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MARITIME CLUSTERS BLUE ECONOMY REPORTING

CallmeBLUE

Cluster ALLiance MEd BLUE

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Summary CallmeBLUE Project

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The role of maritime clusters is increasingly important in the process of connecting public and private entities working in all transversal sectors related to blue economy at both national and Mediterranean level. Maritime clusters are indeed crucial facilitators of networking, technology transfer, internationalisation and innovation between SMEs, large companies, research centers, universities etc., and they act as key actors to promote sustainable investments of the blue economy.

CALLMEBLUE aims to strengthen existing clusters alliances in the Mediterranean area in order to accelerate north-south regional cooperation processes towards the emerging of strategic maritime clusters in North Africa area (south-south cooperation). CALLMEBLUE will aim to create a strategic vision and transferable models of interregional cooperation.

In particular, CALLMEBLUE will aim to implement concrete actions at both local and regional level in order to raise awareness on the relevance of Maritime clusters as key actors for a sustainable blue economy policy. The project will indeed promote exchange of best practices and knowledge transfer between north and southern area, including piloting learning activities aimed at offering a transferable training "Toolkit", addressed to future maritime clusters in the southern area in order to be prepared on the legal, structural, administrative and management aspects for a concrete creation of future maritime clusters.

CALLMEBLUE ambition is to set-up and strengthen maritime clusters alliances (North-South cooperation) – particularly targeting southern Mediterranean countries (South-South cooperation) but also allowing to enhance regional dialogue and more advanced services offered to Cluster Mediterranean ecosystem. At this aim, CALLMEBLUE offers its role as an accelerator for the policy goals set by relevant regional initiatives such as the UfM Ministerial Declaration for sustainable blue economy and the WestMED Initiative.

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Executive Summary

The mapping and networking analysis amongst embryonic and emerging maritime cluster foreseen in the WP2, aims at creating the proper framework on which the foreseen actions in the following WPs will be implemented.
In particular the objective is to get a clear picture on which countries have an interest in the creation of maritime clusters and/or are willing to strengthen existing clusters initiatives, particularly in the southern shore of the Mediterranean countries which suggest a greater interest for cluster as well as those where active cluster initiatives have been already identified.

The report will start setting the scene by exploring a detailed background of the blue economy in the Mediterranean, exploring the crucial role of clusters and their huge impact and key role in achieving a sustainable blue economy. A closer look is taken to blue clusters initiatives in the Mediterranean area, at northern and southern shore levels. In particular, for the latter blue clusters' initiatives for Algeria, Egypt, Libya, Mauritania, Morocco and Tunisia are closely analysed, providing an overview of economic background, potential interest in clusters initiatives and in blue economy.

Once these bases are set, the report moves on with the field analysis and needs assessment process results. Based on the six countries analysed, a detailed overview of the most promising sectors was provided, analysing points of strengths as well as weaknesses due to challenges and obstacles encountered. The results emerged thanks to the involvement of relevant actors of each country in surveys, focus groups and interviews and detailed research, where potential actions to improve governance capacity for each country, potential actions to facilitate cooperation between stakeholders and potential cross-fertilisation activities is highlighted.

From the analysis results have highlighted for each country a huge potential, not only in traditional sectors, but also in emerging sectors. The potential of clusters initiative that will foster and support the implementation of activities in the sector analysed is clear, and results emerged in the report shall represent the basis on which actions foreseen in WP3 and WP4 will be built upon, in particular for what concerns the piloting actions. The piloting actions are aimed to relevant local actors identified in WP2 with a bottom-up approach.

Methodology

The work package 2 "Mapping and Networking amongst embryonic and emerging maritime clusters" has a strategic importance for the CALLMEBLUE project, as it set the basis to implement strategic and concrete actions at the local level, including – but not limited to – piloting actions in the southern shore countries where clusters initiatives are emerging or strengthening.

WP2 has followed a specific timeline:

WP2 - MAPPING AND NETWORKING AMONGST EMBRYONIC AND EMERGING MARITIME CLUSTERS	M1	M2	M3	M4	M5	M6	M7	M8	M9
Task 2.1 - Desk analysis and Mapping of strategic actors of the southern Med Blue ecosystem									
Task 2.2 – Needs Assessment Process									
Task 2.3 - Database building									

Figure 1 - WP2 timeline

Although the activities should have been completed by M8, the WP2 timeline has been slightly extended to ensure high quality of expected results, which include an accurate needs assessment process including field analysis through various organisations based in the Southern shore countries. The timeline extension was beneficial to project results and expectations. The extension is highlighted in blue in the table above.

The **task 2.1** – desk analysis and mapping of strategic actors of the southern Mediterranean ecosystem – has been completed as per schedule and results expected have been successfully achieved. The aim was to set the basis for the following tasks implementation. The task 2.1 results were to identify at least **three countries** suggesting greater interest for maritime clusters implementation and/or have some active cluster initiatives, and at least **seven main local, regional, national actors in each of the selected countries.** The selected countries and actors in task 2.1 have then been involved in the needs assessment process foreseen in task 2.2. As the KPIs table shows (Table 1) the expected results have been achieved even beyond expectations.

In order to reach the KPIs, in occasion of the kick-off meeting, held in Rome on 4-5 December, the overview of the WP was given and the objectives and next steps were clearly stated. Partners, associated partners and advisory board members have

actively joined this activity in support of the WP leader, identifying a list of actors and countries, providing contacts, documents and reports aimed carrying out an up-to-date analysis during task 2.2. In addition to that, Cluster BIG, as WP leader, has contributed also with its know-how and contacts gained through experience in internationalisation activities carried out throughout the years.

Task 2.2 represents the core of WP2 as it aimed at going through the list of identified countries and actors and assess the main challenges and opportunities in terms of maritime clusters creation and/or development through specific actions, such as surveys, interviews, online focus groups etc. The expected results under this task were to identify at least **five most promising blue economy sectors and value chains** to be supported by clusters, at least **five challenges and obstacles that may represent business opportunities, priorities for investments** in the blue economy sector, at least **five actions for improving existing initiatives and governance capacity**, at least **two actions to facilitate cooperation and create business opportunities between stakeholders** and potential **cross-fertilisation activities and lessons learned that will be used for at least five entities** in Mediterranean countries. Results have been achieved also in this case, as shown in the KPI table (Table 1).

In particular, this task was carried out by the WP leaders alongside with a subcontractor which assisted in the interviews and survey phase, providing methodological support, sharing best practises and designing focus groups, with the aim to contribute to the quality of results in key phases of the project. The subcontractor has been selected through an open call, collecting at least three quotes and the best service was chosen in terms of price and quality. Once the subcontractor has been selected, periodic meeting with the WP leaders have been carried out to discuss on methodology of the needs assessment phase and constant updated on the state of progress of the activities. In particular the subcontractor has focused on analysis related to Morocco and Mauritania, sharing common methodology with the WP leaders. Details on the needs assessment analysis have been analysed in a dedicated section.

The last task, namely **task 2.3**, had the aim to summarise the results in a quantitative and qualitative manner, by producing **a dataset** (see table 1) outlining country by country the identified barriers and gaps at sea basin level in the Southern area. The dataset has highlighted the following results: **at least three selected countries; at least five selected promising sectors in the blue economy; at least five selected actors involved in the assessment phase per each country; at least five actions and at least five challenges that may lead to new business**

opportunities and investments in the blue economy sector. Dataset is available in annex 1 and as a separate deliverable (D2.2).

Before analysing the results reached out through the various tasks outlined in the methodology, this report will provide some context focusing on the blue economy in the Mediterranean Basins.

List of KPIs

Below is an overview of the KPI expected from WP2 and their respective actual results. In all cases the expected KPIs have been reached and in some cases results even exceeded expectations.

Table 1 - List of KPIs

KPI				
Tasks	**KPI**	**Country**	**Expected results**	**Results reached**
Task 2.1	identify at least 3 countries suggesting greater interest for maritime clusters implementation and/or have some active cluster initiatives		3	**6**
	at least 7 main local, regional, national actors in each of the selected countries	Algeria	7	**75**
		Egypt	7	**7**
		Libya	7	**25**
		Mauritania	7	**10**
		Morocco	7	**30**
		Tunisia	7	**37**
Task 2.2	at least 5 most promising blue economy sectors and value chains to be supported by clusters	Algeria	5	**6**
		Egypt	5	**6**
		Libya	5	**6**
		Mauritania	5	**5**
		Morocco	5	**8**
		Tunisia	5	**6**
	at least 5 challenges and obstacles that may represent business opportunities, priorities for investments in the blue economy sector	Algeria	5	**12**
		Egypt	5	**8**
		Libya	5	**16**
		Mauritania	5	**6**
		Morocco	5	**5**
		Tunisia	5	**12**
	at least 5 actions for improving existing initiatives and governance capacity	Algeria	5	**35**
		Egypt	5	**31**
		Libya	5	**20**
		Mauritania	5	**6**
		Morocco	5	**5**
		Tunisia	5	**27**
	at least 2 actions to facilitate cooperation and create business opportunities between stakeholders	Algeria	2	**27**
		Egypt	2	**23**
		Libya	2	**16**
		Mauritania	2	**2**
		Morocco	2	**2**

KPI				
Tasks	**KPI**	**Country**	**Expected results**	**Results reached**
		Tunisia	2	**22**
	potential cross-fertilisation activities and lessons learned	Algeria	1	**10**
		Egypt	1	**21**
		Libya	1	**21**
		Mauritania	1	**3**
		Morocco	1	**1**
		Tunisia	1	**13**
Task 2.3	1 dataset outlining country by country the identified barriers and gaps at sea basin level in the Southern area (DELIVERABLE 2.2)		1	**1**

Desk analysis and mapping of strategic actors of the southern med blue ecosystem

Background

"A green economy, called the blue economy when applied to Mediterranean coastal, marine and maritime sectors, promotes sustainable development while ***improving human well-being*** *and* ***social equity*** *and significantly* ***reducing environmental risks and ecological shortages****".*[1] The blue economy sector and all actors involved in carrying out activities in this multi-faceted area, play a key role in reaching sustainability objectives, fostering economic growth, creating new employment opportunities.

The blue economy's central role is highlighted very clearly when considering the data: it is in fact estimated that its turnover is around US$3 and 6 trillion, including employment, ecosystem services provided by the ocean, and cultural services.[2]

According to the Blue Economic Report (2021 edition), the Gross Domestic Product (GDP) of the EU-27 was estimated at €13.500 billion and employment at 193 million people in 2018.

Figure 2 - Contribution of the Blue Economy to the overall EU Economy

As the figure above shows, the contribution of the Blue Economy established sectors – namely the most traditional sectors i.e., marine living resources; port activities;

[1] (Bleu, January 2020), p. 7
[2] (United Nations, n.d.)

coastal tourism - to the European economy in 2018 was 1.5% in terms of Gross Value Added and 2.3% in terms of employment.[3]

By looking closely to the Mediterranean basin, it is clear the fact that it represents a key and strategic area where marine and maritime activities have always played a crucial role for the development of coastal areas. Along the years, especially with the emergence of new priorities and new strategic sectors in the blue economy, a boost of new business, investment and cooperation opportunities has clearly emerged.[4] The blue economy and all its multifaceted sectors are key components of the Mediterranean sea basin economy and it provides huge potential in terms of innovation and wealth: as a matter of fact, the Mediterranean Sea represents the fifth largest economy in the region, with a total value estimated at €4.7 trillion.[5]

Figure 3 - Mediterranean GMP[6]

A WWF's study shows that although the Mediterranean area covers only 1% of the global ocean area, in terms of Gross Marine Product (GMP), namely the annual economic output of all sectors related to the sea, it represents the 20% of the global GMP, making it the fifth largest economy. In fact, it is estimated that each year the GMP is $450 billion, and the greatest contribution comes from Italy, followed by Spain, France and Turkey.[7]

[3] (Blue Economy report, 2021), p. 18
[4] (Mancini, 2022), p.2
[5] (Bleu, January 2020), p. 7
[6] (Reviving the economy of the Mediterranean Sea, 2017), p.10
[7] (Reviving the economy of the Mediterranean Sea, 2017), p. 9

The central role of the Mediterranean in the economic contribution has, however, faced several unregulated activities that has compromised the sea's health. Hence, increasing regional support and cooperation is key: all countries and actors involved in blue economy activities shall join forces create a new sustainable path of the blue economy development in the Mediterranean.

Blue economy clusters do represent the key organisations at regional, national and international level that act as main facilitator for actors involved in blue economy activities, including public and private actors such as operators, large enterprises, SMEs, research centres and universities, secondary schools and VET institutes, national agencies, local and national administrations, institutions and policy makers.

Results that blue clusters may help to achieve are many and the impact on the sustainable blue economy benefits are hugely relevant:

Figure 4 - Blue economy clusters benefits to a sustainable blue economy

Nonetheless, to maximise the sustainability results in the Mediterranean Sea basin, a large and diversified area connecting many different countries, it is a priority to getting to know the overall cluster ecosystem in the area, including northern and southern shore countries. Dynamics, sectoral priorities, political challenges are only a few elements to take into consideration in the overall analysis and on having a comprehensive overview of the blue clusters' initiatives in the Mediterranean area.

Blue clusters initiatives in the Mediterranean area

According to an analysis carried out by the Union for the Mediterranean, clusters can be classified in several ways, specifically based on their level of maturity, the adopted approach and based on their distribution at the geographical level.[8]

The **levels of maturity** are mainly four and the difference lies on their operational progress:

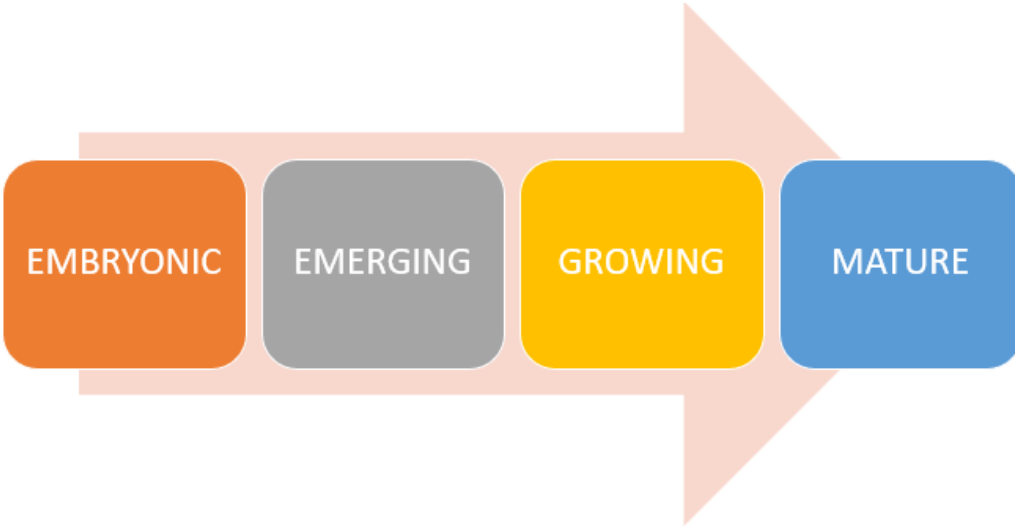

Figure 5 - Clusters classification by operational progress

Embryonic clusters are not operational yet, while **emerging clusters** are setting the basis to become operational. Both embryonic and emerging clusters are mostly based in the southern shore, aim at increasing their competitiveness by aggregating all relevant actors in one unique industrial district with joint services (e.g., internationalisation & export, sectorial training etc..) and therefore they act as a "wedge" to access European and international markets in a systemic and integrated way.

Growing clusters have established their operations for a limited number of years, while **mature clusters** for several years. Both growing and mature clusters are mostly based in the northern shore of the Mediterranean, and they are more oriented towards R&I and they address actions towards these aspects to catch industrial and commercial opportunities.

The approach adopted by clusters in blue economy activities and sectors can also be classified, specifically in two main categories: **cross-cutting approach,** whose activities touch upon a wide range of sectors of the blue economy, and **sectoral**

[8] (Union for the Mediterranean (UfM), December 2019), p. 14

approach, focused on few related activities and at times covering both maritime and inland activities.[9]

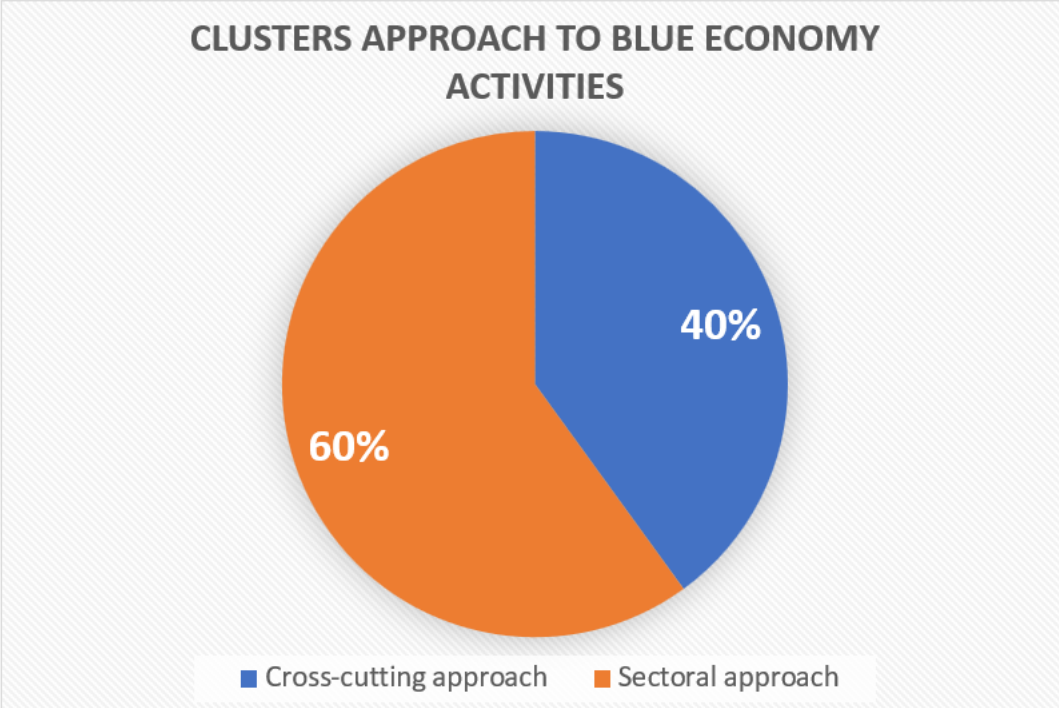

Figure 6 - Clusters approach to blue economy activities

Despite the approach adopted by clusters, the activities are mainly focused on specific sectors of the blue economy at various levels, including not only more traditional sectors (i.e., aquaculture; transport; tourism), but also emerging and innovative sectors (i.e., biotech; safety and surveillance; desalination). This is worth noting as the blue economy is constantly evolving and clusters are the main tools that blue economy actors can rely on to be up-to-date with most recent developing trends and needs. The figure below shows the distribution of activities among traditional and emerging sectors, as analysed by the Union for the Mediterranean.[10]

[9] (Union for the Mediterranean (UfM), December 2019), p. 14
[10] (Union for the Mediterranean (UfM), December 2019), p. 15

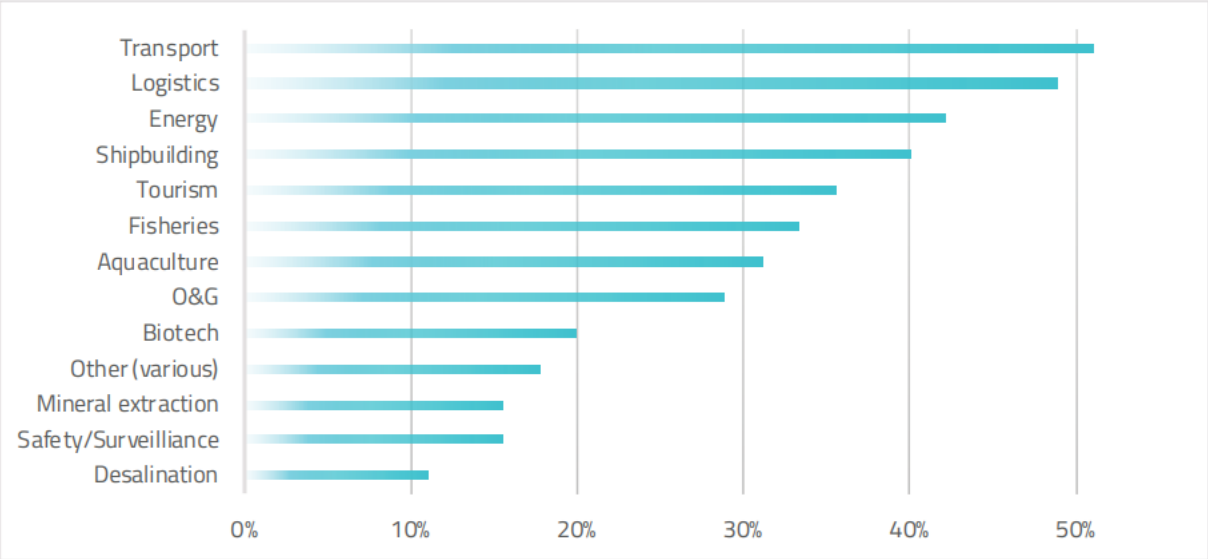

Figure 7 - Distribution over blue economy activities

The cluster initiatives distribution across the Mediterranean area depends on many factors. This includes the priority given to the overall Blue Economy, proportion of territories with Mediterranean coastlines, development of central or regional/local clusters,[11] as well as economic vocation of the area, supply chain efficiency, sectoral industrial and commercial partnerships, especially in the international markets. As a matter of fact, the clusters initiatives have evolved and grown in numbers in the past thirty years, starting from being a territorial aggregator of stakeholders impacting on the economic vocation of the designated area, going through evolving to increasingly powerful commercialisation tools serving larger organisations, optimising supply value chains and fostering internationalisation, to becoming platforms connecting actors operating in transversal and cross-cutting sectors fostering connection between actors, including those highly involved in new technology and innovation, and promoting sustainable job opportunities.

[11] *Ivi*, p.16

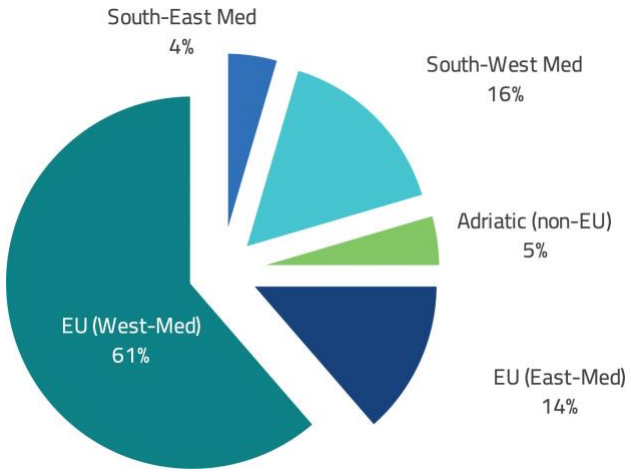

Figure 8 - Clusters distribution in the Mediterranean area

As shown in the figure above, blue economy clusters are mostly based in the northern shore of the Mediterranean, highlighting the high maturity level of activities. A smaller distribution is evident in the southern shore area where, as already stated, the clusters are mostly at an embryonic or emerging level.

The evolution of cluster initiatives in the southern shore area will be analysed taking into account the selected countries and their needs in terms of blue economy sectors, challenges and obstacles that may represent business opportunities, priorities for investments, actions for improving existing initiatives and governance capacity, actions to facilitate cooperation and create business opportunities between stakeholders and potential cross-fertilisation activities and lessons learned. All these aspects will be further assessed though a dedicated needs assessment analysis.

Blue clusters initiatives in the southern shore of the Mediterranean

From an overview of Clusters initiatives in the Mediterranean, it has emerged that emerging and embryonic clusters are more peculiar in the southern shore of the Mediterranean. Given the main scope of the CALLMEBLUE project, namely setting-up and strengthening maritime clusters alliances particularly targeting southern Mediterranean countries to assess the needs of more embryonic and emerging clusters, a closer analysis on the clusters initiatives in the area will provide a general context, in order to go further in depth in the needs analysis country by country.

In the specific case of clusters based in the southern shore of the Mediterranean, a further classification based on cluster types has been stressed by the Institut de Prospective Economique du Monde Méditerranéen.

Figure 9 - Cluster classification in the southern shore of the Mediterranean

Spontaneous clusters are often groups with long lasting history and culture built on specific know-how and nourished in a peculiar territory. Their evolution can reach relevant dimension to reach export markets.

On the other hand, **recognised clusters** are less culture based and more related to technology and industrial aspects and are oriented towards the competitiveness of the national economy. Recognised clusters can benefit of public policy support.[12]

Given the diversified political situation in the southern shore area and the diversifies socio-economic dynamics, the implementation of clusters initiatives, as well as the development of specific blue economy sectors, can only be analysed by taking into account that each country has its own peculiarities and priorities.

[12] (Cluster au Maghreb: Entre mondialisation et territorialisation, 2019), p.15

From a preliminary desk analysis, a general interest in the blue economy in the area has been assessed, in order to identify local, regional and national actors in selected countries for a more detailed needs assessment analysis (task 2.2) and for assessing the potential of clusters initiatives in the country.

In terms of **interest in the blue economy**, in some of the countries analysed the level of interest is unfortunately slowed down by the state's influence, making it difficult for a solid market to evolve also in terms of creation of employability and entrepreneurship opportunities, causing an exclusion from international dynamics and competitive supply chains. On the other hand, other countries that can benefit of a more centralised governance have allowed the implementation of more concrete regulations, fostering the creation of proper institution, agencies, education organisations in the blue economy, fostering R&I, entrepreneurship and international partnerships.

As far as clusters initiatives in the southern shore are concerned, it is crucial to consider that the political situation can influence the creation and growth of cluster initiatives, in particular in relation to specific sectors, such as the blue economy. The southern shore countries identified for this analysis – as highlighted in the figure below – are those where clusters initiatives are or can be implemented at different levels, and where a relevant blue economy interest at various levels has been encountered.

