

Blue Finance as a Mechanism for Sustainable Financing: An Analysis of the Financing Gap and an Assessment of Feasibility in Algeria

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Abstract:

This study aims to analyze the financial instruments available for mobilizing investment resources in Algeria and to assess the financing gap between investment needs and available resources, with a focus on institutional and legal factors affecting financing effectiveness. The study adopts a descriptive-analytical approach to present the theoretical framework, supported by quantitative analysis to estimate financial needs relative to available resources, as well as a comparative approach to evaluate the suitability of financial instruments in the Algerian context.

The findings reveal a significant financing gap, reflecting limited resource mobilization and weak private sector participation. This highlights the need to develop innovative financing instruments, strengthen public-private partnerships, and improve the institutional framework to ensure project sustainability and achieve economic and social development objectives.

Keywords: Blue finance, sustainable finance, investment, financing gap, financial instruments, blue economy.

Résumé:

esoins et les ressources disponibles, en mettant l'accent sur les facteurs institutionnels et juridiques influençant l'efficacité du financement. L'étude s'appuie sur une approche descriptive et analytique pour présenter le cadre théorique, complétée par une analyse quantitative afin d'estimer les besoins financiers par rapport aux ressources disponibles, ainsi qu'une approche comparative pour évaluer la pertinence des instruments financiers dans le contexte algérien.

Les résultats mettent en évidence un déficit de financement significatif, reflétant la faiblesse de la mobilisation des ressources et la faible participation du secteur privé. Cela souligne la nécessité de développer des instruments financiers innovants, de renforcer les partenariats public-privé et d'améliorer le cadre institutionnel afin d'assurer la durabilité des projets et la réalisation des objectifs de développement économique et social.

Mots-clés : Finance bleue, finance durable, investissement, écart de financement, instruments financiers, économie bleue.

Jel Classification Codes : Q01 ; Q22 ; G20 ; G28 ; O16.

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I. Introduction

In recent decades, there has been growing global interest in issues of environmental sustainability and natural resource management, particularly in light of the increasing challenges associated with climate change and the degradation of marine ecosystems. In this context, the concept of the blue economy has emerged as a development model that seeks to strike a balance between the exploitation of marine resources and the achievement of economic growth on the one hand, and the conservation of coastal and marine ecosystems on the other. However, achieving this transition towards a sustainable maritime economy requires the mobilisation of significant financial resources capable of funding projects related to ocean protection, developing maritime infrastructure, and promoting economic activities with a positive environmental impact.

It is against this backdrop that blue finance has emerged as one of the most significant innovations in the field of sustainable finance, aiming to channel public and private capital towards activities linked to the blue economy, such as sustainable fishing, environmentally friendly aquaculture, marine renewable energy, and eco-tourism, as well as projects to protect marine ecosystems. This type of financing relies on a range of innovative financial instruments, such as blue bonds, concessional development finance, public-private partnerships, and blended finance, thereby enabling environmental objectives to be transformed into fundable investment opportunities.

In the Algerian context, the country possesses significant natural and geographical assets for the development of a promising blue economy, particularly given the length of its coastline, the diversity of its marine resources, and the potential for port and tourism activities. Building on this, this article seeks to analyse the theoretical framework of blue finance and its main instruments, whilst examining the financing gap associated with funding sustainable maritime projects in Algeria and assessing the feasibility of applying these mechanisms in the national context.

In light of the above, the main research question can be formulated as follows:

To what extent can blue finance constitute an effective mechanism for mobilising financial resources and financing sustainable maritime projects in Algeria, given the existence of a financing gap and institutional and investment challenges?

To achieve the study's objectives and answer the research question, a combination of scientific methodologies appropriate to the nature of the subject was employed. The descriptive-analytical approach was used to present the theoretical concepts associated with blue finance and to analyse the most important financial instruments used in this field. The quantitative analytical

approach was also employed to estimate the financing gap associated with the blue economy in Algeria by comparing investment needs with the financial resources available in the various maritime sectors.

In addition, a comparative analytical approach was adopted to assess the suitability of various blue finance instruments for the Algerian context, based on criteria relating to the depth of the financial market, the legislative and institutional framework, and the capacity to mobilise resources and share investment risks.

II. Theoretical Framework of Blue Finance

Blue finance is a growing field in the literature on sustainable finance, representing a financial mechanism to address environmental risks associated with marine and coastal activities, whilst simultaneously creating investment opportunities that support the blue economy and contribute to the achievement of sustainable development goals (March et al., 2024, p. 151). This type of finance aims to channel financial resources towards projects that preserve marine and coastal ecosystems, thereby ensuring a balance between economic growth and the protection of natural resources.

