period. However, this does not accurately depict the sector's developmental prospects and its potential for making effective contributions to the national economy. Several factors contribute to this observation:

- The fishing economy extends beyond the mere exploitation of fishery resources essential for food security. It encompasses the entire value chain, including industrial and service sectors such as shipbuilding, construction, and related activities. This broader perspective reveals a consistent and accelerated growth trajectory in terms of employment and contributions to the gross domestic product (GDP), with a notable fourfold increase over the past decade.
- The advancement of the fishing sector predominantly hinges on aquaculture. Presently, aquaculture constitutes only 7% of total production. However, the sectoral program sets ambitious targets aiming to elevate this figure to 33% by 2035 and 50% by 2050.
- Despite a recent decline in processing activities attributed to dwindling fishery resources, there exists potential for the revival of these industries. Increased production or alternative sources, potentially from international waters, could reignite processing activities and stimulate growth in this segment.

Overall, while past performance may not fully reflect the sector's potential, strategic initiatives and targets indicate a promising trajectory towards enhanced sustainability and economic contribution in the future.



Data source: Ministry of Fishing and Fisheries Productions



Data source: Ministry of Fishing and Fisheries Productions

It's evident that aquaculture has undergone substantial growth and expansion in recent years. The proportion of aquaculture production in the total output surged from under 2% in 2010 to nearly 8% in 2022, marking a staggering 400% increase in just two years. Production experienced a similar growth rate during this period. Notably, aquaculture stands out as the sole economic activity boasting a double-digit growth rate, occasionally surpassing 50% per year (Figure 4, Figure 5).

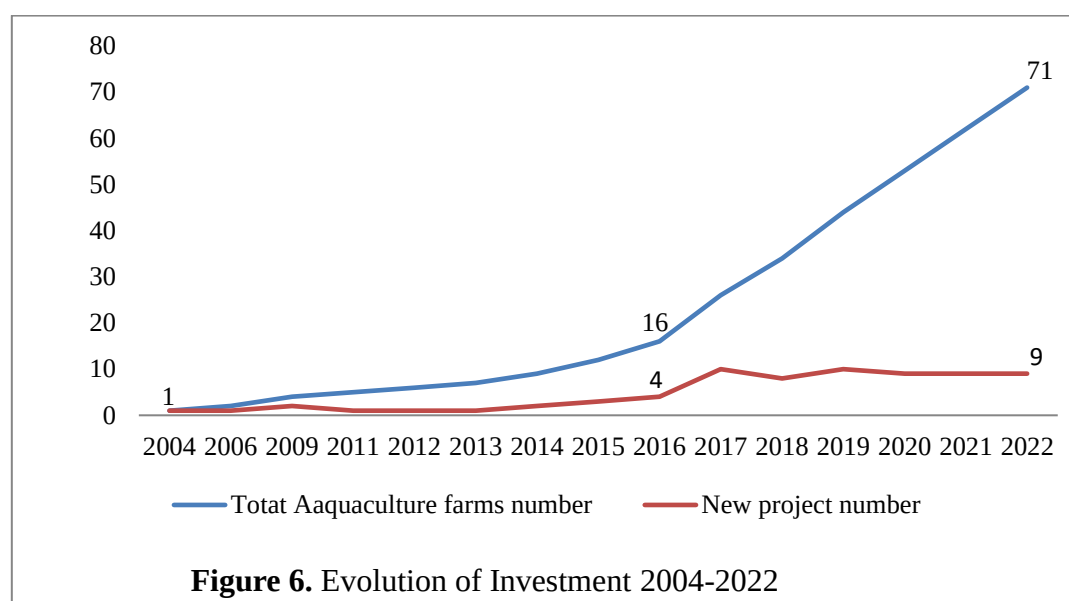
This remarkable growth is mirrored by substantial investments in the sector, amounting to approximately 10 billion DA. The table below illustrates the evolution of marine aquaculture project implementation (Figure 6, Table 1).

Table 1. Evolution of marine aquaculture projects implementation (2004 – 2021)

Activity sectors	2004	2006	2009	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Shellfish farming	1	1					1	1	2	9	2	3	2	2	2
Fish farming in ponds			1	1	1										
Fish farming in floating cages			1			1	1	2	2	1	6	7	7	7	7
Total New project	1	1	2	1	1	1	2	3	4	10	8	10	9	9	9
Total Marine aquaculture exploitation	1	2	4	5	6	7	9	12	16	26	34	44	53	62	71

Data source: Ministry of Fishing and Fisheries Productions

The demand for investment in the fisheries sector is on a continuous rise, underscoring the importance of fostering aquaculture development. Yet, this marine activity serves as an integrated sub-sector, acting as a catalyst for other economic domains such as industry, the digital economy, and the knowledge economy.