Figure 10 - Southern shore countries analysed

Algeria

According to a study conducted by the EuroMed Clusters Forward, the Algerian economy still heavily relies on oil exportations (around 90% of the merchandise export, 19% GDP in 2021), and despite the awareness of the importance of industrialisation, the government still limits foreign externalities and private investments, maintaining a nationalised approach.[13]

In this framework, clusters initiatives have been encountered, nevertheless there is still lack of proper cluster promotion and there is still room for development. Currently, clusters are mainly specialised in services industries related to logistics services and the organisation of their mutual pooling for different stages of supply chains such as transports and warehouses. In addition, there is increasing awareness of the importance of enforcing clusters initiatives through digital platforms and through the development of new projects with other European clusters.[14] Hence, it is clear that there is government's interest in cluster implementation.

Algerian clusters are, hence, quite young and have started operating less than 25 years ago since their government implementation, and they are an aggregate of organisations including, among others, enterprises, R&D education and training bodies, government and public administration entities, financial institutions. They follow a top-down approach aiming to achieving specific policy objectives, usually registered as non-profit-entities, or in few cases as national agencies.[15]

The growing clusters initiatives are more sector-oriented and focused on economic activities, i.e., tourism, green and renewable energy. In particular, according to a document published by the WESTMED Algerian Hub,[16] there is an ongoing strategy for the implementation of a cluster based on fishery and aquaculture sectors, which is a hugely relevant growing sector. As a matter of fact, fishery production in Algeria has increased over the past years, starting from producing 112.000 tonnes of fish in 2020 up to an expected production of around 166.000 tonnes in 2024. Likewise, an increasing investment has been registered in the fishery and aquaculture sectors.

[13] (Clusters in the MENA Region: Overview, Challenges and Opportunities, 2023), p.20
[14] *Ibidem*
[15] *Ivi,* p.22
[16] (Cluster Maritime Pêche, 2020), pp.32-38

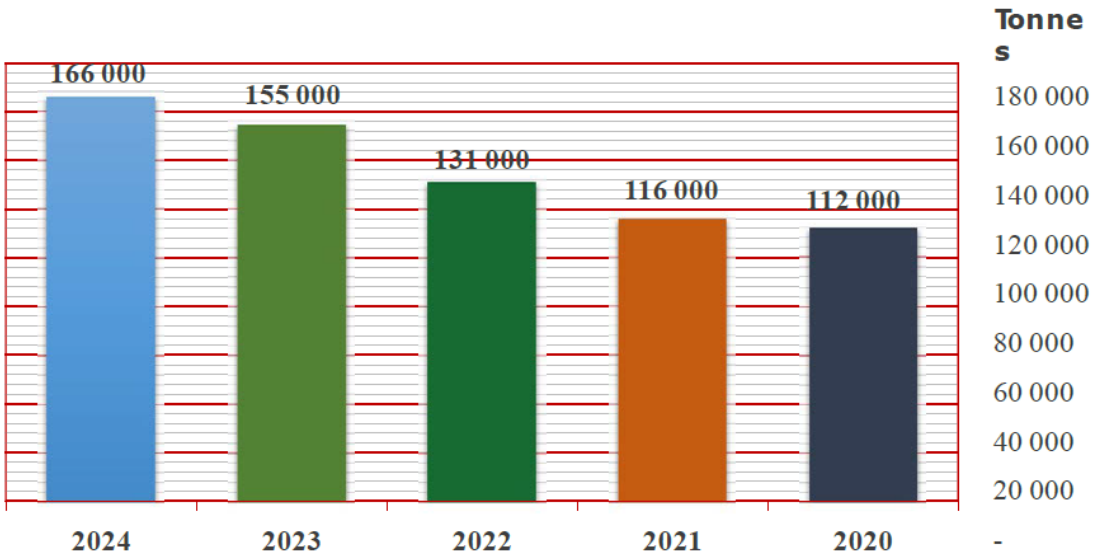

Figure 11 - Fish production in Algeria

Given this significant growth, six clusters in the sector have been created, each of these composed by research centres, training centres, chambers of commerce and associations, enterprises, young entrepreneurs and incubators, and they are spread all over the Algerian territory.[17]

Figure 12 - Distribution of fishery and aquaculture clusters in Algeria

Moreover, other blue economy sectors are in the Algerian government's radar, and attention has been paid in governmental strategies to implement new concrete

[17] *Ibidem*

actions in the national strategy towards 2030, in order to enhance the contribution of maritime activities to GDP, engage maritime and coastal communities and lead to an increasing economic diversification to reduce economic vulnerability.[18] An overview of sectors of interest is displayed in the figure below, highlighting the current status of development and related potential.[19]

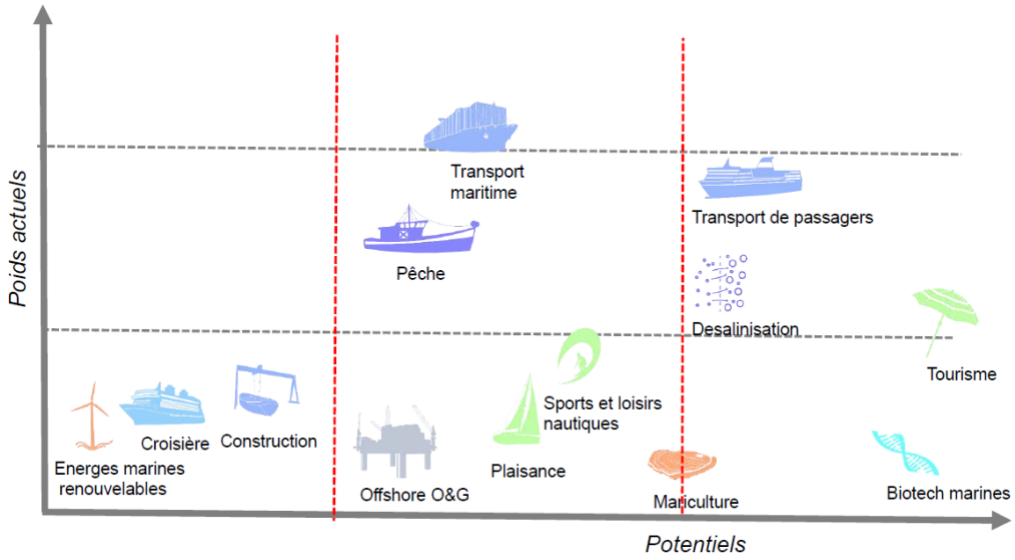

Figure 13 - Overview of blue economy sectors in Algeria

Given the increasing governmental interest in blue economy and in general in clusters initiatives, which will be further assessed through a needs assessment analysis, there is indeed potential for further implementation of blue clusters initiatives.

Egypt

Despite a significant industrialisation over the past years, the Egyptian economy is still facing adjustment-related issues due to difficulties shifting to a more liberal market economy, as the government still play a central role with numerous State-owned firms. In the MENA region, Egypt still plays a leading role in terms of

[18] (Economie bleue, PEM, enjeux et stratégie pour l'Algérie), p.7
[19] *Ivi*, p.22

economy, economic growth is still led by capital intensive sectors, which limit job creation and value added.

Nevertheless, in Egypt there is a great potential for cluster implementation and currently Egyptian clusters, like the Algerian ones, are still very much national-oriented and lack export clearance to access foreign markets. They are actually focused towards production of goods and services and are mainly sector-oriented (i.e., energy, water, environment services and solutions; R&D, fashion and design).[20] Egyptian clusters' composition – established less than 25 years ago – is similar to the Algerian ones, gathering various organisations (i.e., enterprises, R&D education and training bodies, government and public administration entities, financial institutions, marketing and communication entities), but unlike the Algerian clusters, they follow a bottom-up approach, meaning that cluster policies are addressed by local actors rather than by the government. Their legal status is different from other countries as the majority are associations, qualified industrial zone (QIZ), or technological zone/parks.[21]

Indeed, Egyptian clusters could benefit from a wider openness towards international markets, accessing to a larger network, matchmaking opportunities and international events, all chances to increase their value and competitiveness, also in blue economy sector, which the government strongly supports. In fact, Egypt is formulating its National Strategy for the Blue Economy to maximise the management of marine natural resources and achieve sustainable development. As stated by the Minister of Irrigation and Water Resources Hany Sewilam, there is an increasing pressure from climate change on all aspects of life, especially the water sector, therefore it is crucial to focus on the development of a national strategy in order to achieve new blue economy standards that will lead to results in terms of support to future generations, higher standard of living, income increase and new job opportunities.[22]

According to a study conducted by the World Bank, the most promising sectors are fisheries and aquaculture, coastal tourism, critical ecosystems, port infrastructure, offshore energy and mineral resources, and emerging economic activities such as desalination, all sectors threatened by climate change.[23] Here below is a figure displaying the distribution of sectors over the Egyptian territory.

[20] (Clusters in the MENA Region: Overview, Challenges and Opportunities, 2023), pp. 31-32
[21] (Clusters in the MENA Region: Overview, Challenges and Opportunities, 2023), p.33
[22] (Hamdy, 2023)
[23] (Rama Chandra Reddy Tarek A. Temraz), p. 3

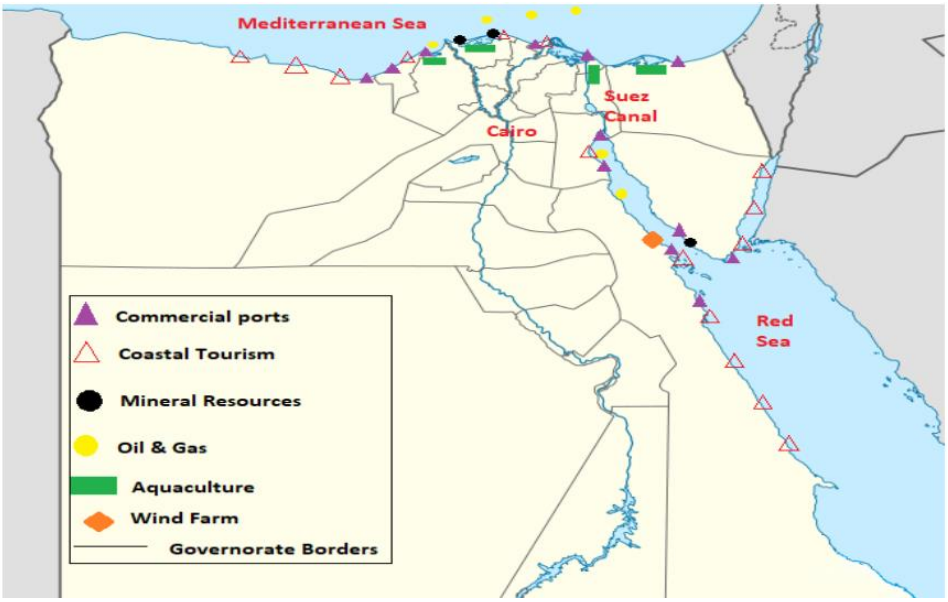

Figure 14 - Distribution of blue economy sectors over the Egyptian territory

The blue economy in Egypt will be indeed more focused on nature-based solutions and ecosystem services for biodiversity in the Red Sea, North Coast and several other regions. Through the new strategy, a detailed work plan will be developed and will be exploring all relevant sectors to the blue economy for the development of Mediterranean's coastal areas and its economic zones.[24]

Libya

The Libyan economy has faced a quite significant recession in the past years due to conflicts and low performance of hydrocarbon, services, and manufacturing sectors. In addition, obstacles have been posed by the lack of a concrete agreement for the unification of the Central Bank of Libya with its Eastern branch, affecting the country's monetary policy and banking system. In fact, despite a relevant GDP growth of 28,3% in 2021, the following year GDP growth only accounted for 12,1%.[25]

[24] (Hamdy, 2023)
[25] (African Development Bank Group, n.d.)

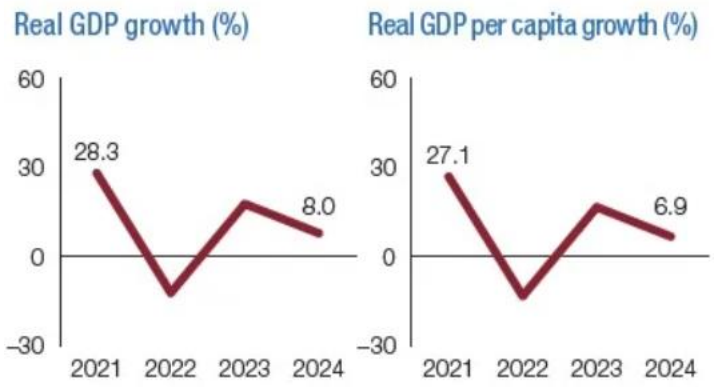

Figure 15 - Libyan GDP growth rate (2021-2024)

Moreover, Libya faces also several environmental challenges: Libya is in fact situated in an area where its climate conditions are influenced by both the Mediterranean Sea and the Sahara Desert, a dual source of heavy weather transitions. In addition, the lack of rivers and the low rainfall rate poses several challenges, in fact over 90% of water comes from fossil groundwater aquifers. Another foreseen high risk is the increase of temperatures and the number of droughts, with consequences on agriculture.[26]

Hence, there is need to act in a timely manner at the political level to respond to climate changes challenges, however, currently Libya has not elaborated a national climate change strategy yet.[27] In addition, the lack of political stability can slow down these processes, including clusters initiatives establishment.

As a matter of fact, clusters initiatives are still not developed in Libya, although there is a serious commitment to boost clusters creation in particular in the blue economy field. In this context, the WestMED Clusters Alliance play a crucial role to raise awareness on the blue economy related needs, on the importance of establishing a Libyan blue economy cluster, boosting the cooperation with its neighbours, in particular Tunisian maritime cluster, via potential strategic agreement.[28] Contacts were established with key government officials, including the Minister of Marine Resources that expressed enthusiastic support for the

[26] (ISPI - Italian Institute for International Political Studies , n.d.)
[27] (African Development Bank Group, n.d.)
[28] (WestMed Blue Economy Initiative, s.d.)

establishment of the maritime cluster. In February 2024, the initiative took concrete steps towards formalization by initiating procedures with the Civil Society Commission in Benghazi and Tripoli, and activities are still in progress.

The blue economy in Libya is, in fact, a sector of huge relevance and with over 1.900 km of coastline, more than 50.000 km^2 and about 70 coastal cities and villages, Libya emerges as being one of the key countries in the Mediterranean.
Investing in sustainable blue economy, focusing on relevant promising sectors,[29] would be something that the potential maritime cluster in Libya could focus on seeking governmental support.

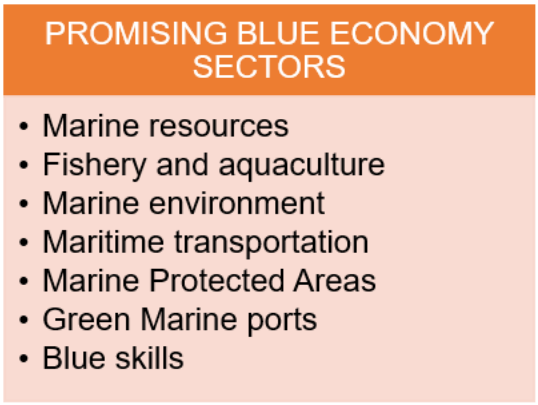

Figure 16 - Promising blue economy sectors in Libya

It is relevant to take into account that also through the WestMED Cluster initiative, Libya could benefit from the experience of neighbour existing clusters from both southern and northern shore, in particular Tunisia and Italy. In fact, the WestMED Italian hub is actively engaging with Libya to support in the process and the recent event held in Tripoli on 30th November 2023, where experts and blue economy stakeholders from government institutions, academia, research institutions and the private sector, discussed on the possibilities, opportunities and challenges in relation to the development of a sustainable blue economy in Libya, proving the huge potential and needs to speed up a cluster implementation process.[30]

Mauritania

In Mauritania the national Marine Cluster has been established in 2023, as one of the main results of inclusion and capacity building undertaken by the WestMED

[29] *Ibidem*
[30] *Ibidem*

Maritime Clusters Alliance. In fact, while the country had already started a virtuous path in some priority sectors of the Blue Economy (fishery first, but also MPAs and environmental protection), the engagement of public and private stakeholders, gathering them in a coordinated organization, was still to be implemented.

The country has focused its development strategy on the valorisation and processing of finished or semi-finished products, coming from the primary production (breeding and fishery), its infrastructural and logistics chain for the export, the preservation of these natural resources, the related maritime space protection and subsequent surveillance policies.

Within this landscape, the halieutic resources of Mauritania represent the main asset on which a Sustainable Blue Economy has been set, with a dedicated policy, governance and growing supply chain organization.

The Banc d'Arguin, the largest Marine Protected Area and the main global biosphere reserve on the Continent, recognized by the Ramsar Convention, is considered the most important spawning and nursery ground on the Atlantic coast of Africa.

The Mauritanian coastline conceals ichthyological riches characterized, at the same time, by their abundance (potential estimated at more than one and a half million tonnes per year), their density (up to 1,000 tonnes of fish per nautical mile square), their diversity (nearly 300 commercial species recorded) and the high market value of reference species (crustaceans, tunas, cephalopods).

Despite the insufficiency of catching resources and limited reception capacities, Mauritania is, with Morocco, the leading fishing power in Africa and the Arab World. With a weighted average harvest level of 1,000,000 T/year, it represents 20% of the Continent's sea fish production.

Almost all production is intended for export, domestic demand remaining marginal, fish consumption per capita remaining one of the lowest in the world, due to underpopulation and the historical absence of fish in food traditions and civilizational heritage.

Its overall contribution to the formation of the Gross Domestic Product oscillates between 6 and 10%, depending on the year.

Maritime fishing provides around 54,000 direct paid jobs, and nearly 200,000 indirect jobs, or 16 to 17% of the active population.

A strong institutional and governance structure is ensured by the Exclusive Economic Zone of 200 miles, in the Merchant Marine and Maritime Fisheries Code, adopted in 1978, by the New Fisheries Policy since 1979 with its progressive integrations (1987, 1994, 2000) till the adoption of The Sustainable Development and Management

Strategy for the Fisheries Sector and the Maritime Economy in 2015/2019, further extended by that of 2020/2024, with the establishment of the system of Individual Quotas (QI), to guarantee greater equity in access to the resource by facilitating, along the way, the control and statistical monitoring of samples.

Today the increasing synergies between the research&academic institutions and the production&processing organizations are allowing the definition of the permissible harvest potential (Total Authorized Catch – TAC-) for each year, and ensures close monitoring of stocks, through the use of catch statistics and proposes appropriate corrective measures to the Minister of Fisheries, responsible resource manager.

While the health, hygiene, product quality and compliance with current national and international standards are monitored by the well-equipped and competent National Office of Sanitary Inspection of Fisheries and Aquaculture, an export monopoly is carried out by The Mauritanian Fish Marketing Company (SMCP), including for fresh produce, fish flour and oil.

The National Fish Distribution Company (SNDP) was created in 2013 to ensure the distribution of fish within the country, at symbolic prices, gradually promoting the consumption of sea proteins among the population, improving the quality of food, contributing to food security and reducing pressure on livestock.

Currently, a Maritime Academy, meeting international standards, trains and retrains officers and non-commissioned officers of the National Navy, Coast Guard, Fisheries and Merchant Navy, in addition to initiation, apprenticeship and the development of fishermen.

The Ministry of Fisheries and Maritime Economy is certainly the central link and the backbone of the institutional architecture of governance of the sector, while the Nouadhibou Free Zone Authority, ensures guardianship of the 2 ports and management of the relevant city-port space.

As the robust setting of the fishery sector is showing, beside institutional and governance policies, Mauritania requires a clear support for the development of the private sector and of infrastructures dedicated to serve such growth, in all fields of Blue Economy. The national cluster may scale-up its activities in favour of the country's ecosystem, and its Atlantic and Mediterranean community, also through a specific range of services for local stakeholders.

The first WestMED national event, held in 2023, has marked an acceleration in this attitude, which is going to be progressively assisted by the Maritime Clusters Alliance.

Morocco

In Morocco clusters represent key pillars of economic diversification strategy, leveraging the country's natural resources, geographic location, and human capital to promote sustainable development and enhance global competitiveness. By fostering collaboration, innovation, and specialization within the clusters, Morocco is unlocking new opportunities for growth, job creation, and prosperity.

The Moroccan government actively supports the establishment and development of clusters as part of its broader economic development strategy. Cluster initiatives of different sectors, like Agriculture and Agribusiness clusters, Tourism clusters or Information Technology and Digital Services Clusters, are supported by a number of governmental enablers like policy framework, financial incentives, infrastructure development, regulatory reforms but also skills development as the government prioritizes skills development initiatives to build a skilled workforce capable of meeting the needs of cluster industries. This includes investments in education, vocational training, technical education, and lifelong learning programs tailored to the requirements of specific sectors within clusters. By addressing skills gaps and promoting human capital development, the government strengthens the competitiveness and sustainability of clusters.

The government has formulated policies and strategies to promote cluster development as a means of enhancing competitiveness, fostering innovation, and driving economic growth. These policies provide a framework for collaboration between government agencies, industry stakeholders, and academia to identify priority sectors, overcome barriers, and implement cluster initiatives effectively. To support further the clusters financial incentives including grants, subsidies, tax incentives, and access to financing have been developed. These incentives encourage private sector investment in cluster projects, infrastructure development, technology adoption, and innovation activities. Additionally, the government may provide funding for research and development, skills training, and capacity building within clusters. Crucial role is playing the infrastructure development like industrial parks, special economic zones, technoparks, and innovation hubs. These facilities provide physical space, utilities, and shared services to cluster participants, promoting collaboration, knowledge exchange, and networking opportunities.

At the same time the government undertakes regulatory reforms to create a conducive business environment for cluster development, including streamlining administrative procedures, and improving the ease of doing business. These reforms aim to enhance the competitiveness of cluster participants, attract investment, and stimulate entrepreneurship and innovation.

According to a study conducted by the World Bank, the most promising sectors are fisheries and aquaculture, coastal and maritime tourism, port infrastructure and logistics, offshore energy, marine biotechnology, but also focusing on marine conservation and environmental protection.

Tunisia

COVID-19 caused a significant economic crisis in Tunisia, leading to structural weaknesses and to low investment and low job creation, high unemployment, mismatch between skills demand and supply, not to mention an outward migration of high-skilled professionals. Nevertheless, despite an 8.8% decline of GDP in 2020, the projection for 2023 was a growth of around 3%.[31]

In this context, clusters initiatives can help economic recovery – in fact, they significantly boost good and services production in various sectors (e.g., food, marine and seafood, logistics and transports),[32] moreover there is a relevant commitment of promoting clusters initiatives at the northern Africa level and international level.
Clusters initiatives are quite spread out in Tunisia, and there is a national Cluster dedicated to the Blue Economy, namely the Tunisian Maritime Cluster. The positive impact of clusters initiatives in Tunisia is more evident than in other countries, in particular in terms of employment stability, enhanced reputation, improved performance, and increased value.[33] At the international level, a significant advantage of Tunisian clusters is due to the fact that they have export certification, a relevant aspect that lacks in other southern clusters' countries. Nevertheless, there is still room for improvement in terms of foreign market access, and marketing and quality standards shall be improved to have a more effective access to international market. It is worth noting that one of the most advanced Tunisian clusters is indeed the Tunisian Maritime Cluster, active at the international level thanks to several partnership with European countries.

The blue economy is, in fact, a hugely relevant sector in Tunisia, given the great maritime area's extension, which is around 135,000 km^2, representing the 82% of the Tunisian territory.[34]

[31] (Tunisia Economic Snapshot, 2022)
[32] (Clusters in the MENA Region: Overview, Challenges and Opportunities, 2023), p.76
[33] *Ivi,* p.77
[34] (State of the art and future development of Blue Economy - Towards a sustainable blue economy in Tunisia), pp.3-4

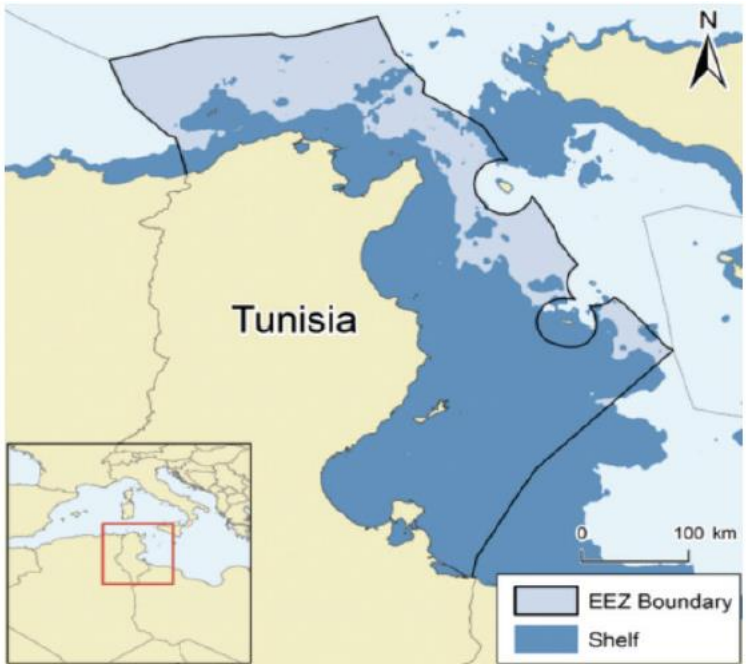

Figure 17 - Tunisia's maritime extension

Moreover, given the relevance of its coastal zone, there is a huge concentration of population in the area, great potential for export activities, vast natural resources, all aspects that led to the development of various diversified sectors and public facilities (including ports e.g., La Goulette Port, Rades Port). The Tunisian coastal zone, however, impose also many challenges due to the several hazards and sea-level rise risks:[35] this confirm the urgence to implement actions at all levels to guarantee a sustainable blue economy responding to all challenges and clusters initiatives can be the main ambassadors to do so.

Tunisia is indeed a country in which blue economy sectors cover a central role. Not only more traditional and established sectors are of huge relevance, but also emerging sectors.