II.1 The concept of blue finance

The concept of blue finance is closely linked to the sustainable blue economy and refers to the mobilisation and channelling of financial resources to support activities that conserve oceans and water resources whilst simultaneously delivering economic and social benefits. United Nations reports define it as a financial activity directed towards or supporting the development of a sustainable blue economy, whilst the World Bank emphasises that it is based on the use of ocean resources to achieve economic growth and improve livelihoods whilst ensuring the integrity of marine ecosystems (World Bank, 2025).

Accordingly, blue finance can be defined procedurally as:

The set of financial tools and mechanisms used to mobilise public and private capital to finance sustainable blue economy and coastal projects, taking into account environmental, social and governance dimensions.

Its importance lies in its role in financing the protection of marine environments, improving access to clean water, enhancing the capacity of coastal communities to adapt to climate change, and creating new economic opportunities based on the rational use of water resources (IFC, 2022).

II.2 Concepts related to blue finance

II.2.1 The Blue Economy

The blue economy refers to a development model that seeks to utilise marine and water resources sustainably by integrating environmental considerations into economic activities related to the oceans. It aims to generate economic value added whilst maintaining the ecological balance of marine ecosystems, thereby making the oceans a source of growth and employment without depleting their resources (Khatab, 2020).

II.2.2 Green Finance

Green finance refers to directing investments and financial services towards activities that limit environmental degradation and promote resource efficiency, such as renewable energy, environmental protection and clean technologies. Blue finance is a sectoral extension of green finance, focusing specifically on marine and coastal areas, whilst adopting the same principles relating to sustainability and the management of environmental and social risks (Haddadou, 2021).

II.2.3 Sustainable Development

Sustainable development is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs; it is based on the integration of three interlinked dimensions: economic, social and environmental. Blue finance is one of the practical mechanisms that translates this concept into tangible investments in the marine and coastal sector.

II.2.4 Activities Eligible for Blue Finance

Blue finance is not merely a source of funding for maritime activities in general; rather, it specifically targets projects that generate economic value whilst preserving the integrity of coastal and marine ecosystems. Consequently, a project's eligibility for blue finance is measured by the extent to which it actually contributes to protecting water resources, reducing pollution and promoting environmental sustainability, rather than merely by its geographical link to the sea or coast.

International literature indicates that the scope of eligible activities includes sectors that combine economic viability with a positive environmental impact, such as low-carbon maritime transport, sustainable fishing, environmentally friendly aquaculture, eco-tourism, marine renewable energy, as well as ecosystem restoration services and marine biotechnology. These areas represent promising investment opportunities capable of attracting private and public capital within the framework of a sustainable blue economy.

Table (01): Eligible Activities for Blue Finance and Their Investment Focus Areas.

Activity	Investment Focus Area
Maritime Transport	Decarbonization of ships
Fisheries	Solutions to reduce illegal fishing; alternatives to minimize food

	waste
Aquaculture	Transition to less environmentally harmful production systems; offshore aquaculture
Oil and Gas Extraction	Environmentally responsible decommissioning of production platforms; decarbonization of production activities
Coastal and Marine Tourism	Transition towards eco-tourism
Marine Biotechnology	Expansion of research and development in sustainable products
Marine Renewable Energy	Scaling up investments in offshore wind energy; expanding research and development in other ocean energy forms such as tidal and wave energy
Ecosystem Services	Protection and restoration of marine and coastal ecosystems

Source: Adapted from Pereira, A., & Nogueira, M. (2021), *Marine Policy*, p. 583.

Eligibility is not limited to the type of activity alone, but also depends on a set of environmental and institutional assessment criteria. The International Finance Corporation (IFC) emphasises that blue projects must align with sustainable finance principles and contribute directly to the achievement of the Sustainable Development Goals (SDGs), particularly Goal 6 (Clean Water) and Goal 14 (Life Below Water), whilst avoiding negative impacts on other environmental and social goals. It also requires the application of environmental, social and governance (ESG) standards and risk management to ensure long-term sustainability of impact (IFC, 2022).

Consequently, the classification of activities eligible for blue finance is a selective process based on environmental impact and developmental value, allowing financial resources to be directed towards projects best able to balance economic returns with the protection of marine ecosystems.

III. Blue Finance Instruments

Blue finance represents an integrated financial framework that is not limited to providing cash resources, but relies on a suite of innovative investment and banking tools aimed at mobilising public and private capital and channelling it towards activities linked to the sustainable blue economy. These tools derive their importance from their ability to share risks, improve the economic viability of marine projects, and reduce the cost of capital, thereby enabling environmental objectives to be transformed into fundable investment opportunities.

In this context, blue finance instruments range from capital market instruments and development banking mechanisms to contractual partnerships, as well as incentive mechanisms and sovereign guarantees, reflecting the hybrid nature of this form of finance, which combines environmental considerations with financial logic.