Data source: Ministry of Fishing and Fisheries Productions

Within the Algerian maritime economy, the fishing sector holds significant prominence, particularly in ship repair. As of 2020, the sector boasted 5,892 fishing vessels, with a consistent demand for repair and maintenance services. Presently, these operations primarily occur in ports of vessel activity or in ports equipped with suitable facilities. However, it's crucial to note that coastal resources are not evenly distributed. Some ship owners' resort to engaging informal craftsmen in fishing ports for maintenance and repair tasks (Ministère de la pêche et des productions halieutiques, 2020).

An examination of present capacities reveals notable shortcomings in repair and maintenance facilities for fishing vessels, both within traditional ports and in newly constructed ones. These deficiencies primarily manifest at operational levels, such as inadequate lifting equipment, organizational levels, response times, and the quality of services provided.

Out of the 40 ports currently in operation, only 29 are outfitted with maintenance

facilities, with 18 of them situated outside port premises. These installations are staffed by a modest workforce, comprising 53 mechanics, 41 turners, 59 electricians, and 7 electronics engineers, operating at a national scale to ensure the maintenance and upkeep of the fleet.

Algeria boasts 44 shipyards, with some specializing in the repair of fishing vessels. These shipyards play a vital role in fostering the growth of the shipbuilding and repair industry. However, they encounter various challenges that impede their optimal development. A collaborative diagnostic effort, conducted in partnership with existing shipyard companies, revealed several issues identified by sector operators (Ministère de la pêche et des productions halieutiques, 2020).:

- **Raw material shortage:** Shipyards grapple with obtaining essential materials like resin, stainless steel, and hydraulic products crucial for repair and construction work.
- **Financing hurdles:** Companies in the sector encounter challenges accessing

project financing provided by the Bank of Agriculture and Rural Development (BADR).

- **Complex customs procedures:** Cumbersome customs procedures for importing fishing equipment result in lengthy and restrictive processes, causing delays in project completion.
- **Navigation equipment acquisition constraints:** Procuring critical equipment such as radios, sonars, and GPS navigation systems faces various constraints, posing challenges to the sector.
- **Lack of skilled labor:** The sector suffers from a shortage of qualified technicians, limiting its capacity to undertake projects effectively.
- **Cumbersome approval process for construction plans:** Lengthy procedures for obtaining construction plan approvals contribute to project start delays.
- **Distance of shipyards from ports:** Shipyard locations often lie far from ports, leading to logistical and transportation challenges.
- **Land acquisition difficulties near ports:** Obtaining land in proximity to ports proves challenging, hindering shipyard expansion opportunities.
- **Legal vacuum in shipbuilding and repair unit establishment:** A lack of clear and precise legal frameworks for creating and operating shipbuilding and repair units creates uncertainty in the sector.

The 2020-2024 government program, endorsed by the Council of Ministers, underscores two pivotal strategic directions

for the naval sector. Primarily, the objective is to bolster naval maintenance and repair capabilities across the entire maritime coastline. This entails the establishment of dry docks, lifting equipment, and provisions for spare parts. Subsequently, another focus area pertains to fostering the naval industry dedicated to high seas fishing. These initiatives complement and structure the recent endeavors of the sector, aiming to fortify naval maintenance and repair capacities, as well as enhance the management of existing fishing ports.

Conversely, the fish product processing industry encounters several challenges and obstacles that impede its progress. Among these are:

- **Decline in fish catches:** Overexploitation of stocks, exacerbated by factors such as climate change and marine pollution, contributes to a dwindling supply of fish (FAO, 2022).
- **Underutilized inland fishing:** Despite potential resources, inland fishing remains underexploited, limiting its contribution to the industry.
- **Competitive pressures from international trade:** Algerian fish products face competitive pressures in global markets, affecting both prices and product quality.
- **Innovation deficit:** The lack of innovation hampers the diversification of processed products and their alignment with market demands.
- **Financing challenges and land access:** Difficulty in securing financing and accessing land impedes investment and modernization efforts within the industry.