[35] *Ivi*, p.5

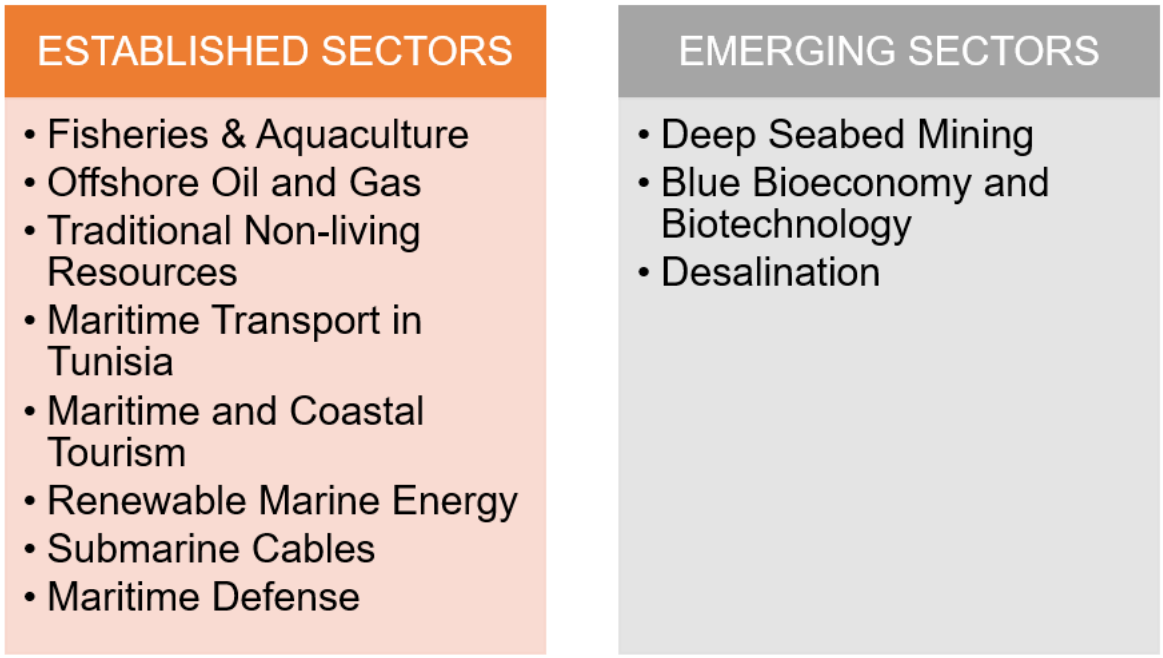

Figure 18 - Tunisia's main blue economy sectors

The relevance of the advanced state of both blue economy and cluster initiatives implementation indeed sees Tunisia as the country with the pivotal role in the southern shore area.

Identification of local, regional and national actors per country

In the identification of countries actors per country, the project partners, associated partners and advisory board members have actively supported the WP leader in the identification, providing contacts, bearing in mind the results emerged from the desk analysis. The WP leaders have also taken into account all suggestions and included in the identification phase several organisations thanks to the extended internationalisation experiences gained throughout the years, in particular in the southern shore of the Mediterranean. In this process, the WestMED clusters alliance has also played a key role.

The key steps taken into account in the identification process were starting from the countries analysed in the desk research, moving forward to looking for actors at the local, regional and national level, and classifying these per category, namely policy makers, sectoral bodies, research centres, universities and business organisations.

As outlined in detail in the KPI table (Table 1), the number of actors identified per country exceeded the results expected, guarantying accurate results of the needs assessment (task 2.2).

In **Algeria** the total number of actors involved in the needs assessment process is 75, including local, regional and national actors. In this process the project partners from Algeria have played a key role in the identification process given their knowledge and expertise of blue economy in the area. The majority of actors involved came from business organisations and a fairly number of actors belong to other categories, namely research centres and universities, policy makers and sectoral bodies, as shown in the graph below.

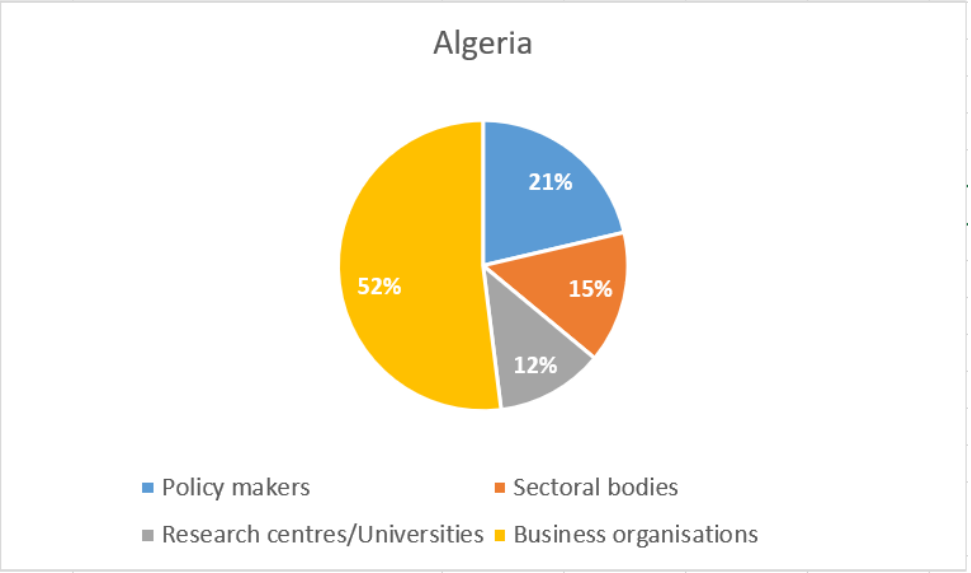

Figure 19 - Actors involved in Algeria

In **Egypt** the total number of actors involved in the needs assessment process is 7, despite being perfectly in line with KPIs expected, the level of involvement of actors was more limited comparing to Algeria. Even though no sectoral body was involved, nevertheless, among the group of actors involved a huge role was played by policy makers and research centres and universities, as the graph below displays.

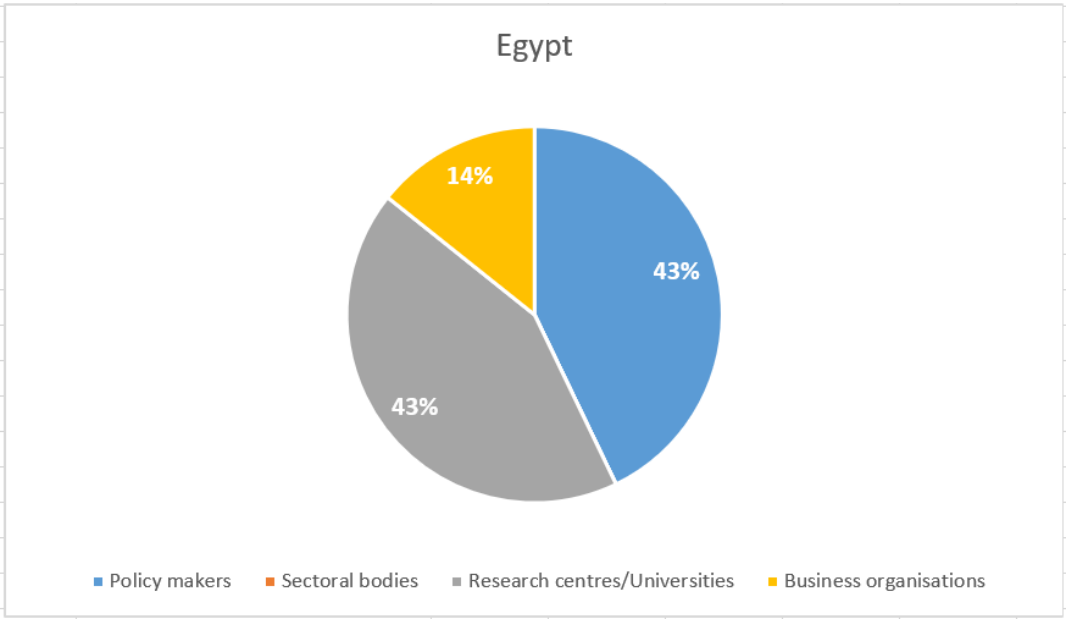

Figure 20 - Actors involved in Egypt

In **Libya** the total number of actors involved in the needs assessment process is 25, including local, regional and national actors. Especially business organisations but also a good number of policy makers have been involved in the needs assessment, and a smaller number – but still relevant belong to other categories, namely research centres, universities and sectoral bodies, as shown in the graph below.

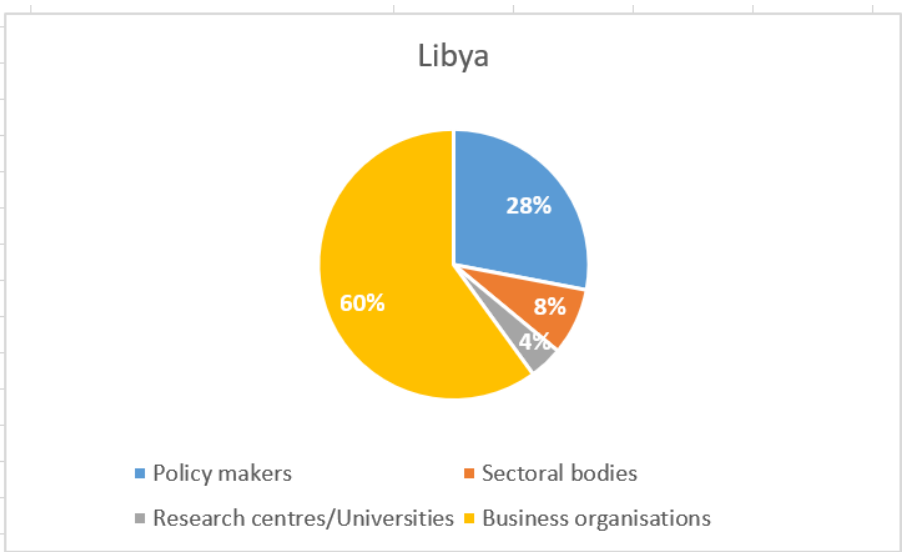

Figure 21 - Actors involved in Libya

Among the 10 actors involved in **Mauritania,** business organisations indeed were among the main type of entity. Quite relevant was the engagement of sectoral bodies and policy makers, although neither research centres nor university were reached for the needs assessment analysis. More details are shown in the figure below.

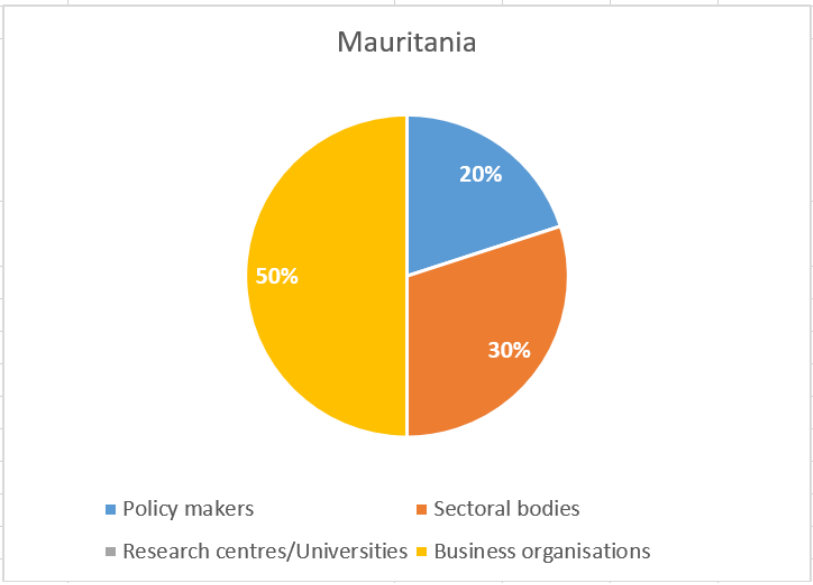

Figure 22 - Actors involved in Mauritania

In **Morocco** the involvement of policy makers was indeed higher than the other assessed countries, with over 67%. A good involvement of research centres, universities, sectoral bodies was registered too as the graph below shows, for a total of 30 actors involved.

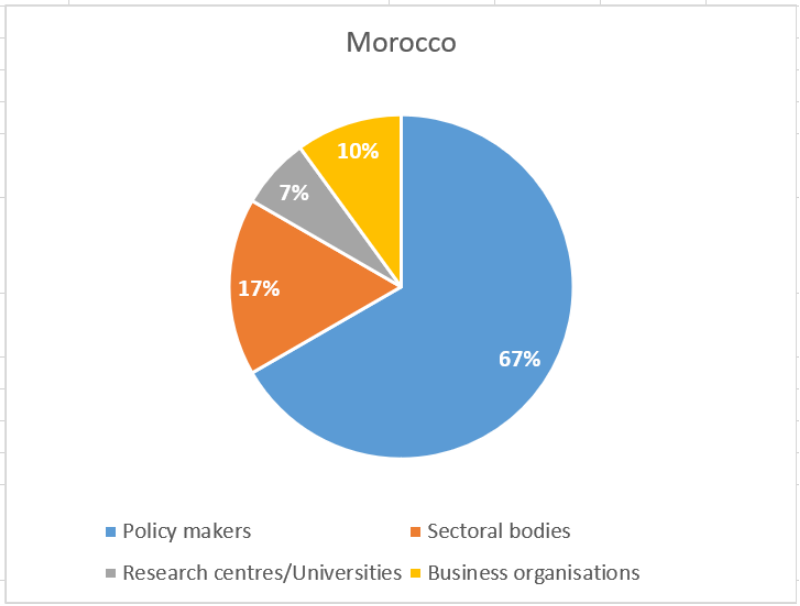

Figure 23 - Actors involved in Morocco

Lastly, in **Tunisia,** among the 37 actors involved in the analysis, almost half belonged to the business organisations category. The rest was distributed in similar percentage among policy makers, sectoral bodies, research centres and universities. In this process the role of the Tunisian Maritime Cluster was decisive.

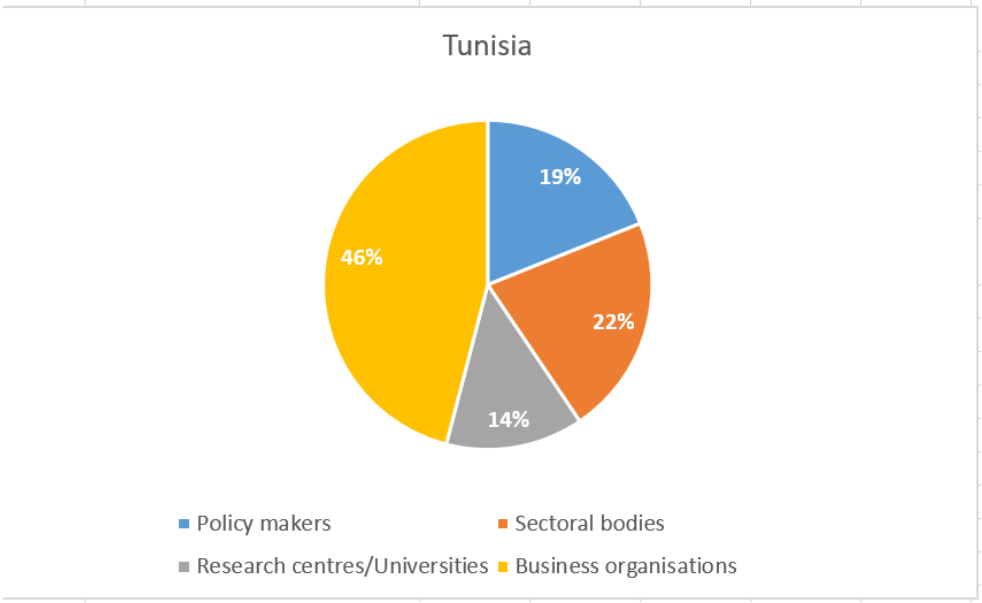

Figure 24 - Actors involved in Tunisia

Field analysis and needs assessment process

The field analysis's objective was to assess the main challenges and opportunities in terms of maritime clusters creation and/or development through specific actions related to the blue economy in the identified countries.

The identified countries, as stated in the desk analysis section, are Algeria, Egypt, Libya, Mauritania, Morocco and Tunisia. In all these countries, a preliminary interest in blue economy as well as in cluster initiatives has been encountered. The field analysis will show concrete results country by country in more detail.

Country analysis

The country analysis was carried out via targeted research, surveys, interviews, online focus groups carried out with the identified actors operating in the blue economy sectors. Through the surveys, it was possible to get a preliminary overview, a more detailed interview helped to elaborate the most cryptical points of their answers and, with specific focus with experts, more outcomes and considerations emerged. The WestMED local hubs provided crucial support in the process.

The outcomes that emerged concerned the identification of the following results expected, which are outlined in more detail in a country-by-country analysis:

- at least **five most promising blue economy sectors and value chains** that existing/emerging/potential clusters can support
- at least **five challenges and obstacles that may represent business opportunities, priorities for investments** in the blue economy sectors
- at least **five actions for improving existing initiatives and governance capacity**
- at least **two actions to facilitate cooperation and create business opportunities between stakeholders**
- potential **cross-fertilisation activities and lessons learned that will be used for at least five entities** in Mediterranean countries.

Algeria

The analysis conducted through blue economy operators in Algeria highlighted that there are blue economy sectors particularly relevant in the country.

The sectors assessed and where most relevant data were acquired are outlined below:

Figure 25 - Identified blue economy sectors in Algeria

Aquaculture

With reference to aquaculture**,** the sector is particularly relevant in the short-medium term, and it is considered one of the most promising blue economy sectors in the country.

More specifically, according to the National Centre for Research and Development of Fisheries and Aquaculture (CNRDPA), in terms of seafood production, a yearly increase has been registered. From 2010 where aquaculture production was around 1.758 tonnes, in 2020 the production rose to 6.000 tonnes. In addition, Algeria imports over 70.000 tons/year, hence it is clear the huge growth potential of local production. In the past years, a significant growth of fishing farms has been encountered, including around 90 operative farms both on-shore and off-shore – this growth has led to increase employment rate in this sector, on average 20% increase of new jobs in three years. This trend shows indeed a relevant progress that will lead to increasing modernisation of distribution channels and retailers' chains.

In terms of sectoral technology development, there are several technologies already in place facilitating the activities, while other ones still to be developed would indeed bring benefits and improvement. Among the existing technologies in aquaculture sector from the analysis we can include:

Figure 26 - Aquaculture existing technologies in Algeria

Despite the development of the sector, there are still **challenges and obstacles** to tackle. In particular, the Algerian banking system does not pay enough attention to the aquaculture sector. The sector, in fact, relies heavily on the support of a single funder, namely the *Banque de l'agriculture et du development rurel (BADR),* slowing down the implementation of aquaculture projects initiated by private promoters.

Hence, improving access of investment in the sector would be something to prioritise to boost the aquaculture sector development.

In addition, there is increasing need of accelerating and optimising several processes to **improve existing initiatives and governance capacity, as well as facilitating cooperation and business opportunities between stakeholders**:

- the establishment of a local industry for the production of aquaculture inputs and equipment (hatcheries, feed factories, manufacture of cages)
- the optimisation of governance and updating of regulations in the aquaculture sector
- the establishment of health and environmental monitoring networks for products aquatic environments
- the optimisation of marine planning and aquaculture zoning
- the certification of aquaculture products and infrastructures and the improvement of conditions of access to national and regional markets

In fact, the Algerian aquaculture sector can become increasingly performant and can get increasing attention by the national strategies. Currently, there are several numbers of national, regional and international funds/programs coordinated by the Ministries – e.g., Law on Fisheries and Aquaculture; The National Plan for the Development of Fisheries and Aquaculture Activities; The National Fisheries and Aquaculture Development Plan 2003-2007; The Economic Recovery Support Program – however further efforts are needed in order to close the technological gap. In fact, there are still **several missing technologies and lack of production** of crucial elements, and actions shall be taken to fill these gaps:

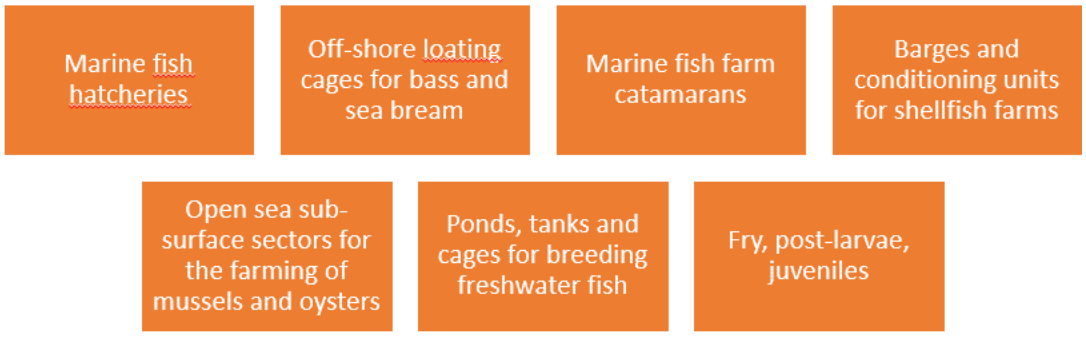

Figure 27 - Missing Algerian production and technologies in aquaculture

In addition, higher education needs to speed up the shifting process from theory to practice in order to adapt the sector needs and guarantee more qualified throughout the value chain. The harmonisation of actions in the higher education

sector, MSP, aquaculture can foster cross-fertilisation activities to the benefit of the overall sector progress.

Digitalisation

The development of the **digitalisation** sector in Algeria is mainly carried out thanks to a strong institutional framework: in fact, the main producer of data are research centres and universities, which are strongly connected with their affiliated incubators and accelerators, start-ups, namely the main developers of solutions and technologies for several blue economy sectors in Algeria. These solutions developed locally are still at a limited stage – e.g., Android and IOS applications; digital platforms, solutions for data – nevertheless this sector is quite relevant with around 15 economic operators involved and an estimated value of the activities for around 8 billion USD/year.

The digitalisation sector in Algeria is a top priority for the government, which through the National Research Programme (PNR) 2021-2027 managed by the Ministry of Higher Education and Scientific Research, set out several priority areas, including emerging technologies, IoT, mobility and connectivity, Big Data and Data Analytics, Artificial Intelligence (AI) and machine learning, automation and robotics, augmented reality and virtual reality. Through this programme – and other similar regulations – the digitalisation sector in Algeria has gained great progress perspective. Among the existing technologies in digitalisation sector from the analysis, we can include:

Figure 28 - Digitalisation existing technologies in Algeria

Among the main **challenges and obstacles** in the sector, the lack of a common national platform that could centralise and connect different data from the blue economy sectors should indeed be addressed.

Among the **actions that could enhance initiatives and governance capacity** we can include the creation of a centralised regulatory instrument that could foresee a common tool to configurate real-time analysis of Maritime spatial planning (MSP) and Integrated coastal zone management ICZM for development planning**.** Likewise, instruments that could map different uses of maritime spaces, analysis of

environmental impact, actions hazard and risk mitigation; facilitating public participation are needed. This would lead to an increasing quality of policy co-ordination.

In addition, actions aimed to filling out technology gaps in this sector can lead to **new business opportunities and investment opportunities**:

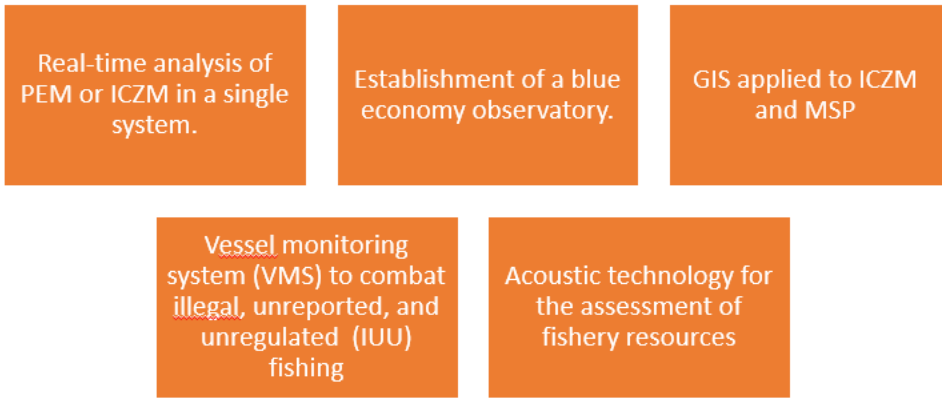

Figure 29 - Missing Algerian production and technologies in digitalisation

Indeed, **among the cross-fertilisation activities,** an increasing share of data from actors and organisation working different aspects of maritime surveillance, fisheries, security, MSP and ICZM can indeed be beneficial.

Marine renewable energies (desalination)

The **marine renewable energies** sector, with specific reference to the **desalination**, is a top priority in Algeria, given the insufficiency of water resources in the country, and it is a reliable strategic resource to fight scarcity in the long term. In Algeria the first seawater desalination facilities were set up in 2002 and currently there is a stable growth of desalination plants, e.g., along the Algerian coast plants using the reverse osmosis method are around 14. As expressed in the figure below, the most used seawater desalination techniques are ion exchangers and electrodialysis, but also other methods are relevant, guarantying a stable growth +20% in the past years.

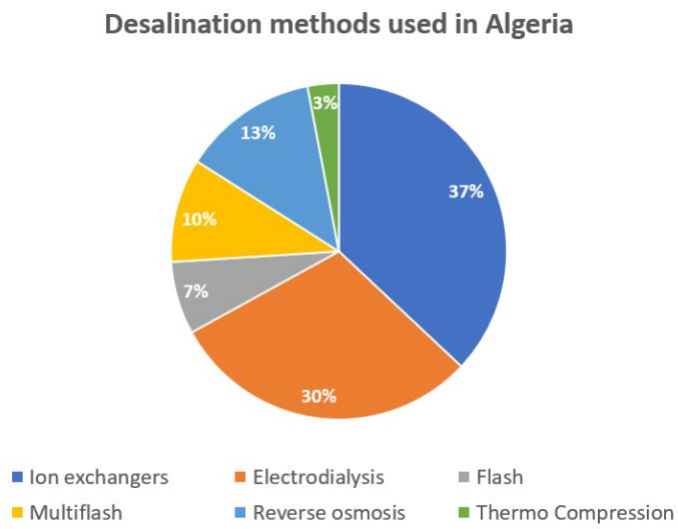

Figure 30 - Desalination methods used in Algeria

Among the existing technologies in the desalination and marine renewable energies sector in Algeria:

Figure 31 - Desalination existing technologies in Algeria

Climate change and the increase in the density of the population, increasing internal water consumption are only a few of the **challenges and obstacles** imposed to the sector, which are causing shortages of fresh water.