III. 1 Blue Bonds

Blue bonds are among the most prominent modern instruments in blue

economy financing; they are securities issued by governments, development institutions or companies with the aim of mobilising financial resources dedicated exclusively to funding projects for the protection of marine ecosystems and the sustainable use of water resources. This instrument is characterised by its ability to attract institutional investors seeking environmentally responsible investments, whilst ensuring an acceptable level of return and risk.

The Seychelles' issuance of the first sovereign blue bond in 2018 served as a pioneering model, with proceeds directed towards supporting sustainable fishing and the management of marine protected areas, with support from the World Bank, demonstrating this instrument's ability to combine environmental protection with local economic development. (World Bank, 2018).

III. 2 Concessional Development Loans and Financing

Development banks and international financial institutions play a pivotal role in supporting blue projects by providing long-term loans on preferential terms, or credit lines targeted at sustainable marine sectors, such as coastal infrastructure, water treatment, and low-environmental-impact aquaculture. Such financing helps to mitigate initial investment risks, particularly in developing countries facing financial and structural constraints.

In this context, the International Finance Corporation (IFC) is working to integrate the principles of blue finance into its lending policies, linking financing to environmental, social and governance (ESG) criteria to ensure the sustainability of the projects it finances (IFC, 2022).

III. 3 Public-Private Partnerships (PPPs)

Public-private partnerships are an effective institutional mechanism for mobilising private investment in major maritime projects, particularly in the areas of green ports, desalination plants, eco-tourism, and marine renewable energy. This model allows for the sharing of roles and risks between the state and investors, thereby enhancing operational efficiency and alleviating the burden on public budgets.

Such partnerships also contribute to the transfer of technology and managerial expertise, a crucial factor for countries seeking to develop their emerging blue sectors (OECD, 2020).

III.4 Blended Finance Mechanisms and Guarantees

Blended finance refers to the combination of public resources, development grants and private capital within a single financing structure, with the aim of improving the investment attractiveness of high-risk or long-term projects. This mechanism uses tools such as credit guarantees, political risk insurance and incentive funds to reduce investor risk and attract additional capital flows.

The United Nations Environment Programme (UNEP) has confirmed that this approach is one of the most effective tools for financing the blue economy,

particularly in developing coastal states that lack developed financial markets (UNEP, 2021).

III.4 Comparative Analysis of Financing Instruments

It is clear from the above that blue finance instruments do not operate in isolation from one another, but rather are integrated within a multi-level system, where bonds contribute to mobilising long-term resources, while development loans provide concessional capital, and partnerships support institutional implementation, whilst blended finance reduces investment risks. The choice of the appropriate instrument depends on the nature of the project, its stage of maturity and the level of risk associated with it, which necessitates a flexible approach combining several instruments to achieve maximum economic and environmental impact.

Table (02): Comparison of blue finance instruments in terms of characteristics and investment function

Financial Instrument	Nature of the Instrument	Funding Entity	Risk Level	Suitable Project Types	Investment Added Value
Blue Bonds	Capital market instrument	Governments, corporations, development banks	Medium	Large-scale, long-term projects (ports, marine protected areas, marine energy)	Mobilizing large financial resources and reducing financing costs
Concessional Development Loans	Bank financing	Development banks and international institutions	Low–Medium	Coastal and water infrastructure	Favorable repayment terms and stimulation of public investment
Public-Private Partnerships (PPP)	Institutional contractual arrangement	Government + private sector	Medium	Operational and service projects (desalination, eco-tourism, maritime transport)	Risk sharing and improved operational efficiency
Blended Finance and Guarantees	Incentive mechanism	Donors + private investors	Low (for investors)	Innovative or high-risk emerging projects	Attracting private capital and reducing credit risk

Source: Prepared by the researcher based on: World Bank (2018); OECD (2020); UNEP (2021); IFC (2022).

In the Algerian context, these instruments could serve as a strategic lever for mobilising financial resources directed towards developing the blue economy, particularly given the country's extensive coastline and the growing need to modernise port infrastructure and improve the management of marine resources. The issuance of sovereign blue bonds could enable the financing of coastal protection projects and the tackling of marine pollution, whilst concessional development loans could support water desalination and sustainable aquaculture projects. Public-private partnerships also represent a suitable option for developing green ports and eco-tourism, whilst blended finance provides an effective mechanism for attracting private investors to innovative projects that might not secure traditional financing. Consequently, the use of an integrated mix of these tools would enhance Algeria's ability to transform its marine resources into sustainable investment opportunities with economic and environmental returns.