Table 2. Distribution of seafood processing units in Algeria (2022)

Wilaya	Description	Number of jobs created	Production (Tons/year)
Alger	Processing and export unit	10	200
	Processing unit (canned tuna, and canned sardines)	4	612
	Processing unit (smoked salmon, other smoked fish)	3	1,89
	Canned tuna manufacturing and export unit	70	2600
	Manufacturing of canned tuna	75	5000
	Processing unit (smoked salmon, canned sardines, etc.)	5	20
Sétif	Tuna and sardine conservation unit	100	2900
Ain-Temouchent	Processing and packaging unit	35	1000
Oran	CANNERY	73	6000
	CANNERY	40	2190
	CANNERY	100	10950
	CANNERY	150	16790
	CANNERY	100	2555
Annaba	Seafood processing complex	210	2800
	Tuna Canning Factory	140	12000
Skikda	Processing industry (Manufacture of canned fish and shellfish)	200	16000
Bejaïa	Tuna processing unit	16	3000

Data source: National Center of research and development of fisheries and aquaculture

Table 3. Fishery product processing units in Algeria (in the launch phase)

N°	Wilaya	Annual production capacity (Tons)
01	Jijel	7500
02	Jijel	30000
03	Rélizane	1200
04	Rélizane	2200
05	Tizi-Ouzou	1000
06	Sidi Belabbes	110

Based on a survey conducted within the structures of the Fisheries Ministry in 2022 (Table 2, Table3), concerning the status of fish and aquaculture product processing

industries in Algeria, these sectors are relatively scarce, comprising only 17 units dispersed across 7 wilayas. Additionally, six more projects focused on processing

seafood products are currently in the launching phase. The fishery product processing industry in Algeria is undergoing remarkable growth, exemplified by the fact that eight out of the seventeen active units commenced operations between 2021 and 2022. With a combined production capacity estimated at 84,619 tons per year, this sector plays a pivotal role in the economy, generating 1,331 direct jobs and over 5,000 indirect jobs. Consequently, it presents significant potential for further growth stimulation.

Furthermore, by the end of 2023, the production capacity of this sector is projected to reach 16,629 tons, representing a growth of over 50%. This promising expansion not only provides opportunities for the industry but also unveils new prospects for stakeholders engaged in fishery product processing in Algeria.

3.2 Growth prospects in the context of the maritime economy:

Algeria is wholeheartedly committed to fostering the development of the blue economy on both the Mediterranean and national fronts. Additionally, it recognizes the importance of integrating into the African strategy to leverage regional synergies and contribute to stimulating economic growth and sustainable development across the continent. This dedication reflects Algeria's proactive stance in harnessing marine resources to drive socio-economic progress and environmental sustainability, both regionally and continentally (Union Africaine, 2019).

After conducting an assessment of job creation potential and the outlook for technological advancement and innovation,

the European Union has pinpointed five value chains that hold the potential to foster sustainable growth and job creation within the blue economy (Union Européenne: Direction générale des affaires maritimes et de la pêche, 2012)., Priority is first bestowed upon sustainable fishing and aquaculture, which offer employment opportunities and foster growth through the sustainable expansion of production. This entails adopting innovative approaches such as multitrophic aquaculture production, along with enhancing traceability and product quality standards (WestMed, 2018). The undeniable importance of the sea and coastline in Algeria's development cannot be ignored. The fishing sector holds significant weight, boasting nearly 4,000 fishing vessels and yielding an average annual fish production of 100,000 tons. While aquaculture currently constitutes around 10% of total fisheries production, plans are underway to establish nearly 100 aquaculture farms by 2025. It's anticipated that total fisheries production will soar to between 150,000 and 200,000 tons by 2030 (Grimes, 2022).

The field of fishing and aquaculture presents significant opportunities for economic and social development. Interconnected with various sectors, it serves as a catalyst for stimulating growth across the board. Commercial fishing necessitates port infrastructure and fish processing facilities, thus driving the development of the shipbuilding industry and maritime logistics. Moreover, the rising demand for seafood products creates employment and income avenues within coastal communities, thereby fostering local economic prosperity.