Among the **actions that can enhance governance capacity** there is further implementation of seawater desalination projects as part of an emergency program carried out by the government to fight against the lack of these resources in the long term.

In terms of actions that represent potential **business opportunities**, we can include filling the technology gaps related to the lack of specific technologies in Algeria in the desalination sector:

Figure 32 - Missing desalination technologies in Algeria

The **cross-fertilisation activities** that can be identified are to merge more the enhancement of education in this sector, by increasing the qualification of local human resources as well as to foster interaction with the R&I institutions.

Blue skills

The development of the **blue skills** sector in Algeria is quite promising and focused on the access to new digital technologies in higher education and VET. The support of the government is evident, if considered that several partnership and memoranda of understanding have been signed between the Ministry of Vocational Training and 14 ministerial departments since 2014, highlighting the importance of investing in professional qualification and skills. A significant growth of the enhancement of blue skills in Algeria can occur through incubators and accelerators, which – as mentioned – often were born from initiatives of public research entities under the Minister of Higher Education and Scientific Research. One of the main focuses is indeed blue skills through the access to new digital technologies in support of the Algerian blue economy, in particular for the fishery, aquaculture and tourism sectors. Blue skills in Algeria relies on the following technologies:

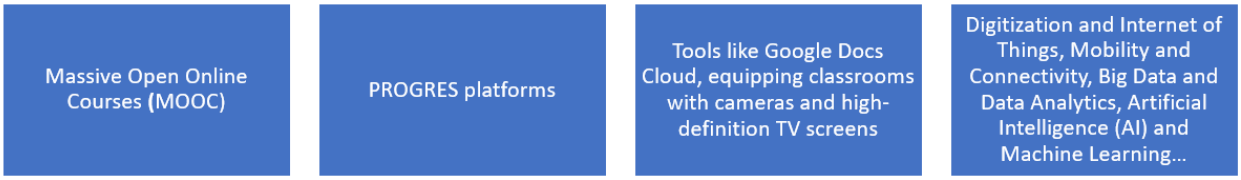

Figure 33 - Blue skills existing technologies in Algeria

The existing **challenges and obstacles** in the blue skills sector in Algeria are related to a lack of a national blue economy stakeholder platform, that could be used to make education in Algeria more accessible. In fact, by **investing** in technologies, it

will be possible to enhance connections between incubators, start-ups, investors, accelerators, entrepreneurs, business networks, universities to multiply innovative blue ecosystems by bridging the gaps between sector demands and workforce skills.

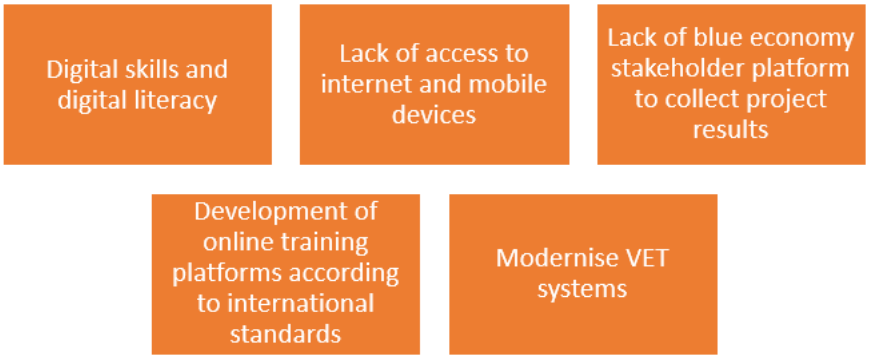

Figure 34 - Missing blue skills technologies in Algeria

In addition, adapting and modernising vocational education and training (VET) systems by integrating the platform of the United Nations Decade of Ocean Science can also improve **existing initiatives.** In particular, VET must access technology transfer and establish of a joint program with regional universities in order to offer qualifying training that meets the requirements of the national market.

The development of online training platforms according to international standards remains a priority for the development of the blue economy (an exchange program similar to Erasmus) which strengthens the exchange of students and teachers from different regions of the Mediterranean in terms of training new graduates and upgrading and recycling existing profiles. This would indeed be in favour of a best practice sharing and foster new **cross-fertilisation activities**.

Sustainable tourism

The undeniable huge potential of the development of **sustainable tourism** in Algeria is evident from the government commitment and focus in the development of technologies related to the hotel industry, catering, finance, retail and so on. As a matter of fact, the Ministry of Knowledge Economy and Startups with the Ministry of Tourism, Handicrafts and Thermalism (HTT) are focusing on the creation of the Siaha Lab program[36] and the deployment of ten incubators and accelerators specialised in

[36] (Algeria invest, n.d.)

the sectors of technologies related to tourism. This would indeed be in favour of a post-COVID increase of tourism rate in the country.

Moreover, the digitalisation in the sustainable tourism sector will speed up the adoption of new technologies, new platforms and applications for the sustainable management of electricity and water resources and for training workers on various related topics, such as geographical approaches of tourism, tourism market, digital marketing, sustainable tourism development, tourism infrastructure planning, guaranteeing a qualified and diversified sustainable maritime tourism. Nevertheless, several technologies are already available and in use in Algeria:

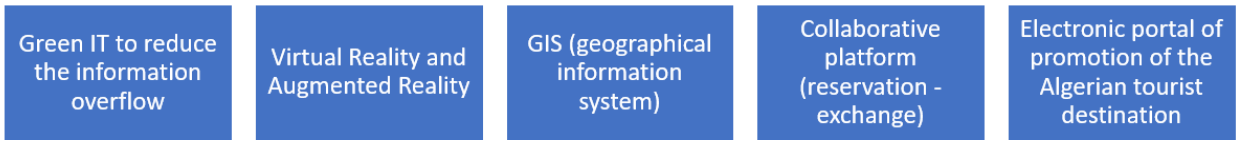

Figure 35 - Sustainable tourism existing technologies in Algeria

The lack of priority given by the central government and local authorities to the sustainable tourism sector represents a huge **obstacle** for a proper exploitation. In fact, the sector cannot indeed create employability and entrepreneurship without heavy investments. Given the great potential in the country, these challenges shall be address and coordinate such a process in a profitable way for the national community.

If more attention will be paid on needed **actions** to address missing technologies outlined below**,** the sustainable tourism sector in Algeria would have huge benefits:

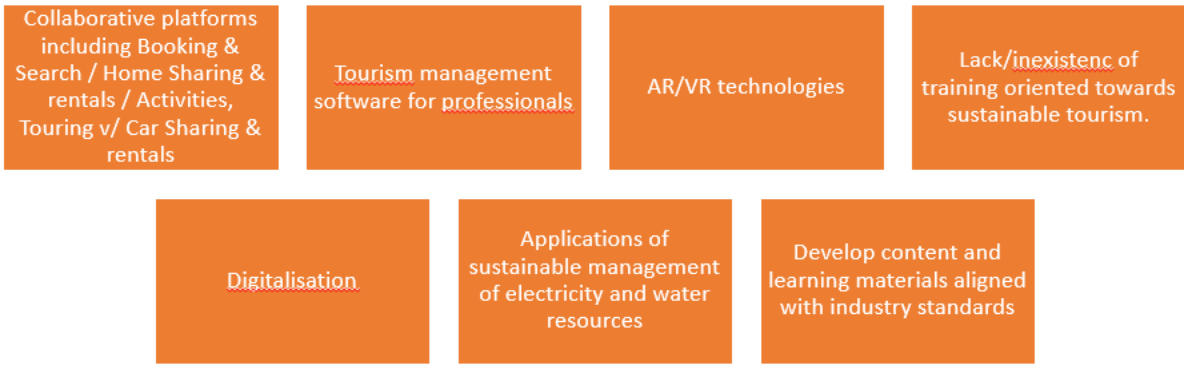

Figure 36 - Missing sustainable tourism sector technologies in Algeria

Governance capacity can indeed be enhanced through the implementation of clusters active in sustainable tourism and eco-tourism, as well as through actions

aimed at filling the gaps mentioned in the figure above, which the majority would lead to **cross-fertilisation activities,** e.g. digitalisation in the sustainable tourism sector; creation of collaborative platforms.

Sustainable maritime transport

The **sustainable maritime transport sector** in Algeria is very relevant if we consider that around 97% of international exchanges are exploited through maritime transport. In fact, Algeria, along 1.200 km coastline, relies on commercial ports, ports focused on oil & gas traffic and dedicated fishery ports, and the most active port is Port of Algiers with around 65% of the whole traffic. Moreover, investment in the sector is growing and with an increasing cooperation between the public and private sectors there are more and more actions to foster and improve sustainable maritime transport's competitiveness, i.e. building new containers, taking on initiatives to enhance export capacity, developing national fleet for freight and RO-RO operations, adopting new sustainable measures. Also, in this sector Algeria can rely on the following existing technologies:

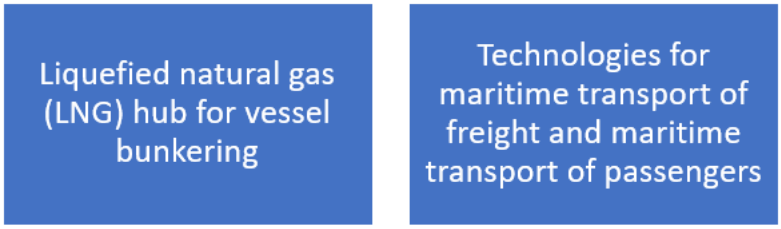

Figure 37 - Sustainable maritime transport existing technologies in Algeria

The perspectives for a strong increase of the sector (+20%) need to comply with the environmental **challenge.** Hence, implementing **actions** toward scaling up Algerian economy according to fully sustainable principles represent a great opportunity. Currently, there is a lack of local production and missing technologies in the sector that shall be addressed to **foster new business and investment opportunities:**

Figure 38 - Missing sustainable transport production and technologies in Algeria

There is still lack of connection between sub-sector of the blue economy aimed at the enhancement of sustainable transport in Algeria. More synergies and **cross-fertilisation activities** between, Ports, Shipping and Marine Transport, Oil and Gas, Coastal Manufacturing, Seabed Mining, Renewable Energy, Marine Biotechnology, Marine Technology and Environmental Services can lead to greater improvement of **existing initiatives**.

Egypt

In Egypt the most relevant blue economy sectors according to the analysis conducted are outlined below:

Figure 39 - Identified blue economy sectors in Egypt

Aquaculture

The relevance of the aquaculture sector in Egypt evident from data. In fact, Egypt is the regional leader in aquaculture with a total national fish harvest of around 1,6 million tons (2 million incl. fisheries). According to the Central Laboratory for Aquaculture Research (CLAR), an increase between 10% and 20% in quantity in the latest 3 years is registered, and the projection is that in the next years there will be a further 20% increase.

Currently, with regard to the majority of fish production, thanks also to the vast natural resources coming from the sea, lakes and Nile River, Egypt is the largest tilapia producer in Africa with around 1 million tons, which is mostly produced by the private sector; while the national production, with Kafr El-sheikh Governorate covering it for over 50% and Behira, Sharkiya, Dakhlya and Fayoum provinces, is related to freshwater species such as Nile tilapia (Oreochromis niloticus), Red tilapia, Catfish (Clarias gariepinus), Common carp, silver carp. Particular relevance in the overall production is covered by marine/brackish water species (Mullet, Seabream, Seabass, Meagre, Eels, Shrimp), produces in Damietta Province (Shatta region), Ezbet Elbourg region, Deeba triangle (private farms) between Port Said and Damietta, Mariotte Lake (Alexandria) and Ismailia, where inland marine aquaculture facilities are based over several acres. Most of the seeds used in marine aquaculture is either coming from the wild or marine hatcheries at K21 Alex, Osman group at Ismailia province and other local hatcheries in Damietta.

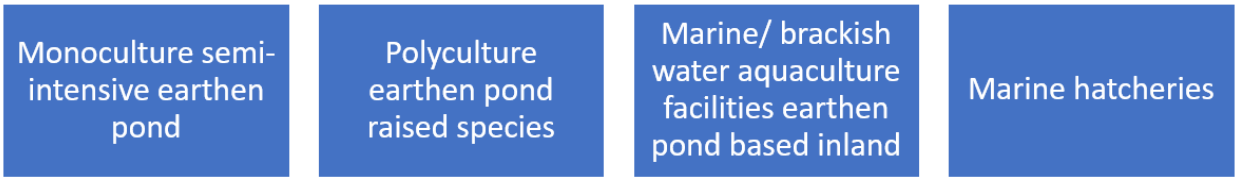

Figure 40 - Aquaculture existing technologies in Egypt

In addition, according to the Egypt's fisheries and aquaculture development plan, it is expected an increase of fish production to 3 MMT by 2025, to cover the national needs from marine fishes, and to destinate possible surplus of marine fish production to exportation, through the expansion of fish farming.

Given the several **challenges** due to climate change, lack of funds available and poor quality of interaction with the R&I institutions, the government is paying attention to the sector through the plan, and actions are foreseen to **increase government capacity and existing initiatives, as well as to foster new business opportunities.** The main objectives of the Egypt's fisheries and aquaculture development plan are to implement mega-national projects in East Al Tafrea and the Suez Canal Company fish farming project; promote the development of hatcheries for the production of marine fry and the expansion of shrimp cultivation; expand integrated fish farming.

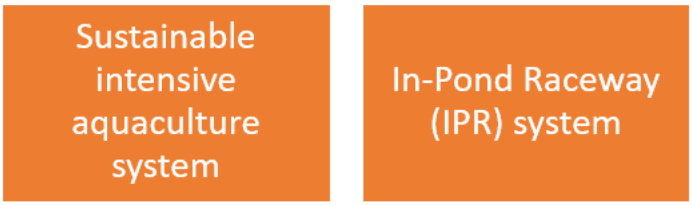

Figure 41 - Missing aquaculture production and technologies in Egypt

Moreover, one of the main focusses of the plan is the increase of sustainability in fish production by shifting from a more traditional system and semi-intensive farms to an intensive aquaculture system. In fact, through a more sustainable approach in the fish production, it can be possible to maximise the return from water unit using technologies such as In-Pond Raceway (IPR), for water circulation and removal of the organic wastes, contributing to higher fish yields, higher growth rate, survival, and an efficient feed conversion ratio. **Another action for improving these initiatives and cross-fertilisation activities** would indeed be alignment with the international best management practices (BMP).

Digitalisation

The digitalisation sector applied to blue economy is one of the most relevant in Egypt. According to Egypt's National Strategy for Science, Technology, and Innovation 2030, a significant growth rate in the field of information collection and monitoring system in all marine sectors has been registered thanks to the establishment of research centres and institutes, including a centre for cloud computing and big data processing, aimed to hosting national databases and major national projects.

The government effort in the sector is also encountered in the "Digital Egypt" plan, as its main objective is to lay the foundations for the transformation of Egypt into a digital society and to create a robust digital economy. The development of communications infrastructure and postal services, the development and modernisation of digital services, the information infrastructure of ministries and government agencies, the strengthening of human and national capacities, the activation of digital citizenship, the development of the information technology industry, as well as the e-government axis are just a few of the axes through which digital transformation is carried out, all actions that will indeed foster an enhancement of the existing **initiatives and governance capacity.** In fact, it is expected a growth rate over 20% for next years in the digitalisation sector.

These strategies are mainly implemented by the Central Administration of Maritime Affairs which is the authority in charge of preparing statistical data and reports. With specific reference to the benefits applied to the blue economy sectors, they

establish databases for ship data (traffic rules - traffic flow pattern - navigational reports), monitoring and tracking of arrival or departing of ships approaching the Gulf of Suez's entrance, documenting ship movements (audio/visual) for their usage and for looking into ship mishaps, monitoring oil and gas exploration activities on White and Red Seas, monitoring the appropriate precautions being taken to prevent oil contamination of the sea and to follow up on oil ships receiving on buoys or those supplied from rigs or supply sites.

Thanks to this great progress in the digitalisation systems, the Egyptian Authority for Maritime Safety has established and operated a system to serve ship traffic in the Gulf of Suez "GOS VTIMS" and the entrance to the Gulf of Aqaba, through radar sensors, meteorological sensors, direction finders, audio communication systems, and communication systems.

An additional proof of the progress made by Egypt in the digitalisation sector is evident in the participation in the medium- term strategy of the Mediterranean Action Plan for the period 2016-2021 providing “knowledge-based assessments of the Mediterranean environment and developing scenarios for informed decision-making and stakeholder action”, regarding the state of the quality of the marine and coastal environment, the interactions between environment and development, potential scenarios and future development, in-depth thematic and sectoral assessments.

Here below only a few of the digitalisation technologies used in Egypt.

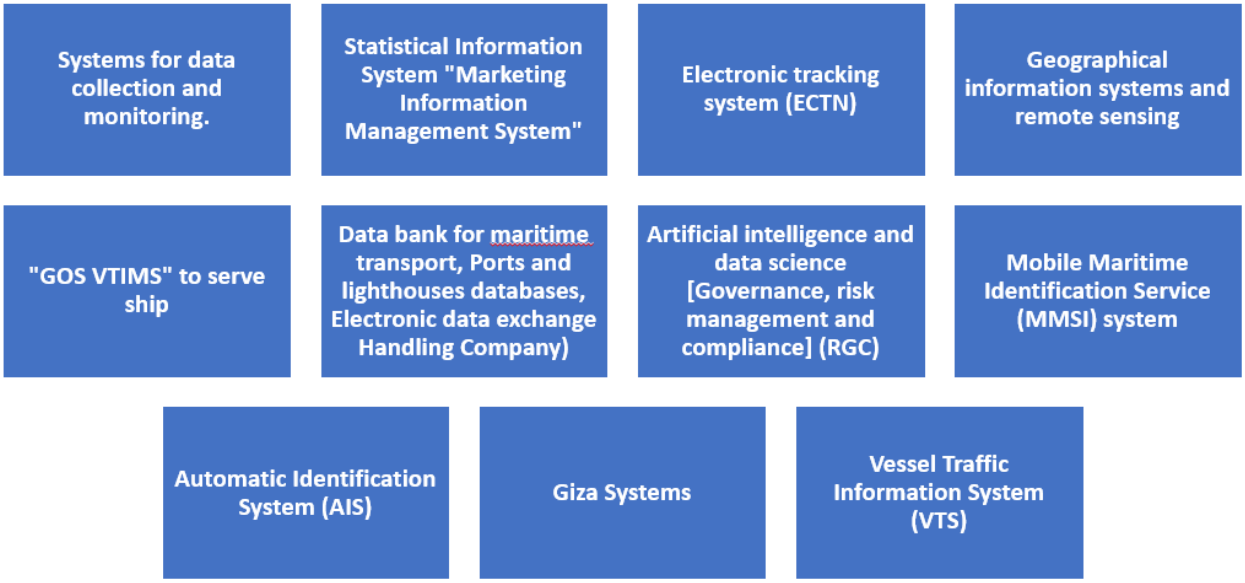

Figure 42 - Digitalisation existing technologies in Egypt

Despite the huge progress in the sector, there are many **actions that could lead to an improvement of these initiatives.** In fact, Egypt lacks of qualified human

resources in a sufficient quantity to satisfy the national demand, and this is currently one of the main **challenges** encountered in the sector. Hired and trained personnel are crucial to manage the various systems and to properly respond to new **business opportunities,** and they need to be able to administrate develop, prepare and maintain new software, and personnel is needed event if cloud-based big data solution are adopted.

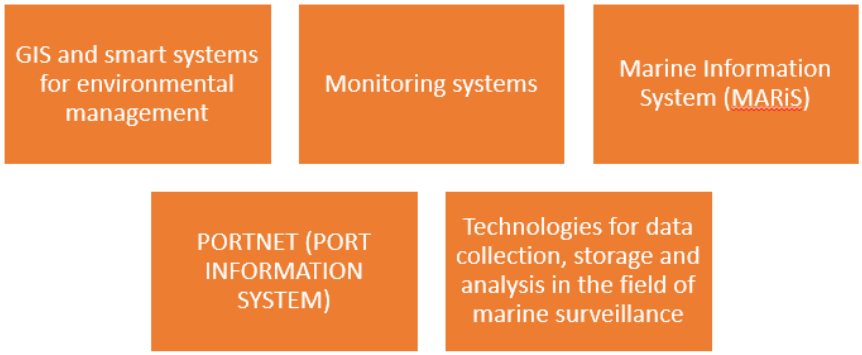

Figure 43 - Digitalisation missing technologies in Egypt

Indeed, there is need of use of technologies in all fields, especially the field of data collection, storage and analysis in marine surveillance and all blue economy sectors represented by training / re-research, to properly identify and respond to risks. Besides improving access to high-quality, multidisciplinary open data for scientists and other key stakeholders as well as monitoring systems are an essential component to ensuring the development of a sustainable blue economy and the preservation of the diversity of biological and marine resources.

Likewise, the country should focus also on getting more funding sources, as they are quite limited. There is in fact a huge disparity in the use of the most advanced technologies, models, and systems by regional technical institutions, research institutes, and technology centers. Best practice exchanges with other experts in the field of expertise and similar **cross-fertilisation activities** can lead to a further enhancement and to bridging the technological and skill gap encountered.

Marine renewables (desalination)

Given the huge commitment in reaching higher level of sustainability, expecting to generate 42% of its electricity from renewable sources by 2035, including wind energy, Egypt is addressing huge efforts towards the establishment of the

largest desalination plants – details on the existing applied technologies are available in the figure below:

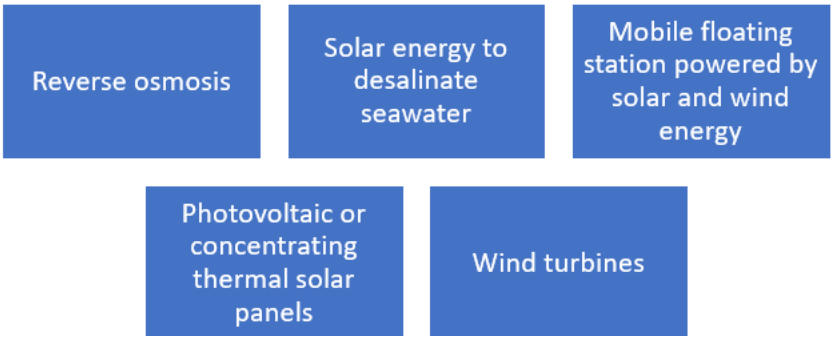

Figure 44 - Existing marine renewable energies technologies in Egypt

This is particularly due also to the climate change trends and the expected increase in population, all **challenges** that could threat the stability in Egypt's share of the Nile water (55.5 billion cubic meters per year, implying a decrease in the per capita share of water to 600 cubic meters, from the global average of 1.000). Hence, there are active plans to build other desalination plants – the existing ones are placed within the border governorates and coastal cities, particularly on the Red and Mediterranean Seas, Bahrain, and the Gulfs of Suez and Aqaba.

There is a great government commitment towards the realisation of water projects with the integration of the seawater desalination technology, is evident in the allocation of hundreds of billions to these projects. Moreover, the Ministry of Housing has worked to implement the construction of 90 seawater desalination plants, with a total capacity of 1.3 million cubic meters, costing 12 billion pounds to build (76 with a capacity of 850.000 cubic meters already completed until 2021).

The commitment of the National Research Center in finding solutions for exploiting solar energy in the desalination process poses new forms of **enhancement of existing initiatives**. Many innovative technologies and solutions are within international partnerships, fostering **cross-fertilisation activities** in the sector. For instance, the Suez Canal Corridor Project (SCCP) is opening even larger opportunities for electricity production through solar and wind power, just like for desalination with floating plants powered by wind and solar energy, local production of spare parts and availability of qualified personnel for these desalination plants upkeep (thanks to the cooperation projects with Singapore and Britain). All these represent new opportunities for **investment and business opportunities,** toward the enhancement of the sector in Egypt**.**

Figure 45 - Marine renewable energies missing technologies/products in Egypt

Blue skills

The Egyptian government, through strategies such as Egypt Vision 2030 Strategy and the Africa Agenda 2063, is highly committed in enhancing education and blue skills, to fight against the high rate of illiteracy, with 17 million illiterate citizens.

The huge potential of the blue skill sector is clear from the blue economy growth perspective in the country (between +10% and +20% in the next years) in comparison with the recent moderate trend (+3% till +10%), given the 3000 km coasts on the Red and Mediterranean Seas and the Gulf of Aqaba, with 50 marine ports and 197 terminals. Hence, the blue economy labour markets experience a high demand for positions in information technology and systems, monitoring and surveillance. In addition, a strong demand is registered for positions in all sectors of maritime transport, tourism (2.000 tourism and hotel graduates from 9 universities every year; 3.500 students graduate from technical institutes) in aquaculture. In perspective, biotechnologies, renewable energies, food processing become increasingly promising.

There is room for improvement technologies and initiatives exist that bring further progress in the Egyptian blue skill sector. Currently the most relevant are:

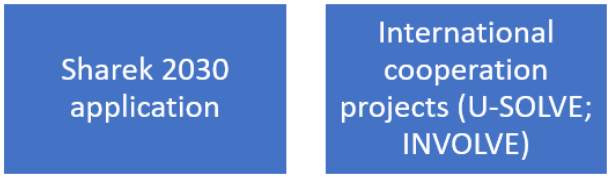

Figure 46 - Existing blue skills initiatives and technologies in Egypt

To fight against the existing **challenges and obstacles**, namely the environmental challenge and foster the sustainable development of the country, is a government top priority, as it will have significant impact on employability and entrepreneurship. The limited impact of top-down policies on the vast young population is the main danger for the success of the government's effort.