IV. Challenges in Implementing Blue Finance in Algeria

Although Algeria possesses the natural and geographical assets to develop a promising blue economy—particularly in terms of its extensive coastline, diverse marine resources, and potential for port and tourism activities—the translation of this potential into projects suitable for financing and investment remains limited in practice. This reflects a clear gap between the abundance of natural resources on the one hand, and the weak capacity to mobilise capital for blue projects on the other, suggesting that the problem is not so much a lack of opportunities as the presence of structural, financial and institutional barriers that limit the sector's attractiveness to investors.

In this context, the challenges of blue finance in Algeria can be classified into three interrelated levels covering economic–financial, environmental, and technical–institutional aspects, according to the extent of their direct impact on investment risks and the viability of projects for financing.

IV.1. Economic and Financial Challenges

The Algerian economy's structural dependence on the hydrocarbons sector constitutes one of the most significant obstacles to channelling resources towards emerging blue sectors, as the conventional energy sector accounted for approximately 14% of GDP, 83% of exports and 47% of budget revenue during the period 2019–2023. This leads to a concentration of public investment and bank financing in hydrocarbon activities at the expense of environmental and maritime sectors (World Bank Group, 2024). This concentration results in a lack of diversification in national investment portfolios and a lack of financial incentives for blue projects.

The local financial market also suffers from limited depth and liquidity, which reduces opportunities to develop innovative financing instruments such as

blue bonds or specialised funds, and increases the cost of capital for long-term maritime projects. This situation leads to an increase in the risk premium demanded by investors, which undermines economic viability and limits the ability of projects to reach the ‘bankability’ stage.

Furthermore, the lack of specialised strategic planning in the maritime economy and the limited scope of government programmes aimed at coastal development reduce the clarity of the investment outlook, which negatively affects the confidence of local and foreign investors in the stability of future returns (Boukourou & Boutella, 2024, p. 295).

IV.2. Environmental Challenges Affecting Investment Attractiveness

Environmental issues do not merely represent a barrier to development in themselves; in the financing context, they become direct risk factors affecting the sustainability of maritime projects. Rising levels of coastal pollution, particularly plastic waste which accounts for a significant proportion of water pollutants, lead to the degradation of marine ecosystems and a reduction in the productivity of related economic activities such as fishing and coastal tourism, thereby reducing expected cash flows and increasing investment uncertainty (Lahouazi, 2024).

At the regional level, declining fish stocks and the impacts of climate change in the Mediterranean exacerbate the fragility of marine resources, undermining the sustainability of projects based on biological exploitation and making them more vulnerable to natural fluctuations. These environmental risks are reflected in higher insurance and financing costs, or in financial institutions’ reluctance to fund projects with unstable returns (Boukourou & Boutella, 2024, pp. 289–290).

Consequently, the poor quality of the coastal environment not only affects the ecological dimension but also limits the attractiveness of the blue economy as a long-term investment destination.

IV.3. Technical and Institutional Challenges

The lack of modern maritime infrastructure and technology represents an additional obstacle to the development of advanced blue projects capable of attracting international funding. Weak digital systems, inadequate port facilities, and limited environmental monitoring and water resource management technologies are all factors that reduce operational efficiency and increase initial investment costs, thereby weakening the competitiveness of projects compared to their counterparts in developed countries.

Furthermore, the shortage of specialised expertise in the fields of marine engineering, marine renewable energy, and environmental project financing makes it difficult to prepare professional feasibility studies and projects structured in accordance with international standards, which limits Algeria’s ability to present bankable projects to development institutions and foreign

investors. This challenge is further exacerbated by the limited regional cooperation in the transfer of maritime technology and expertise (Boukourou & Boutella, 2024, pp. 288–295).

It is clear from the above that the challenges facing blue finance in Algeria are not linked to a scarcity of natural resources, but rather to the weakness of the institutional and financial environment capable of transforming these resources into viable investment opportunities. Consequently, the success of this form of financing remains contingent upon structural reforms, including economic diversification, the development of financial markets, the improvement of the quality of the coastal environment, and the building of technical capacity, thereby reducing risks and bolstering investor confidence. Without these conditions, the blue economy in Algeria will remain an area of latent potential rather than a sector that attracts capital.

V. Analysis of the Blue Finance Gap in Algeria: A Quantitative Perspective

An analysis of the financing gap provides a quantitative perspective through which the volume of required resources can be assessed against those available, thereby illustrating the scale of investment needed to develop the blue economy in Algeria. The financing gap is based on a comparison of the total investment needs for maritime and coastal activities eligible for blue financing with the financial resources available from the general budget, development finance, and private investment.