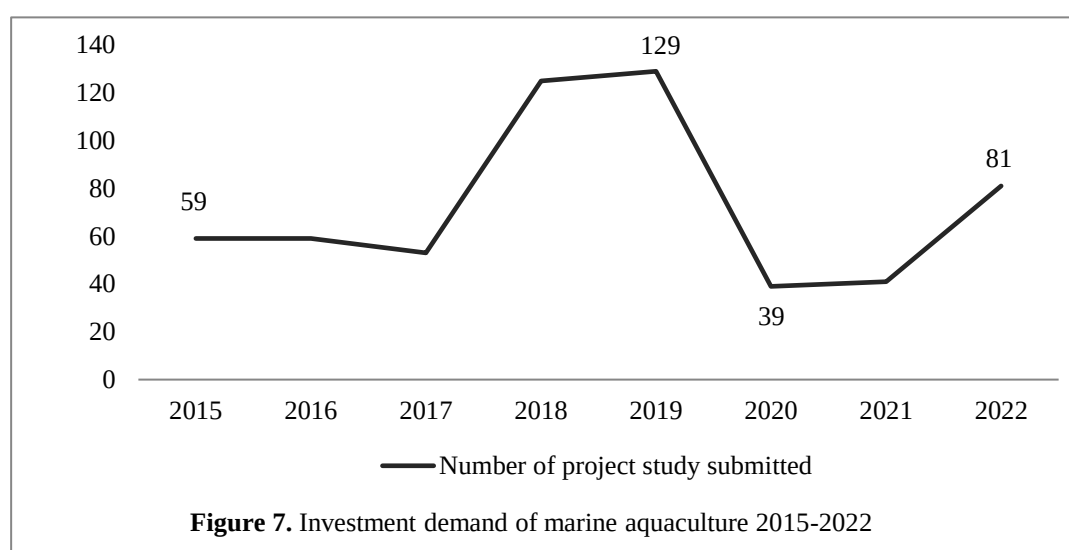
Furthermore, fishing and aquaculture are intrinsically linked to the preservation of

natural resources and biodiversity. Ensuring the sustainability of these activities is paramount for safeguarding marine ecosystems, maintaining healthy fish stocks, and preserving biological diversity. International organizations are increasingly focusing on sustainable fisheries management, implementing regulations and conservation initiatives to uphold the longevity of marine resources. Consequently, protecting natural resources and biodiversity emerges as a top priority both nationally and globally (Conférence des Nations Unies sur les océans, 2022).

The fisheries sector plays an important role in the national economy of developing countries, with its contribution to GDP reaching 5-10% in countries such as Vietnam and Mauritania. (Banque Mondiale, 2003), If we compare with an oil-rich country like Norway, where fishing and aquaculture contribute to 5% of GDP, it's essential to note that the Norwegian GDP is three times larger than the Algerian GDP. Despite the disparity in economic size, the relative contribution of the fishing and aquaculture sector to GDP in both countries

highlights the significance of this industry in their respective economies. While Norway's fishing sector may appear smaller in percentage terms, its absolute value is substantial due to the country's larger economic base. This underscores the importance of diversifying the economy and tapping into sectors like fishing and aquaculture to promote sustainable growth and reduce dependence on oil revenues.

The sector is gearing up to launch a comprehensive aquaculture development program slated for Horizon 2035, aiming to achieve a production capacity of 100,000 tons. This ambitious initiative signifies a significant leap forward, equivalent to a 10-day continuous drive. Investments by the CNRDPA (National Center for Research and Development of Fisheries and Aquaculture) will play a pivotal role in validating this resource and capitalizing on opportunities within the aquaculture sector. Below is a dynamic illustration graph depicting the projected growth trajectory of the aquaculture sector that collapse in 2020 because the covid-19 crisis before return again to his normal dynamic:



Data source: National Center of research and development of fisheries and aquaculture

The graph vividly depicts the evolution of investment demand since 2015. However, during the 2020-2021 period, this demand experienced a sharp decline due to the global health crisis caused by Covid-19, which adversely affected numerous economic sectors. Nonetheless, from 2022 onwards, we observe a gradual resurgence of this trend, showcasing the resilience and robustness of the sector.

Furthermore, aquaculture emerges as a promising development opportunity in Algeria. Drawing on previous experiences in this sector at a global and regional level, several key opportunities for the development of this investment niche can be identified:

Growing demand for aquaculture products:

The global demand for aquaculture products is steadily increasing, driven by rising populations, shifting dietary preferences, and the pursuit of healthy protein sources. In this context, Algeria has the potential to capitalize on this trend by developing its own aquaculture production to cater to domestic market needs and potentially explore export opportunities to other countries with high consumption potential (FAO, 2023).