In order to **enhance existing initiatives**, the Egyptian Knowledge Bank (2016) aims at supporting education and scientific research; fosters the dissemination of science nationwide through success partners from international, regional and local publishing companies and houses, to make information available; develop skills and support academic scientific publishing for the upgrading of the ranking of Egyptian universities; and prepare graduates capable of meeting the requirements of the labour market through various distinguished programs. These are few objectives that can be reached through specific **actions** for **enhancing governance capacity and to foster cross-fertilisation activities**:

- the increasing cooperation among the Ministry, the Egyptian Knowledge Bank and the Clarivate Foundation, to develop more sustainable educational programs to support blue skills and develop the blue economy, to draw the directions of higher education over the next ten years, and the Ministry's interest in obtaining Clarivate expertise in similar projects, globally.
- the FORCE project, to enhance the capacity of the Egyptian National Institute of Oceanography and Fisheries (NIOF), to carry out research activities, aimed at supporting the implementation of sound and science-based policies for the sustainable development of fishery and aquaculture in Egypt, as well as in the whole Mediterranean North African region;
- the U-Solve project, the Academy of Scientific Research and Technology (ASRT) role is to support youth and women's employee entrepreneurship, in the areas where the population lives. ASRT plays an important role in the creation of new entrepreneurship and employment in the green and blue economy, based on the principles of innovation and sustainable development.
- within the EBRD activity to support TVET reform, the agreement EBRD-Sawiris Foundation-Gouna Hospitality School, consisting in 15 hotels offering dual learning opportunities to 200 students per one year;
- the Egypt Tourism Reform Programme (E-TRP), making available a Tourism Vocational Education Training project in co-operation with the Egyptian Tourism Federation. To date, 8 000 people have been trained in various tourism areas. The hotel sector alone has achieved a target of 9 600 trainees in 2019 and plans for 400 000 by 2030.
- EBRD is also supporting the establishment of a new Sector Skills Council (SSC) in Egypt, a multi- stakeholder platform, aiming at fostering more resilient and inclusive human capital in the hospitality and tourism sector. Promoting a National Skill Standards Project, a culinary training center, enhanced capacities in tourism establishments, and an accreditation and certification system.

In addition, the Ministry of Higher Education and Scientific Research has issued some new legislations that encourage and promote research and innovation and Public Private Partnership (PPPs), with incentives to establish spin off companies in governmental research institutes and universities. This law is an enabling environment to innovate and develop frontier research for emerging technologies in various blue economy sectors, including energy, blue growth, food security, and biotechnology. This new international and public-private partnership and policy dialogue platforms will develop skills-gap analyses, skills development strategies, qualification frameworks and occupational skills standards. It will also provide market-relevant training to the sustainable blue tourism sector, thus helping to develop a skilled labour market and opening up greater access to employment for those working in the tourism-related industries. The development of tourism sector in the light of blue economy principles is a fundamental contributor to the country's economic growth.

Sustainable tourism

Egypt is one of the main world tourist destinations, ranking 19th with a total of 13 mln tourists in 2019, ranging between 12 and 15% of the country's GDP and employing till 3,1 mln workers, some 9,5% of total workforce. Despite fall of tourists' expenditure due to the Arab Spring in 2011, a new increase was registered at the highest level $16.6bn in 2019, before falling by 70% to $5.1bn in 2020, and very partially recover to $6.9bn in 2021.

Given the huge importance covered by the tourism, in 2018 the Ministry of Tourism launched the 'Egypt Tourism Reform Programme' (E-TRP), which poses several structural reforms with the aim to align with international standards and UN SDGs goals, towards new forms of green labelling that enables Egypt to become one of the most sustainable touristic destinations. The expected targets are ambitious, as the aim is to attract 20 million international arrivals, raise the average tourist expenditure per night by 50%, increase Egypt's share of world tourism to 1.5%, double Egypt's share of Arab tourism, raise tourism revenues to USD 20 billion and attract USD 10 billion of new foreign direct investment in tourism.

Among the existing technologies used in the Egyptian touristic sector we can include:

Figure 47 - Sustainable tourism existing technologies in Egypt

However, there are still several **challenges** to tackle, in particular related to potential further drawbacks due to the difficult geopolitical situation and environmental challenges: management of solid waste, fluctuation of ground water level, air pollution, water pollution and biodata. Investing also in missing solutions can **enhance business opportunities.**

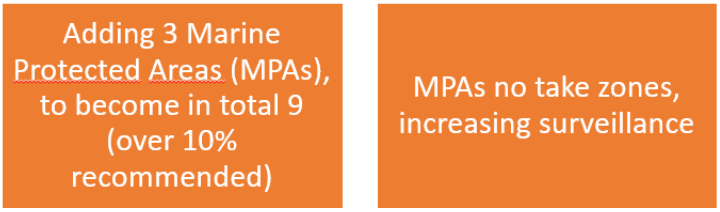

Figure 48 - Sustainable tourism missing technologies/production in Egypt

Among the foreseen actions through the above-mentioned reform programme to **enhance the governance capacity and existing initiatives,** we can highlight:

- Actions towards training to personnel, so to improve and elevate the skillset and capacity of the workforce to ensure that the quantity and quality of workforce meet labour market.
- Actions in the legislation, enabling a greater role of the private sector
- Actions to diversify revenue streams and increase the resilience of the sector through new source markets, through marketing actions
- Actions to elevate to international standards in around 67 tourist areas, with a focus on bringing hotel health, food safety and overall quality.
- Actions to promote digitalisation and innovation in the sector, promoting the economic empowerment of women.

Sustainable maritime transport

With its great geographical location and coasts extending over 3,000 km on the Red and Mediterranean Seas and the Gulf of Aqaba, Egypt has a huge potential in the sustainable maritime tourist sector. In fact, there are around 50 marine ports with 197 terminals, among these 15 are commercial ports distributed in the Mediterranean and in the Red Sea.

One of the largest ports in the Mediterranean is the Alexandria port, which includes two harbours (Alexandria and Dekhelia), it is operated and controlled by the Alexandria Port Authority, the country's largest, and it handles approximately 55% of Egypt's international trade. Overall, Alexandria's various harbors handle over three quarters of Egypt's foreign trade, with nearly 80% of the country's imports and exports passing through the city. With over 3800 ships in 2020 (-7% on 2019) and ca. 60 mln tons, 20 mln tons of handled containers (+15% on 2019), with perspectives of further increase.

Huge relevance is covered by the Suez Canal. It is in fact crossed annually by over 18.000 ships, 50 daily cargoes meaning 1,14 bln tons (10% of the total global seaborne trade, 2018). SC draft and width can accommodate till 60% of tankers and 90% of bulk carriers. Suez Canal means an annual revenue of 6 bln USD, about 5% of Egyptian GDP in 2018, with perspective to double in the next years.

The SCCP (Suez Canal Corridor Project) is the driving process of the whole development of the Egyptian maritime transport (expected +20% in the next years, increasing from the recent 10-20%), and of its sustainability: through the parallel canal of 37 km, deepening till 25mt and widening till 225mt for 35 km, and totaling length till 194km, the SCCP has allowed to reduce waiting time for ships from 18 to 3 hours, and transit time from 16 to 11 hours.

Currently Egypt can benefit of technologies and solutions towards a more sustainable transport management.

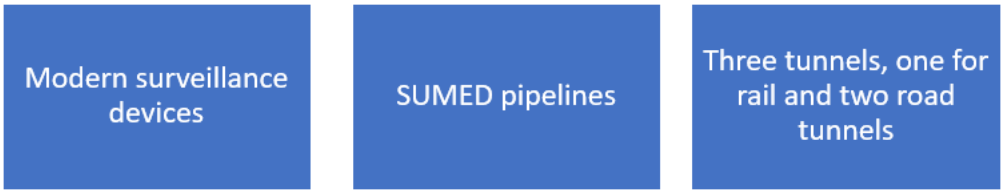

Figure 49 - Sustainable transport existing technologies/production in Egypt

Through the SCCP actions towards the enhancement of **existing initiatives and business opportunities,** are the development of six ports, namely East and West Port-

Said, Al Arish in North Sinai and Altor in South Sinai and two ports in Suez, Al Adabia and Ain Sokhna, as well as the conversion of East port-said and Ain Sokhna into intermodal logistics hub harbours. Moreover, it aims also creating around 1 mln jobs (impacting 5 mln persons), with an increase of GDP by 100 bln USD annually.

Existing **Challenges** related to the environmental crisis and lack of funds can be tackled. Through the SCCP, among the **actions to improve existing initiatives** we can include bunkering, maintenance, and recycling, solar panels and power plants from gas and wind farms to generate clean energy and to reduce climate change impacts. The implementation of green ports (particularly for East Port Said), with the increasing employment of renewable energies (wind turbines, PV, and biofuel, bio-diesel, batteries, Bio-alcohol, fuel cells, and scrubbers, led- lights as the primary source for energy-generating to reduce GHGs emissions in the port area from ships, trucks, light masts, and cranes). The goal is to achieve 20% of renewable energy by 2022: 6% hydropower, 12% wind, 2% solar, 80% fossil fuel. It would be opportune to reduce CO2 emissions by 50% by 2030.
The SCCP is also accelerating the digitalisation of maritime transport in Egypt, increasing the role of GIS and smart systems in the localisation of the best sites for establishing seaports, their management, in the environmental aspects, marine pollution control, ease of access to the port by land and water.

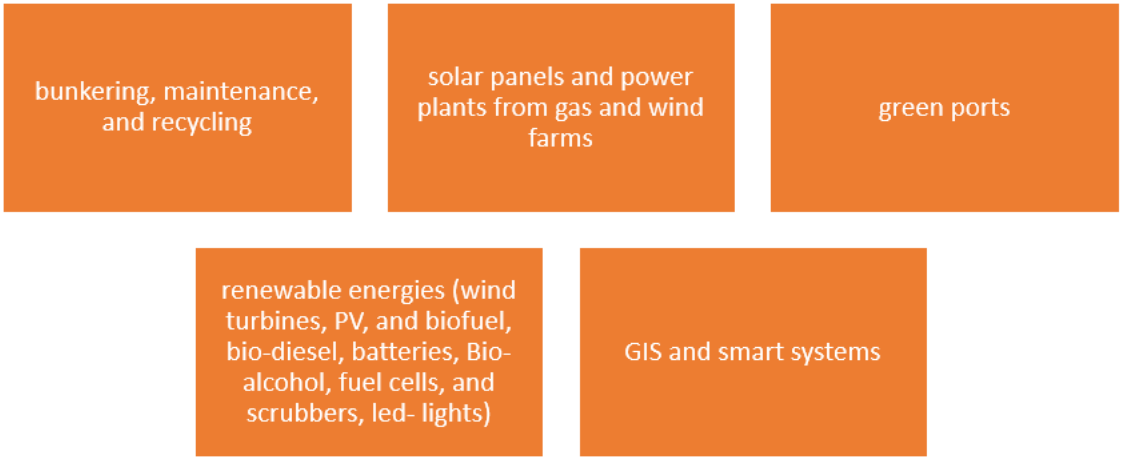

Figure 50 - Sustainable transport missing technologies/production in Egypt

Libya

The analysis conducted through blue economy operators in Libya highlighted that there are blue economy sectors particularly relevant in the country.

The sectors assessed and where most relevant data were acquired are outlined below:

Figure 51 - Identified blue economy sectors in Libya

Aquaculture

According to the analysis results, aquaculture in Libya is not quite developed. Despite the huge potential, there is lack of reliable conditions to grow-up and a limited knowledge about a satisfactory business model. At the political level, there is also limited awareness and it would indeed be beneficial to focus on the huge role that aquaculture could play in the country in terms of preservation of marine wealth and quality and quantity of the fish supply chain. In fact, the current production of farmed species is based in the inner-land – focused on carp, catfish and Nile tilapia – while the projects of expanding coastal plans to produce seabass and seabream are still far behind despite the national investments occurred from 2004 to 2010.

The government commitment, however, was evident with the launch through the Minister of Marine Wealth of the National Hydroponics Project through the resolution No. 497. The aim of the project, whose headquarters would be based in Al-Bayda city, is to commit to the implementation of public policies in the field of aquaculture, including the exploration and search for suitable sites for the establishment of hydroponic projects, selecting the most appropriate ones, conducting preliminary surveys (topographic and hydrographic surveys), preparing a general plan along the Libyan coast for appropriate and appropriate sites for establishing Hydroponics projects.

There are other existing projects, namely:

- Tajoura hydroponics complex project (worth $8,700,000), with an expected 350 tons/year of sea bass and sea bream and about one million fingerlings;
- Farwa Compound Project for Hydroponics (worth $8,300,000), with an expected 800 tons of fish and 3 million fingerlings of seabass and seabream, in addition to several attempts to farm shrimp;

- Ain El Ghazala Hydroponics Project (currently closed), whose re-start is evaluated $7,900,000, to produce (breeding and hatching) bass and sea bream (fish and fingerlings) with a production capacity of about 2 million fingerlings and 400 tons of fish;
- Al-Khuba Valley Hydroponics Project (worth $4,000,000), with an expected 340 tons per year of marine fish and 60 tons tilapia

These projects prove the state-of-the-art of technologies used in Libya in the aquaculture sector:

Figure 52 – Aquaculture existing technology in Libya

Among the main **challenges and obstacles** in Libya related to the sector, it is worth to mention the well-known political instability, hence the difficulty to reach a stable market. Therefore, private initiatives to foster the production can be **actions** aimed at improving the **current initiatives and create new business opportunities.**

Figure 53 - Aquaculture missing technologies/production in Libya

In addition, it would indeed enhance **governance capacity** to take on actions to promote policies and good practices for the cultivation of fish, shellfish and marine plants for responsible and sustainable fish production and growth. These are all ways to stimulate growth, control systems, restore biodiversity, and ecosystem services.

Actions should be taken also to support rational fishing, fight against illegal and unregulated fishing, eliminate harmful fishing practices and behaviors, in order to preserve natural fisheries and fish stocks restoring.

Actions towards the enhancement of cooperation between countries in the field of the blue economy would foster **cross-fertilisation activities** and new **business**

opportunities: the results would ultimately be an increase of job opportunities and living standard improvement, other than an increase of food security, poverty reduction and sustainable management of water resources.

Digitalisation

Despite the political instability and lack of a proper national plan related to digitalisation. It is expected a remarkable development in the coming years for both state-affiliated companies and private companies, reinforcing till +20% the already strong trend (between +3% and +10% each year), including the consolidation of training in the field of communications and information technology, with a number of national projects.

Libya can currently benefit of a series of technologies thanks to key players:

- The **Information Technology Center** within the Libyan Post, Telecommunications and Information Technology Holding Company: with the aim to invest in development of infrastructure for public and private institutions, to design, implement and maintain computer programs and systems, to build databases and information systems, to develop the human capital through training courses in the field of information technology.
- The **Libyan Center for Geospatial Consultation**: an institution concerned with geographic information systems remote sensing and field survey, modern spatial techniques in institutional databases, environmental modeling and management of spatial data for institutions. The center seeks to become a leading center in the applications of geospatial technology and one of the most important sources of spatial data as an effective partner in building the national infrastructure for spatial data in Libya.
- **GIS consultancy services - Geographic Libyan center** supports its clients through a group of specialized experts, starting in the initial stages of needs analysis and strategic planning, then in the detailed design of systems, data inclusion, quality control procedures, the establishment of spatial data infrastructure, and then developing specifications and specifications, and providing Bids for GIS projects until supervision of implementation processes.
- **Maritime Stations Information System**: it provides a unified security system, which includes the physical characteristics of the station, its management systems and operator training. As this system has been developed to collect marine station information in a unified format using consistent units of measurement, scheduling

organisers and operators, it can better assess ship and station compatibility as well as ensure safe operation and better environmental protection.

- **MAMSA - Offshore Terminal Management Self-Assessment & MTOCT - Offshore Terminal Operator Competencies and Training**: With the common goal of improving maritime safety, the MPIS service is made available free of charge to both maritime station operators and their users - who are identified in the MPIS as Data Users.

For the last two, it is clear the priority towards safety & security in navigation, making it possible for Libya to be ready to respond to MSP and ICZM demand.

Through the activities of these centers, we can conclude that currently there are technologies and productions that Libya can rely on:

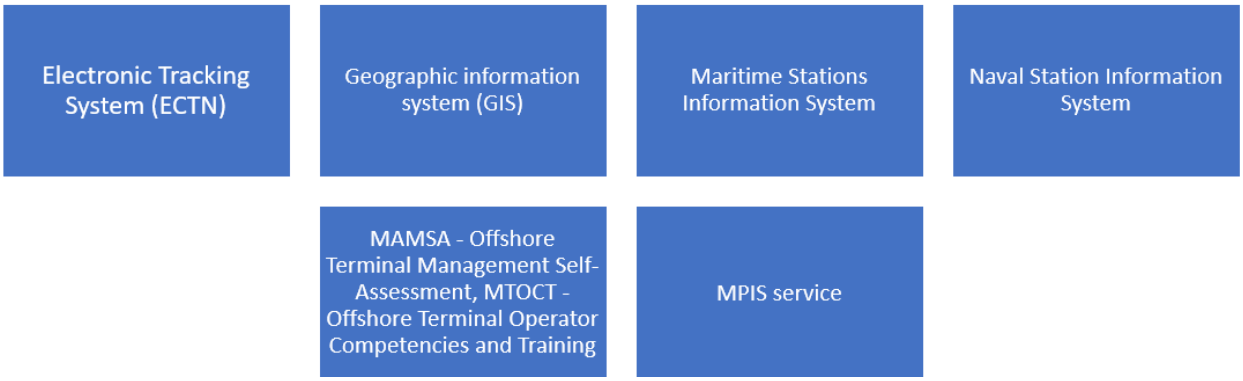

Figure 54 - Digitalisation existing technologies/products in Libya

Despite the remarkable level of advancement of the sector, there are still many **challenges and threats** to tackle, in particular the difficulties to access funding resources and the increasing need of qualified young specialists in the digitalisation sector.

Figure 55 - Digitalisation missing technologies/production in Libya

Hence, actions to improve **existing initiatives and foster new business opportunities** rely on an increasing modernisation of systems related to data collection, monitoring, digital transformation, as well as investing more in training and skills enhancement.

Marine renewables (desalination)

Libya is located in the solar belt region, which has the intensity of solar radiation that is considered the highest in the world; in fact, the country has long hours of high solar brightness which amount to more than 3,500 hours per year – the majority of this can be observed at southeast and western regions of the country.

The renewable energy sector is more pushed by the government, in particular by the Renewable Energy Authority. Through various project, there is willingness to install stations for measuring wind energy and solar radiation intensity in various regions of Libya, install photovoltaic systems to supply remote areas (rural dwellings far from the network, pastoral wells, security gates, and border outlets) in various regions of Libya with electric power, extracting water from pastoral wells and following up on them by performing the necessary maintenance operations if necessary to put them in always ready to work; install photovoltaic systems on rooftops connected to the public electricity network.

As far as the desalination sector is concerned, Libya is in a quite developed stage, although not sufficient compared to the actual country needs. In the country there are currently 8 main desalination plants (Khlij Albumba, Zwara, Alzawia, Zliten, Sirte, Tobruk, Darna, Abutraba) and many smaller ones in almost every coastal city.

Hence Libya can count on crucial technologies and products currently:

Figure 56 - Marine renewable energies used technologies in Libya

Despite all these aspects, Libya has several **challenges and obstacles** to tackle in relation to this sector. Since there is lack of legislation regulating the energy sector in Libya, it is difficult for the private sector to engage in such projects, which are

currently financed by the government only, as there is no independent fund to finance renewable energy projects available. In fact, the strong instability in the country along with the extremely cheap price of carbon fuels, are delaying the development of the whole sector of renewables and the transition of desalination plants to solar and wind powered solutions. In addition, there is an increasing demand for qualified personnel and lack of interaction with national institutions (insufficient financial support for R&D; lack of investment in projects and studies).

Actions towards an enhancement of these initiatives rely on the missing production and technologies in Libya for the sector, which is needed to guarantee a stable growth and progress towards sustainability.

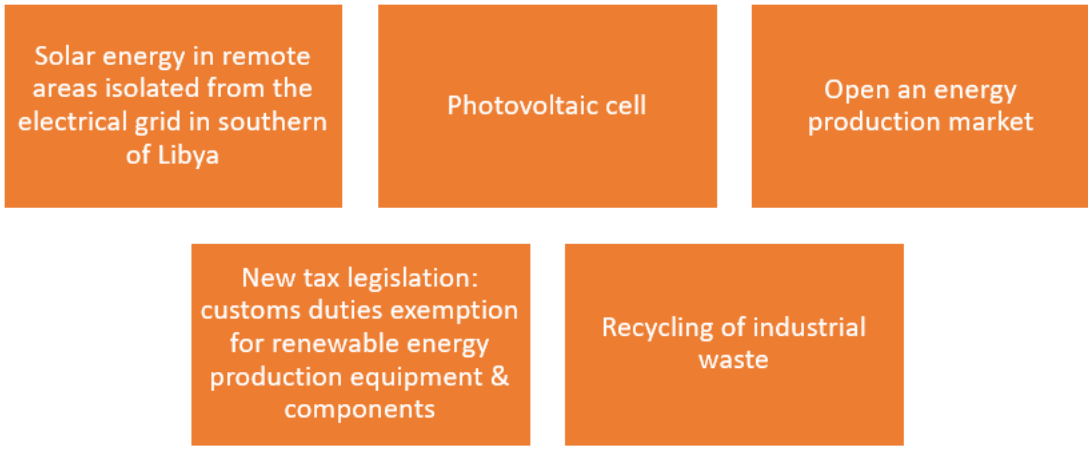

Figure 57 - Marine renewable energies missing technologies/production in Libya

It would be beneficial to implement policies that could provide financial security to private investors in order to guarantee payments under the power purchase agreements. In addition, a new tax legislation is needed as all renewable energy production equipment and components are exempt from customs duties, but the laws do not guarantee any internal tax concessions to renewable energy projects.

Moreover, greater investments in the solar energy sector can lead to new **business opportunities,** along with an openness to the energy production market.

Blue skills

The blue skills sector, in particular related to fishery and maritime transportation sectors, is at a quite developed stage if considered the number of existing institutes, namely 39 technical colleges, 102 higher institute technology

education, 371 vocational education institute in 52 technical and professional disciplines. In fact, in Libya every year there are on average of 300.000 students in universities and higher education institutions (a ratio of 3000 every 100.000 inhabitants, double the average international recommended ration of 1600), while VET is engaging 4.450 students every year and the number of trainers, assistants and employees is almost 31.416.

Figure 58 - Blue skills existing facilities/technologies in Libya

Despite these promising levels, there are still **challenges** to tackle in Libya in the sector. The current situation of instability since 2011, the previous decades of isolation with access to the international frameworks have led to outdated educational and training programs, infrastructures, technologies, especially in the area of secondary technical institutes and VET.

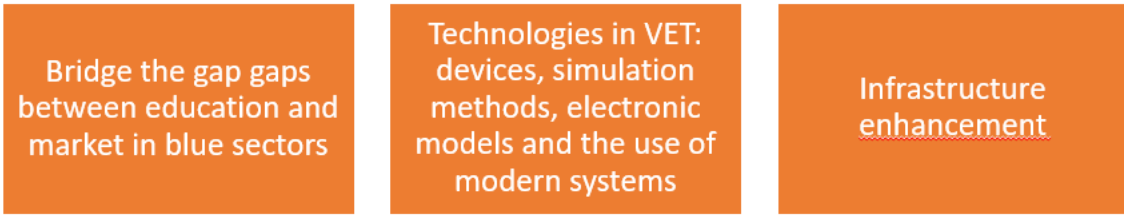

Figure 59 - Blue skills missing technologies/actions in Libya

Hence, **actions towards** a modernisation process are to be taken, particularly in VET, with the adoption of latest technical devices, simulation methods, electronic models and the use of modern systems. This will also re-start interest by potential trainees and students, and will re-balance the number of trainers: marine professions, mechanical, electrical, refrigeration, air-conditioning specialists, vessel construction professions are the most required. A modernisation programme would also raise market requests for other fields, currently underestimated, promoting actions towards an enhancement of the **existing initiatives and governance capacity.** Towards such modernisation, current gaps between education and market will be

addressed, in particular on sectors such as mechanical, electrical, refrigeration, air-conditioning, building and construction professions.

Sustainable tourism

The sustainable tourism in Libya has a huge potential, nevertheless long ongoing situation of instability has historically prevented Libya from developing the sector. The unique controller of the sector is the government through the Ministry of Tourism, which is responsible for organising the legal framework for this sector, and its financing, where a few state-owned companies control each field (Libyan Airlines for aviation; other for sea and land transportation, hotels management, etc.).

Despite all these aspects, there is great competition between tourism service companies and an increase in the amount of tourism projects. In fact, tourism is the second sector in the country by number of (international) projects. The **challenges** posed by the constant instability in the countries can be addressed via various opportunities in the country. That would foster **enhancement of initiatives and new business opportunities**, in particular in relation to underwater archaeology, coastal tourism, as well as training of human resources.

Sustainable maritime transport

The Libyan maritime transport is directly related to the oil & gas export, considering the situation of international isolation of the country as a consequence of the undergoing conflict. Currently, the market is dominated by three national companies, in charge of the different steps of the process: Maritime Transport Company, the Ports Company and the Maritime Handling Company. The main operator is General National Maritime Transport Company, with 21 oil and liquefied gas tankers of similar sizes and tonnages ranging from 700,000 barrels to 1, 000,000 barrels (deadweight tonnage of the company's fleet exceeds 2,104,040 million metric tons). The fleet is fully certified by major oil companies and operates all over the world.

The National Oil Corporation plays an active role in providing maritime transport opportunities according to Libyan laws in supporting national companies, moreover it has adopted a safety management system. In the near future, in fact, it is expected that there will be an increase in the growth rate of shipping companies. Especially after adopting the government's support plan to develop the maritime transport sector, the transport fleet, as well as the main oil ports in the country.

Figure 60 - Sustainable maritime transport existing activities/technologies in Libya

However, there are **challenges** that currently Libya is facing – for instance, many ports suffer from severe shortages and from the missing advanced technologies in shipping, unloading and storage, such as cranes, commodity stores, and other equipment. Most ports need modernisation works too. Plus, despite the growth perspective ranging between +10% and +20%, the Libyan maritime transport has not tackled the challenge of sustainability yet. The subject will immediately come to the agenda, as soon as the political situation will achieve a minimum level of stability. The lack of proper qualified human resources is also reported as being one of the main obstacles.

Figure 61 - Sustainable maritime transport missing technologies/production in Libya

Mauritania

Mauritanian blue economy has been traditionally characterized by the strong reliance of export in the areas of fisheries in particular, and other raw materials, driving the internal maritime transport sector, but also some largely unexpressed potentials lied also on coastal tourism, particularly related to inland and landscape beauties. More recently, the discovery of large reservoir of natural gas has trigger a broader interest in renewable marine energy as well as in the role this could play in fostering sustainable and accessible energy powering for the Mauritanian industries and the blue economy amongst those.