V.1 Estimation of Investment Needs

Investment needs cover the following sectors: low-carbon maritime transport, sustainable fisheries, aquaculture, marine renewable energy, eco-tourism, and the protection and restoration of ecosystems. Based on international studies and national reports, the total annual needs for each sector can be estimated as follows:

Table (03): Annual investment requirements (million USD)

Sector	Annual Investment Needs (Million USD)	Notes
Low-Carbon Maritime Transport	150	Upgrading ships and ports to comply with emission reduction standards
Sustainable Fisheries	100	Improving fisheries management and adopting environmentally friendly fishing techniques
Aquaculture	80	Transition to low environmental impact production systems
Marine Renewable Energy	200	Offshore wind projects and energy from waves and tidal sources
Coastal Eco-Tourism	60	Development of sustainable tourism infrastructure
Ecosystem Protection and	110	Environmental restoration projects and marine waste management

Restoration		
Total	700	–

Source: Researcher's estimates based on (UNCTAD, 2023), (Bank, Financing the Blue Economy, 2024), (Ministry of Fisheries, 2023)

First, data and estimates were collected from authoritative international reports, including UNCTAD (2023), the World Bank (2024), and OECD and sector-specific studies. These sources provided indicative investment ranges for key blue economy sectors at the global and regional levels.

Second, a sectoral breakdown approach was adopted by identifying the main components of the blue economy, namely maritime transport, fisheries, aquaculture, marine renewable energy, coastal tourism, and ecosystem protection. Each sector was analyzed separately to determine its specific investment needs.

Third, the collected international benchmarks were adjusted to the Algerian context by considering:

- The current level of infrastructure development
- National strategic priorities (energy transition, diversification, and environmental protection)
- The institutional and regulatory framework in Algeria
- Existing data from the Algerian Ministry of Fisheries (2023)

Fourth, a triangulation method was applied by comparing multiple sources and harmonizing the estimates to ensure coherence and consistency across sectors.

Finally, the total investment requirement was obtained by aggregating sectoral estimates, resulting in a total estimated annual investment need of approximately 700 million USD for the blue economy

V.2 Available Financial Resources

Available financial resources include: the general budget, concessional development loans, private investment, and innovative financing instruments such as blue bonds and blended finance. These annual resources, estimated in accordance with Algeria's financial circumstances, are as follows:

Table (05): Available financial resources

Source	Available Resources (Million USD)	Notes
Public Budget	250	Limited environmental and marine investments
Concessional Development Loans	100	From international financial institutions
Private Investment	80	Limited projects due to weak incentives
Blended Finance /	50	Potential for pilot projects

Blue Bonds		
Total	480	—

Source: Author's estimates based on (Finance, 2023), World Bank (2024), and IFC (2022).

V.3 The Financing Gap

The financing gap is calculated by subtracting available resources from investment needs, illustrating the additional investment required to make blue projects viable:

Table (06):Financing Gap by Blue Economy Sector (Million USD)

Sector	Investment Needs	Available Resources	Financing Gap	Notes
Low-Carbon Maritime Transport	150	100	50	Requires additional financing through partnerships or blue bonds
Sustainable Fisheries	100	60	40	Potential partial support from blue carbon credits
Aquaculture	80	50	30	Financing from concessional loans and the private sector
Marine Renewable Energy	200	120	80	Largest gap due to capital-intensive nature
Coastal Eco-Tourism	60	40	20	Financing possible through partnerships and private investments
Ecosystem Protection and Restoration	110	110	0	Can be covered by the current budget and blended finance programs
Total	700	480	220	—

Source: Calculated by the researcher based on the tables above, with reference to: UNCTAD (2023), World Bank (2024), IFC (2022).

The estimates presented in the previous tables indicate that the annual investment requirements for blue economy sectors amount to approximately USD 700 million, while the available financial resources are estimated at only USD 480 million. Accordingly, the financing gap is estimated at: USD 220 million annually

This financing gap reflects several structural constraints, including:

- **Limited Mobilization of Public Resources :** Although public budget allocations represent a significant share (USD 250 million), they remain insufficient compared to the overall investment needs due to competing national priorities.
- **Weak Attractiveness for Private Investment :** Private investment accounts for only USD 80 million, which highlights:

- Insufficient investment incentives
- Perceived high risks
- Limited regulatory clarity in marine-related projects
- **Underutilization of Innovative Financing Mechanisms** : Instruments such as:
 - Blended finance
 - Blue bonds
 remain at a pilot stage (USD 50 million), despite their strong potential to mobilize additional resources.