Global apparent ⁶ consumption of fish products continues to exhibit steady growth, surpassing 20 kg per capita in 2020. This upward trend is propelled by shifting dietary preferences, with an increasing inclination towards healthier and more balanced meal choices. Social advancements play a significant role in shaping consumer decisions, particularly in developed economies (FAO, 2022).

Amidst the rise of overweight issues and obesity-related diseases, the prevailing consumer trend is gravitating towards healthy eating habits. This shift underscores a mounting demand for nutritious and wholesome foods, including those derived from aquatic sources (FAO, 2022). In Algeria, however, consumption remains relatively low, averaging between 3 and 4 kg per inhabitant per year, necessitating a tripling of production to reach an acceptable level. Moreover, there's an observed trend where the demand for seafood products is increasing at a faster pace than population growth. This trend indicates the sector's sustained prosperity and expansion, offering substantial investment opportunities to meet the escalating global demand.

Globally, the share of aquaculture in seafood production continues to rise. According to the FAO, in 2018, aquaculture accounted for 46% of the world's total fish and shellfish production, while traditional fishing contributed 54%. By 2020, the aquaculture's share had increased to 49% of global fish and shellfish production, surpassing 55% when algae production is included.

In Algeria, however, the share of aquaculture remains modest, currently representing less than 10% of total fishery product production. Despite this, the country possesses a significant production capacity, presenting a promising growth engine for the sector. By directing appropriate investments and implementing enabling policies, Algeria could capitalize on the opportunities presented by aquaculture, thereby fostering economic

⁶ Apparent consumption = Production + Imports-exports

growth and meeting the escalating demand for fishery products.

Aquaculture is projected to witness global growth of 21.7% between 2020 and 2030, with Africa anticipated to experience slightly higher growth at around 22%. Moreover, countries such as South Africa, experiencing rapid development in aquaculture, are poised for even greater growth, potentially reaching up to 90%. Algeria, classified as an emerging player in the aquaculture sector, recorded remarkable growth of 67% in 2022, underscoring the country's concerted efforts to develop and promote this activity. Algeria's emergence in the aquaculture sector presents significant growth and investment prospects.

Furthermore, besides catering to domestic demand, there's a tangible opportunity for export and international market expansion. Global trade in fishery products is burgeoning, with 225 states and territories engaging in trade in this sector in 2020. Global exports of aquatic products (excluding seaweed) amounted to 59.8 million tons in live weight, representing a value of 151 billion US dollars. Consequently, the trade value of aquatic food products constituted approximately 11% of total agricultural trade (excluding forest products) and approximately 1% of total merchandise trade (FAO, 2022).

These figures underscore the robust growth potential for fishery product exports, presenting favorable opportunities for stakeholders in the aquaculture industry seeking to penetrate international markets

and expand their market reach, for several reasons:

Potential of the Algerian coastline:

Algeria's extensive 2148 km coastline along the Mediterranean Sea offers substantial potential for coastal aquaculture. Favorable environmental conditions, including water temperature, salinity levels, and diverse marine ecosystems, create an ideal setting for cultivating various aquaculture species. According to the development plans outlined by the Ministry of Fisheries, the Algerian coast holds promising prospects for marine aquaculture, with an estimated potential of around 80,000 tons per year across all aquaculture sectors. In support of this endeavor, 18 marine activity zones were established in 2021, with 15 areas identified as having high aquaculture potential. As of March 2022, the fishing sector has issued a cumulative total of 267 prior authorizations for the establishment of aquaculture enterprises, with approximately 70 projects already operational⁷.

Knowledge and Technology Transfer:

Algeria possesses a valuable opportunity to leverage the experience, expertise, and knowledge gained through various international partnerships. The Algerian aquaculture sector has benefited from training and capacity-building programs, notably from countries such as Egypt, South Korea, the European Union, and China. By harnessing this expertise and know-how, Algeria can enhance and advance its aquaculture sector, incorporating best practices and lessons learned from these partner nations.