In the last couple of years, therefore, greater interest towards a potential scaling up of renewable marine energy as well as the diversification of various sectors including tourism, transport as well as potentially aquaculture has emerged. The whole status of development remains still very limited so far, although with some interesting

potentials, and the actual future development will strongly depend on the ability to maximise revenues and spill-over effects from the deployment of green hydrogen for export.

Blue Economy sectors	Performance to date				Potentials towards 2030			
	n.a.	Weak	Emerging	Strong	n.a.	Weak	Emerging	Strong
Maritime Transport		✓					✓	
Shipbuilding/Repairing		✓					✓	
Port activities			✓					✓
Fisheries				✓				✓
Marine aquaculture	✓						✓	
Coastal and maritime tourism		✓					✓	
Blue biotechnologies		✓					✓	
Marine Renewable energy			✓					✓
Desalination		✓					✓	
Green Hydrogen			✓					✓

Table 2 - Overview of the Mauritanian blue economy sectors as emerging from our analysis

Source: interviews and focus group

Aquaculture

Except some pilot experiences rearing jellyfish, **aquaculture** is practically non-existent. National demand for fish is low, and the average consumption per capita, originating mainly from the artisanal sector, is estimated at between 8 and 10 kg/year, and can reach up to 20 kg/year in the urban areas of the coast, Nouakchott and Nouadhibou.[37]

[37] (Aquanet, n.d.)

On the contrary, with an estimated catch volume of 1,8 mln tons/year (about 80% small pelagic fish species), Mauritania is amongst the leading **fishery** countries in Africa (over 20% of the total production) and in the Arab world, with a record 50% in export (mostly to Japan, Spain and Italy).[38] It employs over 54.000 direct fishers and 200.000 indirect employed resources, representing 17% of the active population (3,3% in artisanal fishery), and ensuring a contribution between 6% and 10% of the national GDP, with significant share of processed fish, fishmeal and fish oil. [38]

Remarkable Chinese investments focus on the production of fishmeal and fish oil to be exported to EU and other international markets, while historical EU-Mauritania agreements fix a quota for EU fleets to catch in the country's waters. Also, thanks to the favourable conditions of the Arguin Bank, beside the Greyhound Bay and thanks to the natural protection ensured by the White Cap, the Mauritanian coastline conceals ichthyological riches characterized, at the same time, by their abundance (potential estimated at more than one and a half million tons per year), their density (up to 1,000 tons of fish per nautical mile square), their diversity (nearly 300 commercial species recorded) and the high market value of reference species (crustaceans, tunas, cephalopods).

Particularly the White Cap offers ideal conditions to larvae, fry, juveniles and immature sizes for growing and developing, protected from large currents and predators. But this is also an area that requires protection, so to preserve the biodiversity as well as the quality of local natural resources. Beside an early establishment of the 200 miles of the Mauritanian EEZ, the Arguin Bank represents the largest African MPA, and the largest fishery nursery on the Atlantic coast of Africa.[39] At the same time the establishment of the free zone in Nouadhibou, like the centralization of commercial valorization of the many fishery produces in two national companies (Société Mauritanienne de Commercialisation du Poisson SMCP for export; Société Nationale de Distribution du Poisson SNDP to ensure cheap access to fishery produces by the population) witnesses the attention of the Mauritanian government for this sector.

Notwithstanding this favourable conditions, significant improvements could be achieved through the adoption of refrigeration and conservation conditions on board the fishing vessels, as well as of quality handling and processing along the whole supply chain. Large losses are in fact still recorded due to these improper fish management, while stronger support to responsible fishing and the sustainable management of fisheries resources is needed to minimise fishing impacts on marine ecosystems and respects the activities of the Mauritanian coastal and artisanal fleets. The EU-Mauritania partnership promotes the blue economy in the country by

[38] (Zusammenarbeit-GIZ)
[39] (Ramsar and World Heritage Conventions: Converging Towards Success, n.d.)

contributing to the improvement of ocean and coastline governance, by protecting marine ecosystems through eco-friendly fishing, and by strengthening fisheries value chains with the construction of land and seaport infrastructure.[40]

Source: (EC, The European Commission launches new migration partnership with Mauritania, 2024)

Digitalisation and blue skills

As for the overall performance of the blue economy to date, the opportunities offered by digitalization and blue skills are currently remaining largely unexpressed, as confirmed by the stakeholders involved in our analysis.

The overall **digitalization** of the country is still limited, although greater efforts are foreseen, for example in the cooperation with the EU, towards greater digital cabling and data-centers.[41] Similarly, the potentials offered for the blue economy so far including through the usage of maritime and marine data is relatively low although showing some interest in operators, as emerging from our engagement with stakeholders.

Greater support is also needed towards better **skills** and competencies across the blue economy sectors, and particularly to maximise the opportunity for new value-

[40] Note De Synthese Sur Le Secteur Des Peches Maritimes En Mauritanie, par Hamadi Baba Hamadi, President of the Mauritanien Maritime Cluster

[41] (EC International Partnership, Mauritania, n.d.)

chains in the green energy sector but also as a means to capitalize across the different sectors the innovation generated by the green energy development in the country.[42]

Main opportunities	Performance to date				Potentials towards 2030			
	n.a.	Weak	Emerging	Strong	n.a.	Weak	Emerging	Strong
Access to maritime data			✓				✓	
Spatial plan/protection		✓					✓	
Sustainable infrastructures			✓				✓	
Blue skills and careers		✓					✓	
Financing and innovation		✓					✓	
National/local policy strategy		✓					✓	
Maritime research			✓				✓	
Innovation ecosystems		✓					✓	
Safety and quality		✓					✓	
Stakeholders (political, sectoral) engagement / awareness			✓				✓	
Competencies and skills		✓					✓	

Table 3 - Overview of current capitalization of opportunities in the areas of digital, skills, etc

Source: interviews and focus group

[42] (EC, The European Commission launches new migration partnership with Mauritania, 2024)

Marine renewables (desalination)

Due to a recent discovery of natural gas, and the international interest in this resource, Mauritania has large-scale development potential on renewable sources of **energy**, and the green hydrogen sector is very promising.[43] Covering an area of 33,000 km^2, the gas field contains 1,400 billion cubic meters of reserves, giving it a production potential of 30 to 50 years. Located ten kilometers off the coast of Saint-Louis in Senegal, the huge Great Tortue Ahmeyim gas complex will start producing gas in the first quarter of 2024. Jointly operated by British Petroleum (BP) and its partners Kosmos Energy, Société Mauritanienne des Hydrocarbures (SMH) and Société des Petroleos du Sénégal (PETROSEN), this is the largest gas extraction project in the region positioning Mauritania is poised to become a major world gas producer, and one of the largest in Africa.[44]

In this context, two important projects will come on stream next year: the aforementioned GTA project and the exploitation of the Sangomar oil field, with a production of 100,000 barrels per day. At the same time, progress continues on the Sandiara gas-to-electricity facility. With 700,000 square kilometres of land available for the construction of solar panels and wind turbines, and a climate favourable to the development of these energies, Mauritania could also position itself as the renewable energy hub of West Africa. According to African Business, German project developer Conjuncta signed a memorandum of understanding in March 2023 with Egyptian energy provider Infinity and Masdar of the United Arab Emirates for a $34 billion green hydrogen project in Mauritania. The project could produce up to eight million tonnes of green hydrogen per year.[45]

But the development is not only relevant per se, and to a greater extent, as it also unlashes opportunities for a broader repositioning of electrification of the Mauritanian industries as well as leveraging valuable levies from export taxes to be invested in the diversification of Mauritanian industries, including the blue economy. In this respect, the EU is supporting a 1,400 km high voltage power transmission line from Nouakchott to Nema, rural electrification, and a solar power plant in Kiffa. This would allow electricity to reach the population that is still not benefiting from the electrification network.[46] The government has announced various export-oriented projects to produce renewable hydrogen, ammonia and/or hydrogen-reduced iron. Anchoring demand on foreign offtakers would contribute significantly to de-risk these projects and generate the stable revenue stream needed to mobilise investors at the necessary scale. By attracting significant amounts of capital, such large-scale

[43] (EC International Partnership, Mauritania, n.d.)
[44] (Mauritania, a new player in the gas sector?, 2024)
[45] Ibidem
[46] (EC International Partnership, Mauritania, n.d.)

projects could enable a transformation of the power sector and spur sustainable economic development and growth, but robust and transparent policies and regulatory frameworks are needed.[47]

Sustainable tourism

Despite not being on the map of the most visited **touristic** destinations in the region, Mauritania is currently undergoing an accelerated development at several levels which should lead to the emergence of an organised tourism sector. This evolution is also benefitting from the relative stability and security of the country, as well as the landscaping interest of some destination for naturalistic purposes, and the authentic values and experience to be granted by the country and its people.[48]

In this context, while the demand for the "desert" product has been quite successful most recently, still much can be done to foster coastal and marine-related tourism performance. Mauritanian coast is essentially one long sandy beach which supports a variety of birds, with good spots for fishing, swimming and surfing and opportunity for seal watching and other naturalistic experiences.[49]

The national parks of *Banc d'Arguin*[50], UNESCO Heritage site since 1989, and *Diawling*[51], located in south west Mauritania around the Senegal River delta, are important resources for global biodiversity, with over 220 species of identified birds, including pelicans, black storks, flamingos, and fish. They are also valuable for the conservation of marine and coastal resources, which are under increasing pressure from fish meal production, artisanal fishing and the effects of climate change. The success of the Diawling National Park is also the result of a joint effort by national and local authorities with the main international institutions (UNESCO, FAO and other UN agencies, UE, IUCN) various national international cooperation development agencies (GIZ, AFD etc.) and local civil society organizations.[52]

Not only, nevertheless, the tourism sector is largely underperforming and unable so far to fully capitalise the coastal and maritime potentials of the country, but importantly the sector's potential is threatened by the strong trend in degradation of

[47] (International Energy Agency, n.d.)
[48] https://isto.international/isto_members/office-national-de-tourisme-de-mauritanie/
[49] (Things to see and do in Mauritania, n.d.)
[50] (Banc d'Arguin National Park, n.d.)
[51] (Parc National du Diawling (PND), ENTRE FLEUVE ET OCÉAN, UNE AIRE PROTÉGÉE À DÉCOUVRIR, n.d.)r
[52] *Ibidem*

ecosystems that is characterising Mauritania for more than 30 years.[53] Sea-water rise and the sea-floods are increasingly affecting the city and the coastal villages represent a remarkable challenge for the environmental policy of the country. Vegetation coverage is generally declining, except in areas where user associations manage resources according to the decentralized resource management approach, and threatened by overuse, climate change and steady population growth. [54]

But challenges to the touristic potentials are also coming from man-made degradation. The dunes, which were the only barriers protecting low-lying areas of the city from seawater, where traditionally used as reservoirs of building material for the urban constructions. Fishing activities have considerably increased and the material and methods being used are affecting local ecosystems. Furthermore, the increasing risk of pollution by hydrocarbons on the international maritime route of western Africa and from the petroleum industries is also considerable. [54]

In this respect, the GIZ project « Protecting marine, coastal and land resources in Mauritania»[53] has supported the development of decision-making instruments, the strengthening of the legal framework, and cooperation between various stakeholders with civil society involvement. Local organisations that are active in the national parks and in the coastal zone have benefitted the most. The Banc d'Arguin and Coastal and Marine Biodiversity Trust Fund Limited (BACoMaB) has been responsible for financing the national parks.

Sustainable maritime transport

Mauritania **transport** sector is largely dependent on its export of raw material, traditionally being largely based on minerals, and food products (figure below left side), but also expected to grow towards the export of hydrocarbons and gas, due to the recent discovery of large gas resorts and the relevant plans for their international exploitations (as discussed under the renewable energy section). In this context, RO/RO and other transport types remains relatively limited, as illustrated in the figure below (right side).

[53] (Protecting marine, coastal and land resources in Mauritania, n.d.)l
[54] (Helping Mauritanian coastal cities adapt to climate change, s.d.)

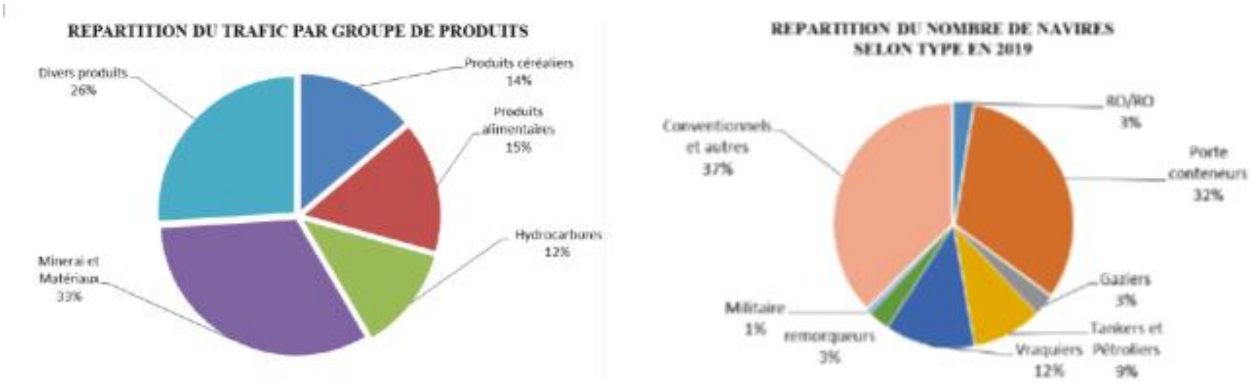

Figure 62 - Overview of transport type (left) and material transported (right) in Mauritania

Source: https://www.port-nouakchott.com/en

The Autonomous Port of Nouakchott[55] instead, known as the Friendship Port (PANPA) and ratified in 2002 by the International Maritime Organization, is the first public commercial port south of the Sahara, relying on 7 berths + 1 service berth and 1 oil berth in service since 2012. According to the 2019 data (the most recent publicly available), with an average handling of ca. 200.000 containers/year and over 5 mln tons of goods, PANPA is related to the trade of iron ore and mining products, agricultural produces and cereals, oil&gas products.

But the transport sector in Mauritania relies on two ports, Nouakchott and Nouadhibou[56], the first being more of a commercial one while the second acting as the main fishery port of the country. In this respect, the establishment of the free zone of Nouadhibou[57] in 2013 has attracted valuable investments to improve the port's competitiveness and to attract fish processing industries such as tuna canning, with support mostly from China and the Emirates.

Building on the potentials for gas and green hydrogen exports, a number of ongoing measures, including through the EU cooperation, are supporting the expansion of maritime infrastructure – and for example creating integrated development hubs with terrestrial infrastructure already built, like the landing facilities at M'Heijratt and PK93 sites, in the central and southern areas of the Mauritanian coast. Such support would imply a boost in transport activities and related revenues including national customs.[58]

[55] (Nouakchott Autonomous Port, n.d.)
[56] (Arab Sea port Federation, n.d.)
[57] (Fish-rich Mauritania looks to its Nouadhibou port for a brighter future, n.d.)
[58] (EC International Partnership, Mauritania, n.d.)

Conclusions: next steps and potential role for maritime clusters

Mauritanian blue economy has remained relatively focused on fisheries and transport, as a source for exporting primary resources, until recently. Due to recent natural gas discoveries, the role of Mauritania as an exported of energy is expected to become prominent in the years to come, as a result of a number of relevant findings across its coasts. In this respect, a number of essential aspects to be duly considered if the Country wants to maximise the potential positive impacts (economic, social) of such discoveries while managing and minimizing any detrimental result for its precious natural ecosystem.

Sustainable and cheaper sources of energy for the blue economy should result from the energy extracted and generated in the future, and it should be ensured that a percentage of such extraction is kept within the Country and channeled to fulfill sectoral needs. Also, investments in sustainable infrastructures should play a key role in order to avoid ecosystem damages, but also as a way to maximise synergies amongst energy sources (e.g. development of multi-purposes infrastructures that could be used for gas, wind, etc.).

Similarly, synergies with other potential activities (e.g. desalination) should also be duly reflected upon, as to allow strategic development of the sector and the blue economy as a whole and in order to develop a number of new streams of valuable economic activities. Co-habitation with existing relevant sectors (e.g. fisheries, tourism) of energy extraction processes and infrastructure is also an essential element to be addressed in order to maximise positive impacts and avoid the eating-out of traditional activities through the development of new ones. To avoid spatial conflicts amongst new and traditional sectors, studies through data collection and analysis, as well as proper development of Maritime Spatial Planning, to constantly monitor the state of the art of economic activities and their impact on local natural ecosystems, but even more importantly to ensure enduring gains.

The recently established **Mauritanian Maritime Cluster (MMC)** should play a leading role in ensuring that all the above-mentioned elements are duly taken into consideration by the relevant actors. It should also support the development of an overall Mauritanian Blue Economy Strategy to identify current gaps and opportunities to be fulfilled, as well as defining financing means (traditional and innovative, including through specific schemes to collect fees from the energy exploitation) as to fulfill such gaps.

- **Exchange of successful practices and valuable knowledge** should be ensured, by building upon as well as expanding the existing network of national stakeholders across the Mediterranean and the EU seabasins, as a means to strengthen local know-how/capacity; in this respect, a number of areas have also been identified and could be expanded:

  - *Desalination techniques, infrastructures and link to renewable energy solutions;*
  - *Multi-purpose infrastructures and their role in supporting a sustainable blue economy;*
  - *Pilot initiatives in developing green ports and sustainable green shipping/shipbuilding.*
- **Impact studies** are pivotal to further understand the state of play, potentials, risks and opportunities in developing a fully sustainable blue economy around energy potentials, those studies should also gather points of view and suggestions from local communities:
  - *Studies of socio-economic as well as environmental impacts of energy development;*
  - *Usage of space and options for maximizing positive impacts and addressing negatives.*
- **Greater support for inter-sectoral coordination and coherence** is needed across blue economy activities, also as a way to support an homogeneous blue economy development and frame a multi-actor strategic board to address a coherent approach for the Country:
  - *Traditional fisheries, tourism, port infrastructures, energy, environment, etc.*
- **A Blue Economy Strategy** is an essential policy framework in Mauritania, to allow for multi-sectoral coherence and prioritisation of strategic investments and sectoral support – it should be actively promoted by the Mauritanian Maritime Cluster, but to be effective it should be developed and fully endorsed under the lead of the Mauritanian Prime Minister.
- **A Blue Economy Observatory will then complement the strategy** as it would allow to identify KPIs and relevant sources of data/information to be collected in order to assess and monitor the advancements towards the strategic objectives set by the strategy; the observatory would also allow for a better identification and understanding of the main risks and potentials related to the future development of the Mauritanian blue economy.

The **CallMeBlue project** should further support the MMC in order to strengthen its overall organizational capacity, but also to sustain its role as advocacy and advisor for the Mauritanian Government in capitalizing on ongoing opportunities, investments and revenues to be generated in the area of energy, so to establishing a diversify and sustainable blue economy for the country. Sharing lessons in supporting promising sectors such as coastal and maritime tourism will be essential, as much as

strengthening policy monitoring, use of data and spatial planning to maximise synergies across sectors.

Morocco

Morocco is a large country characterised by a complex overall economic ecosystem, which is reflected in its blue economy status. The review of its potentials is currently undergoing towards the publication of a Morocco Blue Economy Strategy expected in late 2024 or early 2025. As emerging from the interviews and focus group being held, although there are some differences in terms of the status and potentials across different regions, the sectors can be grouped into three distinct categories:

- **Mature sectors** – including fishery and aquaculture as well as related port activities, potentially requiring turnaround strategies to adapt and fully address the current challenges posed by climate change, energy transformation and overall sustainability;
- **Growing sectors** – such as coastal and marine tourism, shipbuilding, maritime transport[59] and desalination, which have experienced a strong growth in the past years but are still needing support to fully emerge as sustainable and innovative sectors;
- **Embryonic sectors** – such as blue biotech and green marine energy/hydrogen, which substantially still require further support to reach a more mature level of exploitation.

An overview of the current situation is illustrated in the chart below, presenting the results of the interviews and the focus group discussion, whilst the specificities of each sector and the prospect for the evolution/potentials of such sectors towards 2030 are detailed in the next sections of this chapter – hence offering an overview of Moroccan blue economy.

[59] Whilst some ports, such as Tangier, as global players, in fact, the overall sector in Morocco requires support.

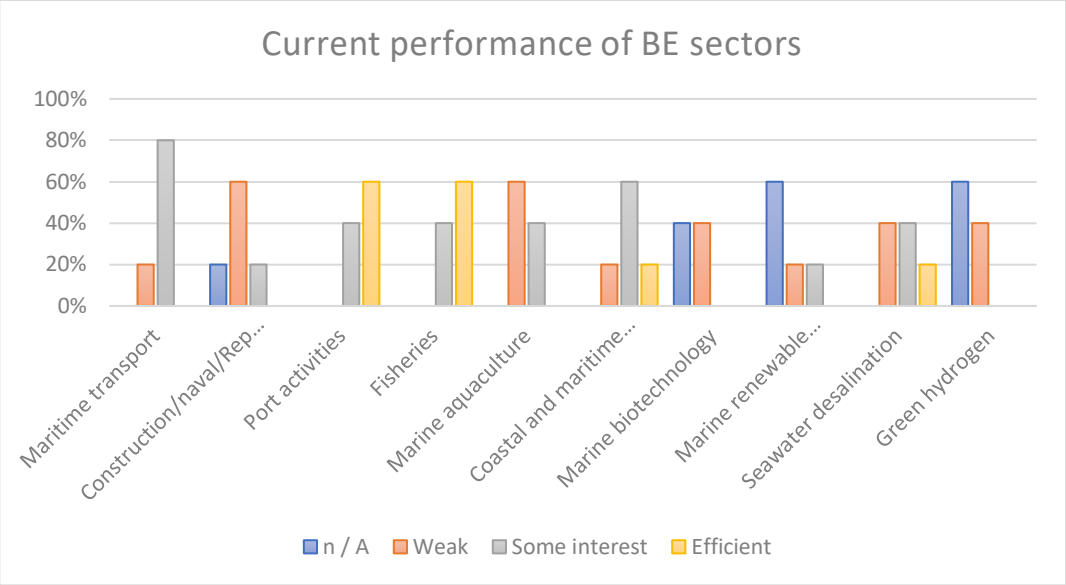

Figure 63 - Overview of the Moroccan blue economy sectors as emerging from our analysis

Source: interviews and focus group

Aquaculture and fisheries

Aquaculture is certainly less developed than fisheries overall, so far, but it offers a great opportunity for a future sustainable blue economy in the country. Aquaculture can diversify towards more innovative and value-added type of productions and value chains and boost the development of innovative and emerging sectors such as blue-biotechs.

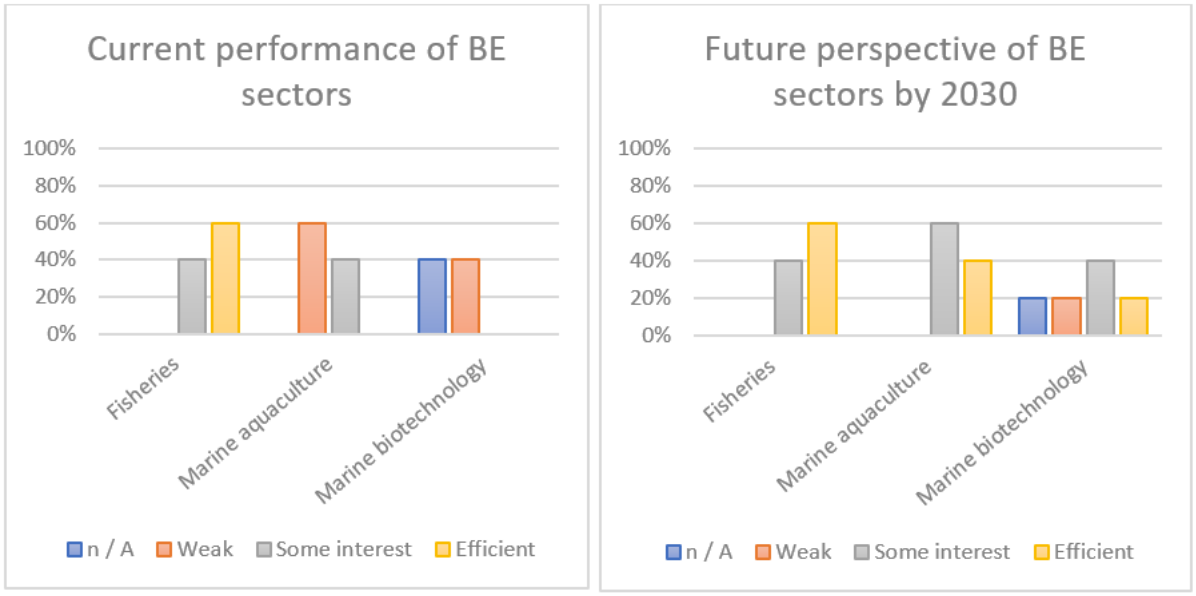

Figure 64 -Overview of the sectors performance today and toward 2030 (including biotechs)

Source: interviews and focus group

Fisheries constitute an economic sector of prime importance in Morocco (between 2% and 3% of GDP)[60], with capture fisheries production at around 1.4 million tons in 2021, with the bulk harvested in the Atlantic[61]. The fisheries heritage is made up of more than 500 species[62] (tuna, anchovies, mackerel, sardines, crustaceans, and shell fish such as mussels and oysters) and Morocco is the first fish producer in Africa, as well as the 13th globally. The Moroccan fleet is estimated 20.000 vessels of which 90 percent less than 12 meters long. Fish consumption per inhabitant is at around 20.3 kg.[63]

With 22 fishing ports and 40 fishing storage points, 21 fishers' villages and 27 landing points, artisanal fishery plays a central role in the halieutic landscape of Morocco (69% of the national fish production, destined for both direct consumption and the fish

[60] (TBTI Global, n.d.)
[61] (Food and Agriculture Organization of the United Nations, n.d.)
[62] L'économie bleue: Pilier d'un nouveau modèle de développement du Maroc - Conseil Economique, Social et Environnemental
[63] El Halimi, M., Raji, F., El Megdri, S., Moutaouakil, H. 2020. Unlocking legal and policy frameworks for smallscale fisheries in Morocco. In Kerezi, V., Nakamura, J., El Halimi, M., and Chuenpagdee, R. (Eds.) Unlocking Legal and Policy Frameworks for Small-Scale Fisheries: Global Illustrations. TBTI Global Publication Series, St. John's, NL, Canada

processing sector). Major fishery ports are Agadir, Rabat, Safi, Casablanca, Tefouan Tan-Tan and Tangier. The fishing industry processes nearly 70% of coastal fishing catches and exports approximately 85% of its production in around a hundred countries on five continents. Morocco has signed fishing agreements with the European Union, Russia and Japan authorizing fishing in Moroccan waters in exchange of a financial contribution and in 2021, exports of fish and fisheries products were almost 800.000 tons, while imports were estimated at 100.000 tons.[64]

The main challenges facing small scale fishery are: 1) promotion of seafood consumption in Morocco; 2) improvement of the quality and the safety standards of seafood products with an awareness of their importance; and 3) development of fish landing infrastructure, marketing, and distribution conditions. To tackle these issues, the Moroccan ministry of fisheries established Halieutis Strategy in 2009[63] , to promote the sustainability of the fishery resources; enhance the performance and competitiveness of the sector; control, govern and improve fish landing infrastructure marketing and distribution conditions.