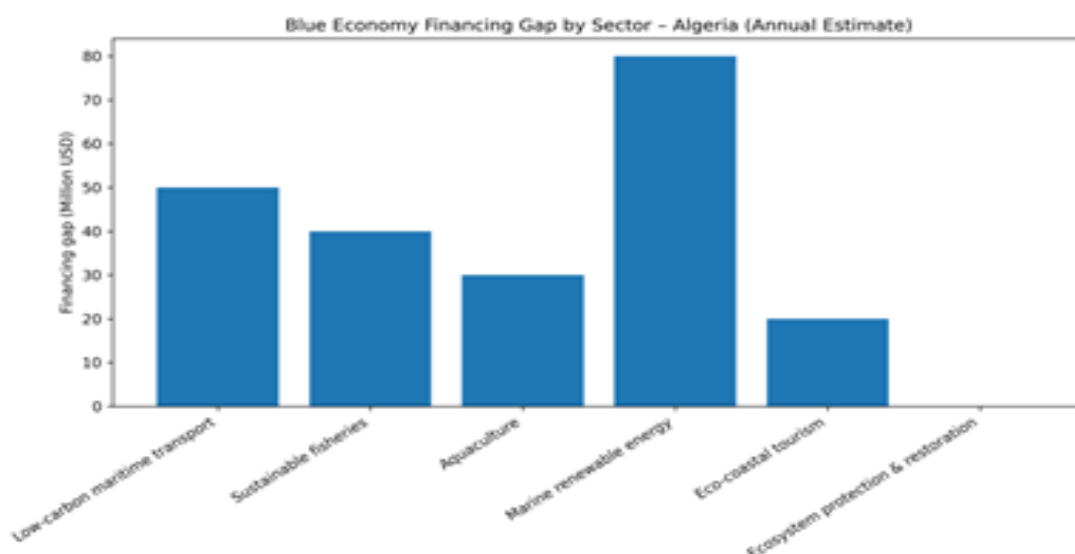
-Limited Reliance on Concessional Development Finance : Concessional loans amount to USD 100 million, which is insufficient to meet the financing needs of large-scale strategic projects.

The identified financing gap suggests that the main constraint facing the blue economy is not the lack of investment opportunities, but rather the difficulty in mobilizing adequate financial resources. From an economic perspective, the persistence of this gap may lead to:

- Delays in implementing marine and coastal projects
- Slower transition towards a sustainable blue economy
- Reduced contribution of the sector to economic diversification

In order to complement the quantitative analysis and go beyond a mere tabular presentation of figures, it is necessary to employ a visual representation that more clearly highlights the disparity in investment needs between the various maritime sectors, whilst revealing the scale of the financing gap that limits the blue economy's capacity for development in Algeria. The graphical representation facilitates comparison between capital-intensive sectors and those with lower costs, thereby enabling the identification of priority areas for resource mobilisation and the design of appropriate financing instruments.

Figure 5. Annual Blue Economy Financing Gap by Sector in Algeria (Million USD)



Source: Author's calculations based on World Bank, (OECD ,2023), (AfDB, 2022)

The sectoral distribution of the financing gap shows that the challenge in Algeria is not only linked to the scarcity of financial resources, but also to the nature of the investment structure itself, where needs are concentrated in activities requiring significant capital, advanced technologies and long payback periods. This reflects the limited capacity of traditional public finance to meet these requirements, necessitating a shift towards more innovative mechanisms such as public-private partnerships, blended finance, and green bonds, as well as attracting specialised foreign investment. Thus, closing the financing gap depends more on reforming the financial system and enhancing the attractiveness of the investment environment than on simply increasing the volume of expenditure.

V.4 Interpretation of Results

The quantitative analysis reveals that Algeria's blue economy faces a structural imbalance between growing investment needs and available financing resources, with the annual gap reaching a significant level that reflects the limited capacity of traditional public financing to keep pace with the requirements of the transition towards sustainable maritime activities. This gap is concentrated primarily in capital-intensive sectors, notably marine renewable energy and low-carbon maritime transport, which are characterised by high entry costs, long payback periods and high technical risks, thereby reducing their attractiveness to the private sector in the absence of appropriate guarantee and incentive mechanisms. Conversely, certain environmental and social activities demonstrate a greater capacity to benefit from public funding, which opens up the possibility of redirecting public resources towards catalytic functions rather than direct funding. Consequently, closing the financing gap is not merely a matter of increasing expenditure, but requires institutional and fiscal reform, including the development of innovative instruments such as blue bonds, blended finance, and blue carbon markets, alongside strengthening public-private partnerships to make marine projects more bankable and sustainable in the long term.

VI. Analysis of the Feasibility of Blue Finance Mechanisms in Algeria in Light of Investment and Institutional Constraints

Although Algeria possesses significant marine and coastal potential that qualifies it to develop a promising blue economy, the transformation of this potential into bankable investment projects does not depend solely on the abundance of natural resources or the existence of political policies supportive of sustainability, but relies primarily on the capacity of the financial and institutional system to mobilise long-term capital and manage the risks associated with capital-intensive maritime activities. Projects to protect coastal ecosystems,

develop marine renewable energy, and modernise port infrastructure require sources of funding that go beyond the traditional reliance on the state budget.