⁷ Fisheries Ministry

Creation of Jobs and Added Value:

Aquaculture presents an opportunity to generate employment at the local level, particularly in coastal regions, across the entire value chain—from production to processing and marketing of aquaculture products. Globally, employment in aquaculture has witnessed significant growth over the years, as evidenced by data in Table No. 14 on employment in fishing and aquaculture by region between 1995 and 2020. An analysis of the figures reveals a substantial increase in aquaculture employment over the years. In Africa, for instance, the number of jobs in this sector surged from 69,000 in 1995 to 634,000 in 2020, indicating remarkable growth. Similar trends are observed in other regions such as the Americas, Asia, Europe, and Oceania, where employment in aquaculture has also experienced an uptick. These figures underscore the escalating importance of aquaculture as a source of employment, offering job opportunities to local communities. Aquaculture plays a pivotal role in creating sustainable jobs and contributing to economic development, especially in regions where traditional fishing may be constrained.

Public Policies: Algeria's public policies are firmly geared towards promoting the sustainable development of aquaculture, with a specific focus on food security and achieving the Sustainable Development Goals (SDGs). The primary objective is to foster sustainable aquaculture that enhances food security by establishing local protein sources and reducing reliance on imported seafood to bolster the country's food sovereignty. To achieve these objectives, the United Nations Development Program (UNDP) has funded the development of a national fisheries and aquaculture strategy

in collaboration with the Ministry of Agriculture, Rural Development, and Fisheries (FAO, 2019). This strategy delineates the orientations, objectives, and priority actions for the sector until 2030, with a particular emphasis on the development of aquaculture. It acknowledges the significant potential of this sector to augment national production of fishery products, diversify income sources for rural and coastal populations, and harness continental and marine water resources. Algerian public policies actively support aquaculture development through the implementation of various concrete measures. These include providing land and public maritime zones, granting tax and financial incentives, streamlining administrative procedures, enhancing the technical and managerial capacities of stakeholders, and promoting the consumption of aquaculture products.

Simultaneously, the Master Plan represents a collaborative initiative between Algeria and South Korea aimed at fostering the development of fishing and aquaculture in Algeria. Integrated into the Sector Policy Letter for the Development of Fisheries and Aquaculture for the period 2016-2023, this strategic plan seeks to bolster the institutional, technical, and human capacities of the sector. It also encompasses measures to enhance fishing and aquaculture resources, develop infrastructure and equipment, improve product quality and traceability, and foster innovation and research.

Consequently, the government has drawn inspiration from these programs to formulate a five-year program aligned with these priority objectives and measures. This program aims to promote the development

of aquaculture and fishing in harmony with the country's needs and aspirations

4. Conclusion:

The review of Algeria's fisheries and aquaculture sector since 2018 underscores significant economic progress, marked by notable growth in employment, production, and exports, all of which contribute substantially to GDP and local employment. Despite encountering challenges such as limited stocks in inshore fishing and barriers related to raw materials and financing, these sectors remain integral to Algeria's economic landscape. It is evident that Algeria has strategically prioritized sectoral development, as evidenced by initiatives like the National Strategy for the Blue Economy (SNEB), which positions the country for a resilient maritime future.

To ensure the continued success and sustainability of the fisheries and aquaculture sectors, several recommendations can be proposed. First and foremost, there is a pressing need to address the challenges related to limited stocks in inshore fishing. This could be achieved through comprehensive fisheries management plans that incorporate scientific research, data-driven decision-making, and effective enforcement of regulations to prevent overfishing and promote sustainable fishing practices.

Additionally, efforts should be directed towards overcoming obstacles in accessing raw materials and securing financing for fisheries and aquaculture activities. This may involve streamlining administrative procedures, providing financial incentives and support to industry players, and fostering partnerships with financial

institutions to facilitate access to funding for sustainable projects.

Furthermore, it is essential to continue investing in infrastructure development and technological innovation within the fisheries and aquaculture sectors. This includes upgrading fishing vessels and equipment, improving processing and storage facilities, and adopting advanced aquaculture technologies that enhance productivity while minimizing environmental impact.

Moreover, international partnerships and collaborations should be strengthened to leverage expertise, knowledge sharing, and best practices in sustainable fisheries and aquaculture management. This can be achieved through joint research initiatives, capacity-building programs, and participation in international forums and conferences to stay updated on global trends and innovations in the marine industry.

In conclusion, Algeria's fisheries and aquaculture sectors hold immense potential for continued growth and economic contribution, provided that concerted efforts are made to address existing challenges and capitalize on opportunities. By implementing strategic recommendations focused on sustainable practices, innovation, and collaboration, Algeria can foster a thriving and resilient marine industry that benefits both the economy and the environment.

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