Aquaculture production is in comparison rather limited and reached almost 1900 tones in 2021. A similar ratio is reflected in the employability of the sector, with less than 1.000 jobs in aquaculture compared to a strong performance by the overall fishing sector, provides direct and indirect employment to nearly 700.000 people (3 mln, including the whole industrial supply chain). The above-mentioned Halieutis Plan also established the National Agency for Aquaculture Development (ANDA), whose long-term goal is to let the country achieve an aquaculture production of 200.000 tons. The ANDA has committed a total of 116 million dirhams for the period 2023-2027, focusing on three main areas: the development of 14 aquaculture farms (four of which are run by women), seaweed cultivation and the creation of a shrimp cluster.[65]

Morocco's delay in aquaculture is also due to the insufficient attention towards diversification in regard to blue biotech development, as a way to valorise its biodiversity. As a consequence, the country is now focusing many efforts on the development of algae and micro-algae production, as well as of its capacity to ensure a significant quantity of fry and juveniles for aquafarms.

Digitalisation and blue skills

Despite some notable exceptions, for example for some aspects related to tourism and transport, the overall potential offered by **digitalization** remains largely untapped. This is particularly a challenge when it comes to the availability of digital

[64] (Agence Nationale des Ports , n.d.)
[65] (Kingdom of Morocco, Ministry of Economy and Finance, n.d.)

data for sector analysis and policy making, but it might include a still limited exploitation of commercialisation potentials of digital solutions across the Moroccan blue economy. Similarly, **blue skills** remain limited across Moroccan sectors, as it is illustrated by a still relatively poor uptake of innovative tools and practices resulting from the figure below. Expectedly, the role of digitalization and blue skills as cross-cutting drivers for the Moroccan blue economy could be further boosted as a result of the foreseen national Blue Economy Strategy, with stronger consequent focus on the specific skills and competencies gaps of each sector.

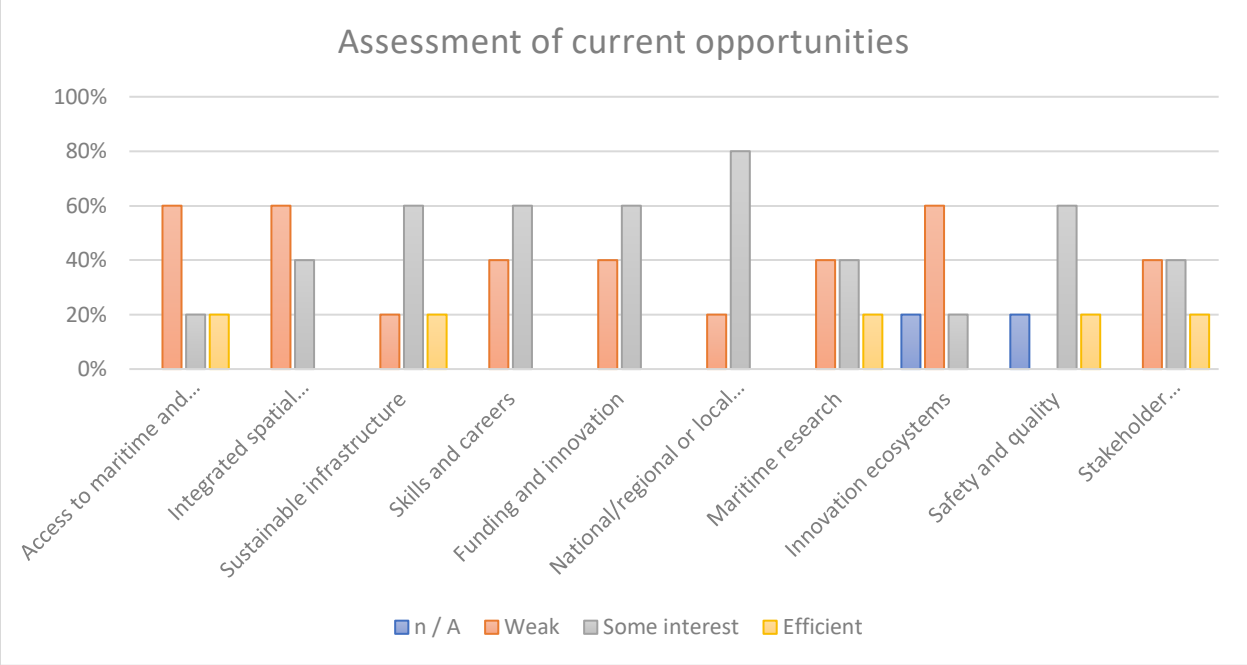

Figure 65 - Overview of current capitalization of opportunities in the areas of digital, skills, etc.

Source: interviews and focus group

Marine renewables (desalination)

Renewable energy mixes are already playing a pivotal role in fostering Morocco green transition towards greater self-sufficiency. Although largely based on in-land solar and wind infrastructures, hydro and off-shore investments are growing of relevance. These

greater investments in renewable energy will also have an impact on desalination needs and investments, both as they will increase the fresh water need as well as offer opportunity for greater desalination powering.

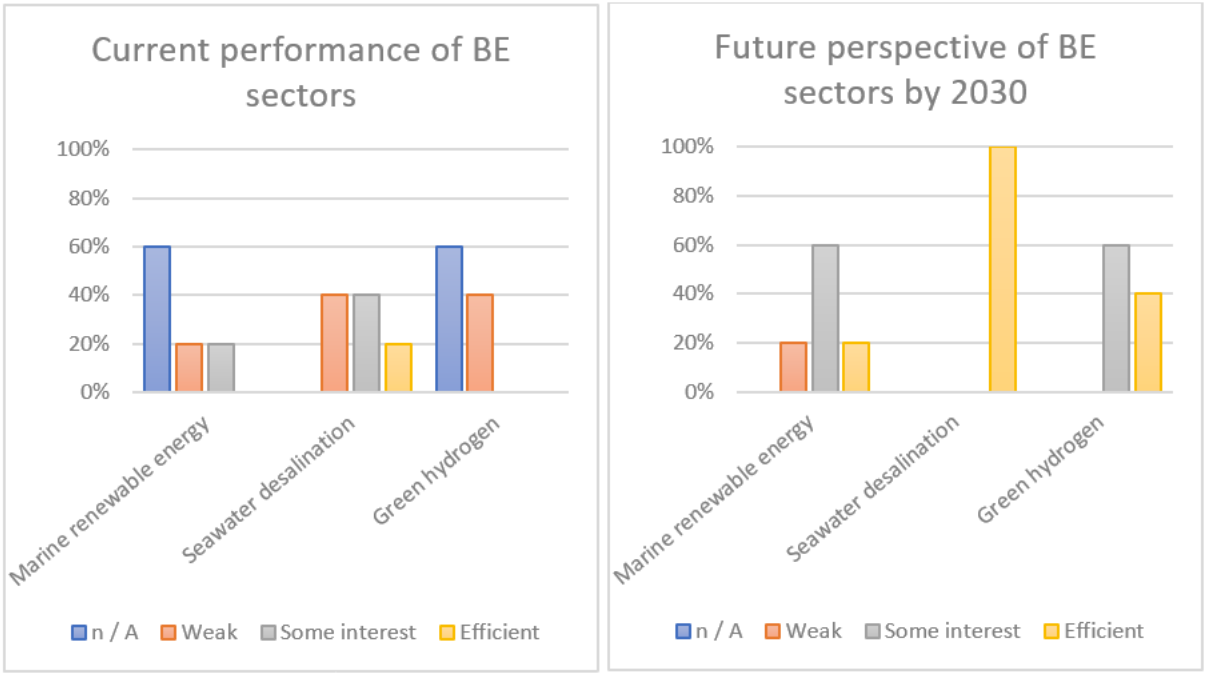

Figure 66 - Overview of the sectors performance today and toward 2030 (including hydrogen)

Source: interviews and focus group

Unlike many other countries in the MENA region, Morocco is not an oil- or gas-producing country. As a consequence, imported fossil fuels—coal, oil, and gas—traditionally accounted for over 80% of Morocco's electricity generation.[66] In this respect, Morocco has developed a plan to transform its energy sector by 2030, aiming to increase the renewable energy share to 52%, with specific targets of 20% for solar power, 20% for wind energy, and 12% for hydroelectric power. Additionally, under its Nationally Determined Contributions (NDC), Morocco plans to cut greenhouse gas emissions to 18.3% below its baseline levels by 2030, a reduction that could reach 45.5% with international support. The EU has an insatiable demand for Morocco's green energy. In addition to their ambitious net-zero targets by 2050, many EU economies

[66] (International Energy Agency (IEA) (2023), s.d.)

are eying green energy imports from North Africa to strengthen their energy security.[67]

Morocco is also notably home to massive **solar and wind resources**. which has helped make this North African country an ideal location for investments in renewable energies, including green hydrogen. Having one of the highest rates of solar insolation among other countries— about 3,000 hours per year of sunshine but up to 3,600 hours in the desert, Morocco ranks second in the Normalized Renewable Energy Country Attractiveness Index, published annually by Ernst & Young.[68] In 2016, the Moroccan Agency for Solar Energy (MASEN), a public-private venture, was established to lead the world's largest solar energy project, aimed at establishing 2,000 megawatts of solar generation and manage a $9 billion investment. Furthermore, beside an established role in energy production from photovoltaic source, Morocco enjoys quite favourable wind resource patterns, both in the northern part of the country near Tanger and to the west where certain regions benefit from regular trade winds. In 2022, 13.48% of electricity produced in Morocco was coming from wind power.[69]

Therefore, to address the solar power's variability and boost energy system resilience, Morocco has also invested in pumped storage **hydropower**. In latest years, in fact, increasing attention is paid to the green hydrogen development, whose supply chain could be fostered through the ongoing investments in port infrastructures and with more intense partnerships with international groups. A number of relevant initiatives have been promoted in partnership with the Tangier ports, towards the development of renewable energy sources and the discontinuation of diesel generators. Amongst other initiatives, the port is supporting the establishment of a center for the management and valorization of ordinary and hazardous waste, recycling waste into products and energy, while developing a broader facility to deploy floating photovoltaic and wave energy recovery, including a solar part and a wind farm, and intending to qualify as an ECOPORT label.[70]

Of course, such increasing green energy activities are putting pressure on the availability of fresh water, adding up to the already severe lack of fresh water, making the country ranking 27thglobally on WRI's Aqueduct Water Risk Atlas. Surface water and groundwater account for 97 percent of Morocco's fresh water sources. The drought over the past few years has forced the government to redirect fresh water from agricultural production to household consumption, resulting in a negative impact on GDP. To alleviate the water shortage, the country is planning to build 12

[67] (Columbia School of Professional Studies, n.d.)
[68] (Renewable energy in Morocco, n.d.)
[69] (Solar power in Morocco, n.d.)
[70] (Energy transition, n.d.)/

large **desalination plants**[71] over the next 10 years that will meet about 15 percent of the country's fresh water needs. However, desalination is very energy intensive. To make desalination sustainable, both environmentally and economically, Morocco has committed to running these plants on renewable energies.

Green hydrogen, produced by splitting water through electrolysis using renewable energy, is also expected to play a key role in the decarbonisation of Moroccan industries, with 1 million hectares currently allocated to green hydrogen projects – starting with 300,000 hectares in a first phase, as part of an offer to attract investors.[72]

Sustainable tourism

Coastal and maritime tourism is an essential component of tourism overall, which is a strong element in the Moroccan economy, and yet it requires further support to move towards full sustainability, greening and to address climate change challenges.

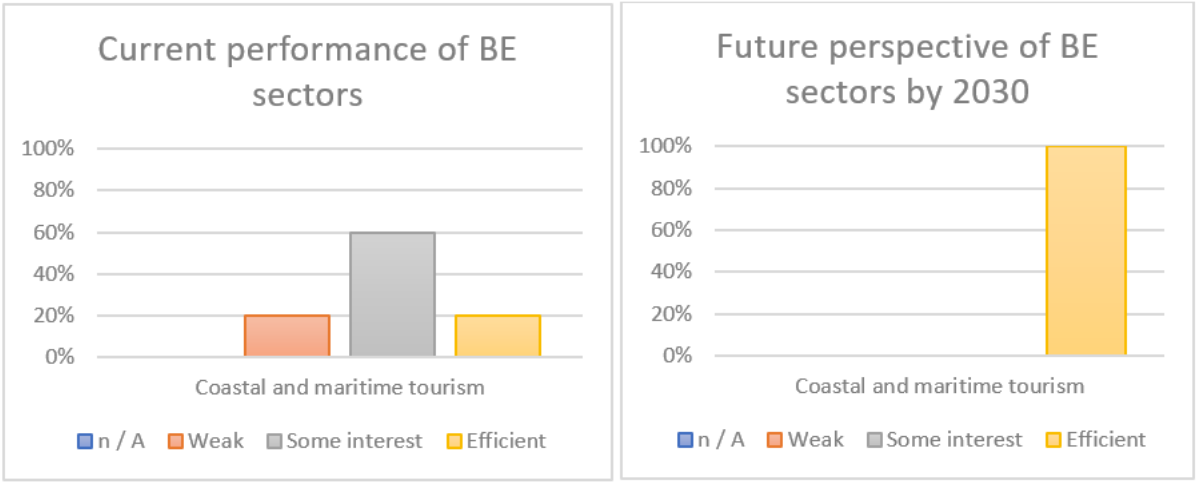

Figure 67 - Overview of the sector performance today and toward 2030)

Source: interviews and focus group

Tourism overall accounts for 7% of gross domestic product in Morocco and just last year it has set a peak since the COVID19 crisis, with about 14 million arrivals for 2023.[73] In this context, coastal tourism represents a key sector for a sustainable blue economy in Morocco and maritime tourism is a relevant portion of port activities, as further discussed in the next session. Besides its about 300 km of pristine coastlines and clear

[71] (New desalination plant points towards Morocco's drought response, n.d.)
[72] (Morocco to dedicate 1 mln hectares to green hydrogen projects, n.d.)
[73] (Morocco set to hit record tourism arrivals despite quake and Gaza war, n.d.)

seas, Morocco also boasts an array of picturesque coastal towns that are as diverse as they are enchanting (Tangier, Essauira, Asilah, Agadir) – from bustling port cities to tranquil fishing villages, each destination offers a unique blend of history, culture, and natural beauty.[74] As a result, blue tourism employment, intended as jobs in tourism in coastal provinces, amounts to more than 300,000 jobs hence resulting in a relevant portion of the overall tourism sector.[75]

Projects to create and transform tourism SMEs involve 100 SMEs in Guelmim Oued Noun, 150 in the Sous Massa region, and 600 in Tangier, with a particular focus on gender mainstreaming and raising women's awareness of entrepreneurship in SMEs, as well as the set-up of wo Regional Development Companies (RDC) in the regions of Tangier Tétouan Al Hoceima and Guelmim Oued Noun in addition to the one already operational in the Souss Massa region.[76] This is only a portion of the ambitious plan for Morocco to spend 6.1 billion dirhams ($580 million) up to 2026 to develop its overall tourism sector in order to attract even more international visitors.[77] An essential element of further support is the shift towards greener, sustainable and climate-change adapted practices.[78]

The government also plans to spend more money on marketing, develop more types of attractions for tourists, upgrade hotels and build new ones, and train more people to work in the sector. Marketing campaigns are expected to also further promote the seaside destinations, by reaching millions more contacts thanks to ongoing efforts on digital platforms, social networking and contributions from influencers.[79]

Sustainable maritime transport

With 37 ports managing 87 mln tons of traffic in goods and services, the sector is certainly a high-performing one although it requires strong support to complete is necessary green transition. Importantly, Moroccan transport and port activities are addressing a number of different sectors/activities, including trade (in 15 ports), passengers and RO-RO traffic (in 5 ports), leisure and marinas (in 11 ports) as well as importantly fishery (in 28 ports).[80]

To coordinate the sector and such transition, three Agencies are established under the Ministry of Equipment and Waters: Agence National des Ports[80] (37 ports, 87 mln

[74] (Coastal Towns of Morocco, n.d.)/
[75] (BLUE ECONOMY PROGRAM FOR RESULTS (P172926), n.d.)f
[76] (Blue Economy: Assessment of the 4th World Bank Supervision Mission, n.d.)
[77] (Morocco Unveils $580 Million Plan to Boost Tourism, n.d.)/
[78] (Eco-friendly fair and sustainable tourism Morocco, n.d.)
[79] (Blue Economy: Assessment of the 4th World Bank Supervision Mission, n.d.)
[80] (Agence Nationale des Ports , n.d.)

tons traffic), Tanger Med[81] (3 ports, 122 mln tons traffic, 8,7 mln equivalent 20 feet containers, 2,7 mln passengers) and Tanger Ville.

While Tanger Med is playing the role of international hub and is therefore gathering significant investments in terms of operative competitiveness, environmental compliance and energy gateway, Casablanca, Nador and Agadir are consolidating their positions for cruising, fishery and trade activities on the respective coastlines. All those ports and transport face different challenges related to the overall need for greening of infrastructures, but also the development of innovative (including digital) solutions to address the challenges and opportunities of a shifting global demand across sectors. In this respect, important investments in shipyards are under implementation in Casablanca, Agadir, Nador, Dakhla.[80]

Furthermore, to support the green and sustainable transition for the transport sector, Morocco has recently set-up a consistent Shipbuilding Cluster (CINM), officially established in February 2024[82], aimed to tackle the main challenges in the transport and shipbuilding sector in terms of sustainability, and also targeting the renewal of over 200 large fishery vessels, the reconstitution of the national merchant navy with ships less than 120 mt length (dry bulk traffic and container traffic), the refitting of the Navy fleet.[62]

Conclusions: next steps and potential role for maritime clusters

Moroccan blue economy has the potential to grow towards a strongly diversified economic ecosystem, with a number of sectors having strong potentials for growth and overall sustainability through diversification. The current commitment towards setting up a National Blue Economy Strategy, including through the set-up of Inter-Ministerial Committee for the blue economy, reinforces such potentials. And yet, the budget available to foster proper research and development remains relatively low, and the overall state of infrastructures and competencies is still lagging behind the state of the art needed to address overall challenges such as greening, energy resilience and addressing challenges due to climate change across all sectors. Also, a general fragmentation of activities, actors and policies in each sector, is hindering the potentials for cross-sectoral synergies and diversification in the development of innovative and resilient value chains.

Maritime Clusters can play a pivotal role in supporting the green and sustainable transition for the blue economy in Morocco, as they already play some key role in fostering established sectors at national level (such as for the transport and ship-building), while other clusters could be created or strategic extension of the current

[81] (Tanger Med port Authority, n.d.)
[82] (Industrie : Naissance du 1er cluster maritime, n.d.)

one could be supported in key areas of innovation (for example in the areas of biotechnologies, as well as eco-ports and for the nexus of renewable energy & desalination). But regional clusters are also currently playing a pivotal role in fostering innovation at the local level, with two pilot Regional Clusters being promoted in the region of Sousse Messah and Tangier Tétois, with the aim of testing a model that could be replicated across all regions.

The **CallMeBlue project** should further engage with the existing national and regional clusters into the regional activities foreseen and particularly support the capability of sub-national clusters, as well as the diversification of current activities of existing clusters (at the national and regional level) towards emerging sectors such as renewable energy, desalination, blue-biotechs and green ports.

Tunisia

The analysis conducted through blue economy operators in Tunisia highlighted that there are blue economy sectors particularly relevant in the country.

The sectors assessed and where most relevant data were acquired are outlined below:

Figure 68 - Identified blue economy sectors in Tunisia

Aquaculture

Tunisian aquaculture is a very dynamic sector, with 30 operative farms, 2 marine hatcheries, 3 feed manufactures (mostly extruded feed), and an appreciable level of integration in the European supply chains. It is registered over 25.000 tons/year production and more than 3.000 employed human resources. Currently Tunisia can count on technologies and production of extruded feed and juveniles, as well as an offshore production system,

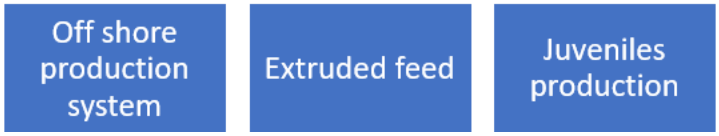

Figure 69 - Aquaculture used technologies/production in Tunisia

Tunisia is tackling **challenges** related to its political instability, to limited access to suitable financial resources and to the lack of qualified human resources. Hence, many **activities to enhance the existing initiatives and to foster new investment opportunities** are now in their target:

- Establishing national production of juvenile, feed and equipment;
- Optimising resources and improvement of quality, in terms of SMART feeding technologies for management & control; assessment of water quality (chemical and biological) against new pathologies in fish farming companies (related to export to Europe of sea bass and sea Bream); toxicological risk assessment (pollution and climate change); optimisation of biomolecules extraction from sea biota (algae/animals) and maximisation of their use for therapeutical aims; fish or crustaceans waste valorization.

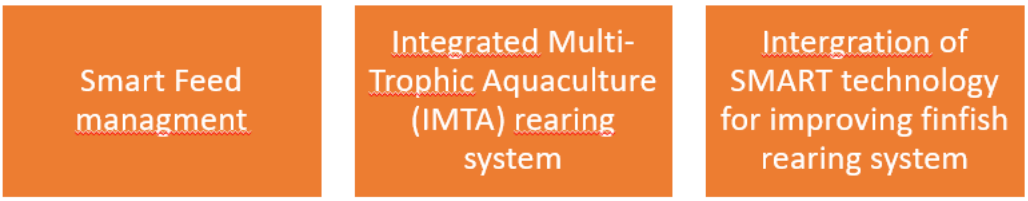

Figure 70 - Aquaculture missing technologies/production in Tunisia

Despite a decent stable increase between 3% and 10%, perspectives look encouraging, especially considering its larger and better export capacities, related to sustainable practices, better feeds, Integrated Multitrophic Aquaculture (IMTA), preservation of brackish waters and coastal inland environments (lagoons, salty lakes, etc.). For instance, the role of SOTUPAP and NUTRIFISH companies, in the field of feed, and of INSTM in the field of technological and biological research, are central for the further **improvement of the sector**, especially considering the high degree of international partnerships looking at the country's ecosystem, as the most vital and diversified in the region.

Digitalisation

The sector has seen a robust growth in the last three years (between +10% and +20%) and looks promising also for the near future, despite the limited actors involved. However, from the analysis, it has emerged that Tunisia is still a bit behind in the whole process, especially in relation to the digitalisation, Maritime Spatial Planning (MSP) and Integrated Coastal Zone Management (ICZM). Despite the regulation imposed by the National Center for Remote Sensing and Cartography (Law No. 24 of 2009) on the various players can indeed contribute to the digitisation of data and their harmonisation in a single geographic information system, however since 2011 all processes have been slowed down by the revolution.

In fact, it is still at the embryonic stage of collecting spatio-temporal data from different parties concerned and grouping and homogenising them in a single digital data bank. **These activities would enhance the sector** and once the process is complete, there is need to better implement the system through an appropriate legislative framework for the MSP, an initial strategy and its action plan, as well as through an MSP simulator.

Figure 71 - Digitalisation missing technologies/production in Tunisia

Being a net importer of systems and technologies (SAROST, Graphtec, etc.), the country is increasing finalising the electronic and digital acquisition of information and data, through a limited number of local companies able to collect and process information. Most of the technologies and systems used, such as acoustic or ultra sound or seismic reflection equipment, software and processing algorithms, are for scanning the seabed and water columns, measuring all types of data.

Figure 72 - Digitalisation used technologies in Tunisia

Marine renewables (desalination)

The marine renewables sector in Tunisia is quite developed. Solar energy and wind energy are the two mainly adopted technologies in Tunisia. A first wind power plant was installed in Sidi Daoud in 2009, with a total power reaching 55MW and an annual energy produced of 150 Gigawatt-hours (GWh)/year and a second in the region of Bizerte in the north of the country on two sites located in Metline and Kchabta. With a power of approximately 97MW and 93 MW respectively, they include 143 wind turbines of 1320 kW each. In addition, the total energy produced by wind power plants in Tunisia is about 750 GWh/year, allowing an annual saving of 153,000 tons of fuel.

This is a step towards increasing the share of renewable energies (excluding hydraulics) in electricity production from about 3% in 2013 to 30% in 2030. Also, the Tunisian solar plan plans to reach an installed capacity of renewable energies in 2030 of the order of 3725 MW including 1700MW wind power, i.e., 45% of the total installed capacity.

As for the desalination sector, in Tunisia there are currently 120 desalination stations: the only technique applied in Tunisia is reverse osmosis, apart from the Bengarden station (since 2015, using photovoltaic technology, 210 KwC, 1800m3/day).

Figure 73 - Marine renewables used technologies in Tunisia

Tunisia is also working on the employment of hydrogen for desalination, within the framework of the cooperation with Germany, this would indeed be a further enhancement in the sector with great **business opportunities and investment potential.**

Among the main actors involved in the desalination sector, the main players are SONEDE, STEG and ANME companies, where the latter has “equipped” the country first with the “SIM2E” information system, allowing to monitor and evaluate, using a top-down approach, the energy management policy, later with an integrated data management system called “Enerinfo”. In the same way it is working on SOFEM project "Solar Fueled Maritime Mobility in Tunisia Project" which aims to promote solar-based electric maritime mobility in the MENA region and to reduce greenhouse gas emissions related to transport.