In this context, blue finance offers a range of market-based, sovereign and contractual instruments that are theoretically capable of channelling resources towards a sustainable maritime economy. However, the effectiveness of these instruments in the Algerian context remains contingent upon their suitability to the characteristics of the national market, the maturity of the institutional environment, and the state's ability to share risks with the private sector. Accordingly, this section adopts an analytical approach to assess the feasibility of implementing blue finance mechanisms in Algeria from an investment and institutional perspective, rather than merely presenting them as theoretical options.

VI.1 Analytical Framework for Assessing Feasibility

International literature indicates that the success of sustainable finance instruments is linked to three main pillars: the depth of the financial market, the clarity of regulatory frameworks, and the efficiency of corporate governance (OECD, 2023; IFC, 2022). The absence of these elements increases the cost of capital and limits projects' ability to reach the stage of bankability.

Accordingly, this assessment is based on four interrelated analytical criteria:

- The suitability of the instrument to the structure of the national financial market;
- The maturity of the legislative and institutional framework governing environmental investment;
- The capacity to mobilise public and private resources and share risks;
- The size of the financing gap in the maritime and coastal sector.

This framework allows for a transition from a conceptual approach to a realistic assessment of feasibility within the Algerian context.

VI.2 Assessment of the Suitability of Blue Finance Instruments

VI.2.1 Blue Bonds: Blue bonds enable the mobilisation of significant long-term capital; however, their issuance requires a deep financial market, active institutional investors, and clear environmental disclosure and transparency frameworks (World Bank, 2023). Given the limited liquidity of the domestic market and the fact that financing relies primarily on banking channels and public spending, the applicability of this instrument in Algeria remains weak in the short term, unless accompanied by structural reform of the financial market and the strengthening of governance standards.

VI.2.2 Blue Carbon Credits: This mechanism requires relatively low initial capital and relies on results-based financing, linking financial incentives to the protection of coastal ecosystems (World Bank, 2025). Algeria possesses the natural conditions to develop coastal ecosystem restoration projects; however, the absence of measurement, reporting and verification (MRV) systems, a national

carbon market and specialised technical expertise limits the immediate benefits. Consequently, it is a promising tool but one contingent upon institutional capacity-building.

VI.2.3 Debt-for-Nature Swaps: This mechanism offers a sovereign option to reduce the debt burden in exchange for a commitment to environmental protection programmes, and has proven effective in several developing countries (Marchant, 2024). Given Algeria's relative dependence on public finance and its need to diversify funding sources without increasing debt, this instrument appears more suited to the characteristics of the national economy than market-based instruments.

VI.2.4 Public-Private Partnerships (PPPs): Empirical evidence suggests that investment partnerships are among the most effective mechanisms for financing blue economy projects, as they allow for risk-sharing and the mobilisation of private capital without the need for a developed financial market (IFC, 2022). Given the constraints on public budgets, this mechanism represents the most realistic option for financing sustainable coastal tourism, port management, marine renewable energy, and nature reserves.

VI.3 Institutional and Legislative Determinants

The success of blue finance is linked to the existence of a coherent regulatory environment that mitigates investment risks and reduces transaction costs. However, the Algerian framework is characterised by a multiplicity of stakeholders and a fragmentation of powers across the environment, fisheries, tourism and energy sectors, without a unified coordination mechanism, leading to slow procedures and complex licensing processes.

Furthermore, the absence of a national taxonomy for sustainable activities and internationally recognised environmental disclosure standards limits financial institutions' ability to channel finance efficiently and undermines the confidence of foreign investors (OECD, 2023). Added to this is the limited adoption of ESG criteria within public and financial institutions, which weakens integration into global sustainable finance markets (IFC, 2022). Consequently, reforming the institutional environment is a prerequisite for the effective implementation of any financing instrument.

VI.4 The Financing Gap and Investment Needs

Algeria faces a clear gap between the development needs of the maritime and coastal sector and the available public resources, particularly in the areas of pollution control, port modernisation, fisheries management, and the development of marine renewable energy. Heavy reliance on oil revenues makes environmental spending vulnerable to fluctuations in energy prices, undermining the sustainability of long-term financing.

International institutions recommend the adoption of blended finance as a

mechanism for risk-sharing and stimulating private sector participation by combining public resources, international grants and private capital (AfDB, 2022), an option that appears appropriate for the Algerian context.

VI.5 Strategic Trade-offs Between Mechanisms

It appears that blue finance instruments do not enjoy the same degree of applicability in Algeria; market-based instruments, foremost among them blue bonds, remain dependent on the development of the financial market, whilst blue carbon credits represent a future opportunity contingent upon technical capacity-building. Conversely, debt-for-nature swaps and investment partnerships appear to be more in line with current institutional and financial characteristics, as they rely on sovereign negotiation or direct contracting rather than an advanced market structure.

Table (06): Comparative assessment of the suitability of blue finance instruments in Algeria

Instrument	Key Implementation Requirements	Strengths	Constraints in the Algerian Context	Suitability Level	Time Horizon
Blue Bonds	Deep financial markets, institutional investors, disclosure and ESG standards	Mobilization of large and long-term capital	Low market liquidity; absence of a national sustainable classification	Low–Medium	Medium/Long term
Blue Carbon Credits	Measurement, reporting and verification (MRV) systems; international registration; technical expertise	Results-based financing; attraction of international climate finance	Absence of a national carbon market; lack of expertise	Conditional Medium	Medium term
Debt-for-Nature Swaps	Sovereign negotiations; support from international institutions	Debt reduction + direct environmental financing	Complexity of negotiations ; reliance on external partners	High	Short/Medium term
Public-Private Partnerships (PPPs)	Clear contractual and regulatory framework; risk-sharing mechanisms	Mobilization of private capital and technical expertise; no need for	Governance risks; lengthy procedures	Very High	Short/Medium term

		advanced financial markets			
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Source: Prepared by the researcher based on: World Bank, 2023–2025; IFC, 2022; OECD, 2023.

Based on the above, the implementation of blue finance in Algeria does not require a complete replication of international experiences, but rather a gradual approach based on selecting the instruments most compatible with the local institutional and financial reality. It appears that launching public-private partnerships, blended finance and debt-for-nature swaps represents a practical path to mobilising resources and mitigating risks, provided this is accompanied by legislative and institutional reform that strengthens governance and transparency and paves the way for the adoption of advanced market-based instruments in the future. Only in this way can we move from latent maritime potential to an actual blue economy capable of attracting long-term investment and achieving sustainable development.

VII. Conclusion

This study analysed the potential of blue finance as an innovative mechanism for financing sustainable maritime activities and supporting the development of the blue economy in Algeria. The analysis showed that although Algeria possesses considerable natural and geographical advantages—such as its extensive coastline and rich marine resources—the transition towards a fully developed blue economy remains constrained by several structural challenges. The quantitative assessment highlighted the existence of a significant financing gap between the investment needs of maritime sectors and the financial resources currently available. This gap is particularly evident in capital-intensive sectors such as marine renewable energy and low-carbon maritime transport, which require long-term capital and advanced technological capacities.

Furthermore, the study demonstrated that the effectiveness of blue finance instruments in Algeria depends largely on the quality of the institutional and financial environment. Limited financial market depth, fragmented governance structures, and the absence of specialised regulatory frameworks for sustainable finance reduce the attractiveness of marine projects to investors.

In this context, the research emphasises the importance of adopting a gradual and pragmatic strategy for implementing blue finance mechanisms. Strengthening public-private partnerships, expanding the use of blended finance, and improving institutional governance appear to be the most feasible pathways in the short and medium term. At the same time, developing regulatory frameworks for sustainable finance and enhancing technical capacities would pave the way for more advanced instruments such as blue bonds and blue carbon markets in the long term.

Ultimately, the successful implementation of blue finance in Algeria could transform the country's maritime resources into a strategic driver of sustainable economic growth, while simultaneously contributing to environmental protection and the achievement of sustainable development goals.

Study Findings

The study produced several key findings:

1. **Significant potential for the blue economy in Algeria:** Algeria possesses substantial natural assets, including a long Mediterranean coastline and diverse marine resources, which provide strong foundations for developing blue economy activities such as marine renewable energy, fisheries, and eco-tourism.
2. **Existence of a structural financing gap:** The quantitative analysis indicates a considerable gap between annual investment needs and available financial resources in maritime sectors, estimated at approximately **220 million USD annually**.
3. **Institutional and regulatory constraints:** The absence of specialised policies for blue finance, limited coordination between institutions, and weak financial market depth hinder the mobilisation of capital for maritime projects.
4. **Unequal feasibility of blue finance instruments:** While market-based instruments such as blue bonds face structural limitations in the short term, mechanisms such as public-private partnerships and blended finance appear more suitable for the Algerian context.

Study Recommendations

Based on the findings, the study proposes several strategic recommendations:

1. **Developing a national strategy for the blue economy** that integrates sustainable financing mechanisms and aligns maritime development policies with environmental objectives.
2. **Strengthening the institutional and regulatory framework** by introducing legislation supporting sustainable finance, environmental disclosure standards, and ESG criteria within financial institutions.
3. **Promoting public-private partnerships (PPPs)** to mobilise private investment in coastal infrastructure, eco-tourism, port modernisation, and marine renewable energy.
4. **Expanding the use of innovative financing instruments**, particularly blended finance mechanisms and concessional development funding, in order to reduce investment risks and attract international investors.

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