Blue skills

Tunisia is a country where Blue Economy is naturally at the core of the social and economic activities. The Tunisian education sector is valued at a total of 1 billion Euro, corresponding to the budget of the two ministries (High Education and Professional Training), where Blue Skills itself only counts 2-3% of this value. Nevertheless, there are excellent organisations in the Blue Skills, which are well integrated within the international and Euro-Mediterranean partnerships.

A great interaction between education and industry is increasingly intensive for what concerns the most promising sectors, namely marine biology, fishery and aquaculture, tourism, transport and logistic, shipbuilding of recreational boats.

In the education process, digital systems and tools are used in the courses and practical works: since the start of the coronavirus pandemic, distance learning has spread across the country and many, in blue sector, use the MOOC (Massive Open Online Course). In Tunisia, the use of the internet helped the update of the educational system in blue sector.

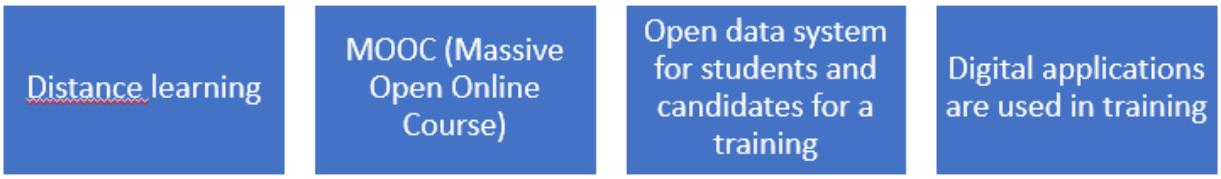

Figure 74 - Blue skills used technologies in Tunisia

Among the main **challenges** to tackle is the negative trend in terms of young students' freedom to choose Blue Skills and relevant courses; moreover, an advanced legislation should be put in place, with more coordination among all national contributors, and support the blue training; stronger co-operation and exchange programs with the other African and European countries are much needed and overall **actions to reverse this negative trends** should be taken in order to make progress in the existing initiatives. In addition, it would be beneficial to conduct benchmarking and a better management of educational institutions, to modernise the sector and let it better respond to the market solicitations, which would lead to **new business and investment opportunities**.

Figure 75 - Blue skills needed actions in Tunisia

Sustainable tourism

Tunisia relies on maritime tourism, as an important asset for its GDP, both in the short term, through the scale-up of the recreational boating sector, as well as in the mid-term focusing on the valorisation of bio-diversity and preservation of the marine wealth.

Today, more than ten years after the revolution, associations, NGOs and companies involved in sustainable tourism have multiplied: from the realisation of ecotourism circuits in the North-West region to the establishment of cycle routes on the historic site of Carthage; the ecotourism program in the Kerkennah salt pans with self-guided visits, with a presentation of its biodiversity in addition to a pilot experience of multitrophic aquaculture; national parks such as the Zimbra and Zimbretta islands, protected areas as the Kuriats, Jalta and Kneis islands, the coastal saltworks such as the Sfax saltworks.

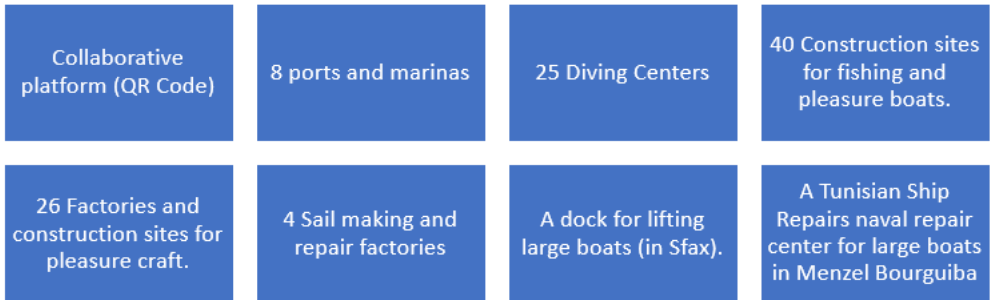

Figure 76 - Sustainable tourism existing facilities in Tunisia

Actions that would enhance the sector and provide new business opportunities are definitely within the fields of ecotourism, pesca-tourism, creation of national parks, marine protected areas and coastal saltworks, all areas which seem to represent the real future of Tunisian sustainable development.

In addition, other actions are needed, such as the promotion of collaborative platforms for reservation and a proper legislative framework to regulate and organise this sector and foster new activities, leading to **new business opportunities and**

enhancement od sustainable initiatives. In recreational boating, for instance, the challenge of introducing principles of sustainability and aligning the infrastructures and services to international standards has been driving the operators in the recent years.

Among the main **challenges**, we can include the political instability that the country is going through, the difficult access to funding sources and the missing MSP & ICZM process, along with an institutional fragility, the littoralisation and urbanisation of tourist areas, conflicts among the different actors and uses of land and sea areas. Nevertheless, there are strategic actions that Tunisia can carry out to **enhance the sector.**

Firstly, thanks also to the huge work carried out by the Tunisian Maritime Cluster through its VET institutes, the improvement of the training offer for professional positions in the yachting activity and the coastal passengers' transport are significant, since the educational and training national system offers only certificates of competency for merchant ships exceeding 500 tons.

Actions should be carried out towards the following Tunisian strategic objectives:

- Position Tunisia as a yachting destination
- Plaisance to qualify Tunisia as a tourist destination
- Associate the ports with the hearts of resorts and tourist towns
- Develop the sector of nautical activities and nautical services
- Maximise the expenses of stays of international boaters
- Promote Tunisians' access to yachting
- Reach 8000 rings with the construction and development of the 13 ports and marinas planned by the marina master plan.

The Tunisian Ministry of Tourism is preparing a strategy for the sector by 2035, trying to address actions towards the achievement of the following elements:

- What intelligent maritime infrastructure for an increasing flow and improved security?
- Opportunities of the blue economy, biotechnology and renewable energies.
- Coastal protection and inclusive policy integrating the target populations.
- Marinas and nautical entertainment activities, including:
    - Creation and constitution of an international higher council for pleasure boating.

- Revision and updating in accordance with the improved technology of the EURO-MARINA convention;
- Ensure the full application of the London Convention of 1 November 1974 for the safety of life at sea (SOLAS, Chapter V). D) Examination and ratification of the draft convention on pleasure navigation in the Mediterranean Sea.

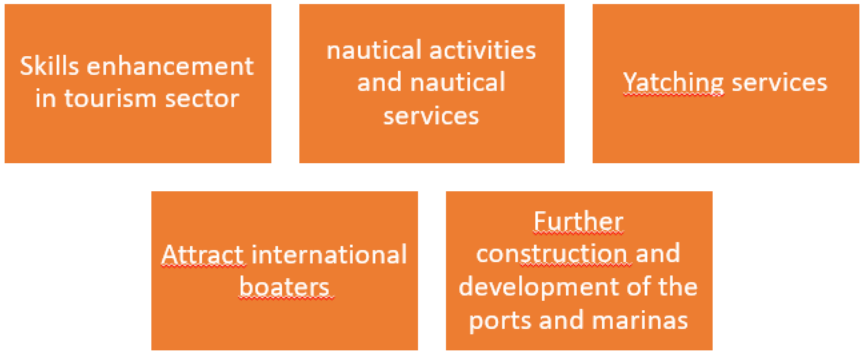

Figure 77 - Sustainable tourism missing production/development in Tunisia

Sustainable maritime transport

Tunisia can count on 7 seaports of trade (a deep waters port project, procedure undergoing, in the area of Enfidha), which handle an annual average of 30 million tons of goods whose can be divided into, namely, 5 main groups: hydrocarbons which represent almost 1/3 of trade; general cargo; solid bulk; cereals; liquid (chemical) bulk. The sector is expected growth, with particular reference to cruise sector, where the growth rates are expected to be higher than 20% between 10% and 20% for passengers & vehicles, while between 3% and 10% for containers, trailers, liquids in bulk, cruise passengers, dry bulk cargo, general cargo.

Among the technologies currently used:

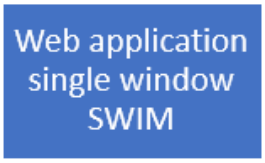

Figure 78 - Sustainable transport used technologies in Tunisia

Among the main **challenges**, indeed national and international politics are heavily affecting the perspectives of Tunisian sustainable maritime transport, in particular with reference to the internal political situation and the Ukrainian crisis. In fact, the environmental (need to reduce air emissions and to comply with UN-SDG) and safety (COVID-19, Monkey-pox public health emergency) factors might really put at risk the planned growth path.

Among the **actions that would enhance the sector** we can include the production of the OPS (on-shore power supply) systems, which can help the modernisation process of Tunisian ports, in view of a reduction of emissions.

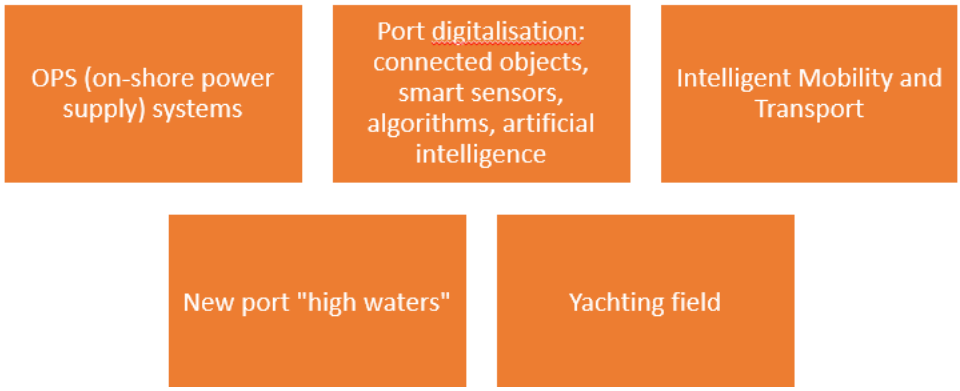

Figure 79 - Sustainable transport missing technologies/production in Tunisia

Conclusions

From the report, the importance of blue economy and clusters initiatives in boosting the sustainable goals has been analysed from various points of view.

The blue economy sector and all actors involved in carrying out activities in this multi-faceted area, play a key role in reaching sustainability objectives, fostering economic growth, creating new employment opportunities. By looking closely to the Mediterranean basin, it is clear the fact that it represents a key and strategic area where marine and maritime activities have always played a crucial role for the development of coastal areas.

In this framework, blue economy clusters in northern and southern shore of the Mediterranean do represent the key organisations at regional, national and international level that act as main facilitator for actors involved in blue economy activities, including public and private actors such as operators, large enterprises, SMEs, research centres and universities, secondary schools and VET institutes, national agencies, local and national administrations, institutions and policy makers.

In particular, given the diversified political situation in the southern shore area and the diversifies socio-economic dynamics, the implementation of clusters initiatives, as well as the development of specific blue economy sectors, can only be analysed by taking into account that each country has its own peculiarities and priorities.

Hence, the analysis carried out by consulting specific actors in the analysed countries led to concrete results on which further actions can be implemented. Firstly, six countries have been identified, along with the list of actors at local, regional and national level, as discussed in detail in a dedicated paragraph.

For each country an overview of political interest, economic background, interest in clusters initiatives implementation has been analysed. As a result, in all countries clusters implementation show great potential, and their implementation is different from country to country. The figure below summarise an overview of the clusters initiative state.

ALGERIA	EGYPT	LIBYA	MAURITANIA	MOROCCO	TUNISIA
• Clusters initiatives have been encountered • Cluster are sector-based • Government interest in cluster implementation has been encountered • Follow a top-down approach aiming to achieving specific policy objectives	• Great potential for cluster implementation • focused towards production of goods and services and are mainly sector-oriented • follow a bottom-up approach, as cluster policies are addressed by local actors rather than by the government.	• Clusters initiatives are still not developed, however concrete steps towards formalization by initiating procedures with the Civil Society Commission in Benghazi and Tripoli (2024) • Could benefit from the experience of neighbour existing clusters from both southern and northern shore, in particular Tunisia and Italy	• the national Marine Cluster has been established in 2023, as one of the main results of inclusion and capacity building undertaken by the WestMED Maritime Clusters Alliance • Engagement of public and private stakeholders in the blue economy, gathering them in a coordinated organization, can now be reinforced through the cluster	• The Moroccan government actively supports the establishment and development of clusters as part of its broader economic development strategy. • The government has formulated policies and strategies to promote cluster development as a means of enhancing competitiveness, fostering innovation, and driving economic growth.	• Clusters initiatives are quite spread out in Tunisia and there is a national Cluster dedicated to the Blue Economy, namely the Tunisian Maritime • Clusters can help economic recovery and significantly boost good and services production in various sectors • The relevance of the advanced state of both blue economy and cluster initiatives implementation indeed sees Tunisia as the country with the pivotal role in the southern shore area

Figure 80 - Summary of clusters initiatives in the southern shore countries

For each country the most promising blue economy sector have been taken into account, as summarized below.

ALGERIA	EGYPT	LIBYA	MAURITANIA	MOROCCO	TUNISIA
• Aquaculture • Digitalisation • Sustainable Maritime Transport • Sustainable Tourism • Marine Renewables/ desalination • Blue skills	• Aquaculture • Digitalisation • Sustainable Maritime Transport • Sustainable Tourism • Marine Renewables/ desalination • Blue skills	• Aquaculture • Digitalisation • Sustainable Maritime Transport • Sustainable Tourism • Marine Renewables/ desalination • Blue skills	• Fisheries/Aquaculture • Desalination • Energy/ Green Hydrogen • Tourism • Port Activities	• Fishery and aquaculture • Port activities • Coastal and marine tourism • Shipbuilding • Maritime transport • Desalination • Blue biotech an • Green marine energy/hydrogen	• Aquaculture • Digitalisation • Sustainable Maritime Transport • Sustainable Tourism • Marine Renewables/ desalination • Blue skills

Figure 81 - Summary of most promising blue economy sectors in the southern shore countries

For each country and each sector, the main challenges and obstacles that may represent business opportunities, priorities for investments in the blue economy sectors are summarised below. Indeed, several were encountered based on the

peculiarities of each country, however the list below is not intended to be exhaustive – full details are available in the report as well as in the database available as a separate deliverable (D2.2).

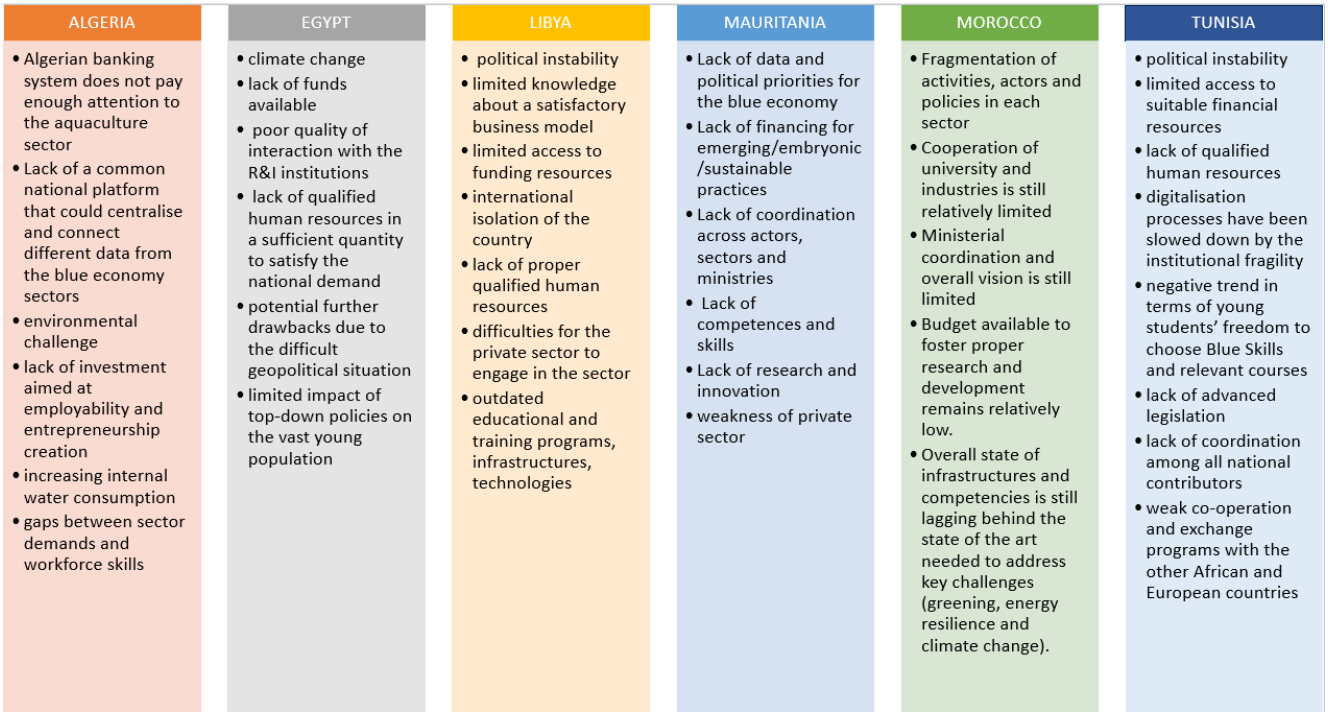

Figure 82 - Summary of main challenges and obstacles in the southern shore countries

From the analysis, several potential actions that could improve existing initiatives and governance capacity have been encountered. Although the figure below does not show an exhaustive list, it provides a good overview of some of the actions that could help in enhancing current existing processes.

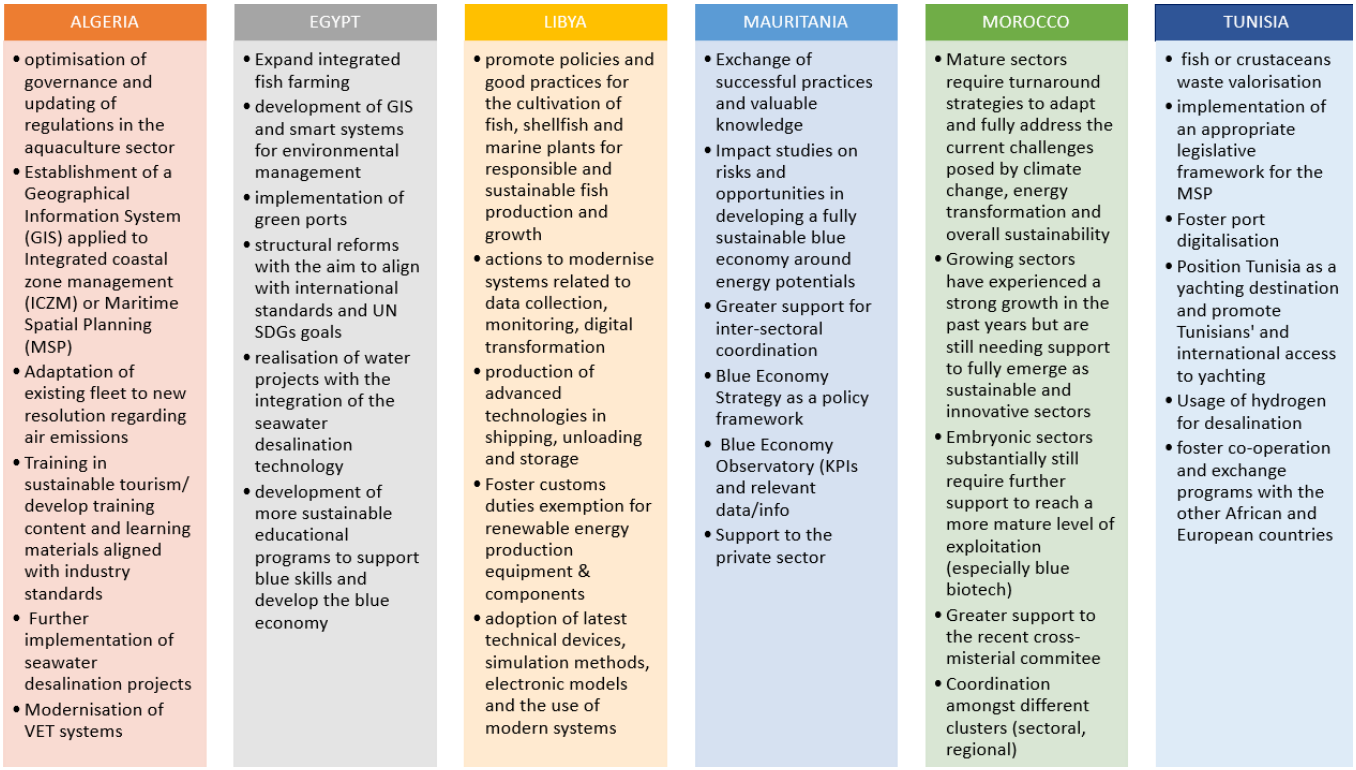

Figure 83 - Summary of main actions to enhance existing initiatives in the southern shore countries

Fostering cooperation and business opportunities shall be a way to involve actors in fostering progress and modernisation of existing activities in the blue economy. The figure below shows a summarized version of the main potential actions that can be encouraged in the following WPs and actions in the CALLMEBLUE project.

ALGERIA	EGYPT	LIBYA	MAURITANIA	MOROCCO	TUNISIA
• production of marine fish hatcheries • production of acoustic technology for the assessment of fishery resources • adaptation of existing fleet to new resolution regarding air emission • creation of collaborative platforms: booking & search; home sharing & rentals; touring activities; car sharing & rentals • production of membrane and spare parts for desalination plants • Create stakeholder platform	• promote the development of hatcheries for the production of marine fry and the expansion of shrimp cultivation • production of monitoring systems • production of solar panels and power plants from gas and wind farms • training to tourism personnel to improve and elevate the skillset • production technologies for using electricity through solar and wind power • training programmes for graduates to respond to labour market demands	• launch ecosystem services to restore biodiversity • actions to modernise systems related to data collection, monitoring, digital transformation • production of advanced technologies in shipping, unloading and storage • promote activities in underwater archaeology and coastal tourism • Produce thermal and wind energy plants • adoption of latest technical devices, simulation methods, electronic models and the use of modern systems	• Support the Mauritanian Maritime Cluster (MMC) in order to strengthen its overall organizational capacity • Sustain its role as advocacy/advisor for the Mauritanian Government in capitalizing opportunities, investments and revenues to be generated in the area of energy	• Maritime Clusters can play a pivotal role in supporting the green and sustainable transition for the blue economy in Morocco • Regional clusters are currently playing a pivotal role in fostering innovation at the local level, with two pilot Regional Clusters being promoted in the region of Sousse Messah and Tangier Tétois, with the aim of testing a model that could be replicated across all regions.	• assessment of water quality (chemical and biological) against new pathologies in fish farming companies • production of a MSP simulator • creation of new ports high waters • Develop the sector of nautical activities and nautical services • production of hydrogen-based desalination plants • foster coordination among all national contributors

Figure 84 - Summary of main actions to increase business opportunities in the southern shore countries

Lastly, from the analysis several potential cross-fertilisation activities have emerged and these shall be food for thoughts to implement actions among the identified actors in the piloting actions and activities foreseen in WP3 and WP4.

ALGERIA	EGYPT	LIBYA	MAURITANIA	MOROCCO	TUNISIA
• harmonisation of actions in the higher education sector, MSP, aquaculture • increasing share of data from actors and organisation working different aspects of maritime surveillance, fisheries, security, MSP and ICZM • enhancement of education in this sector by increasing the qualification of local human resources • enhance connections between incubators, start-ups, investors, accelerators, entrepreneurs, business networks, universities to multiply innovative blue ecosystems	• align with the international best management practices (BMP) • foster best practice exchanges with other experts in the field of expertise to bridge the technological and skill gap • accelerating digitalisation of maritime transport • structural reforms with the aim to align with international standards and UN SDGs goals • foster international partnership for the development of innovative technologies and solutions	• encourage cooperation between countries • actions to modernise systems related to data collection, monitoring, digital transformation • Foster customs duties exemption for renewable energy production equipment & components • boost interest by potential trainees and students and re-balance the number of trainers: marine professions, mechanical, electrical, refrigeration, air-conditioning specialists, vessel construction professions are the most required.	• Sharing lessons in supporting promising sectors such as coastal and maritime tourism will be essential • strengthening policy monitoring, use of data and spatial planning to maximise synergies across sectors	• Further engagement of the existing national and regional sectorial clusters with the regional maritime clusters, foreseen to be established in the other coastal regions, starting from the two sub-national ones. • support the capability of sub-national clusters, as well as the diversification of current activities of the existing clusters towards emerging sectors such as renewable energy, desalination, blue-biotech and green ports.	• foster international partnerships • boost processes related to collection of spatio-temporal data from different parties in a single digital data bank • Foster port digitalisation • implement a proper legislative framework to regulate and organise this sector and foster new activities • Foster co-operation and exchange programs with the other African and European countries in blue tourism, blue skills and blue incubators

Figure 85 - Summary of main cross fertilisation activities in the southern shore countries

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Disclaimer

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Annex 1

Survey template

Survey to identify needs and analyzes of challenges and opportunities of the Country market in the context of the Mediterranean

Respondent Details

Name	
First name	
Organization	
E-mail	
Phone	

Overview of promising sectors so far and towards 2030 for the sustainable blue economy in COUNTRY ASSESSED

Please add an "X" where you think it is more relevant for each sector (if you know) both for their performance so far and for their development potential towards 2030 (i.e. low , a certain interest or performance). If the sector is not available at all in the country (or in your region), you can select " N/A".

Blue economy sectors	Performance so far				Potentials around 2030			
	N/A	Weak	Some interest	Efficient	N/A	Weak	Some interest	Efficient
Maritime transport								
Shipbuilding/Repair								
Port activities								
Fisheries								
Marine aquaculture								

Coastal and maritime tourism								
Marine biotechnology								
Marine renewable energy								
Seawater desalination								
Green hydrogen								

Based on your answers, from your own perspective, ***can you elaborate on why you think certain sectors are more or less promising for COUNTRY ASSESSED?*** *Please elaborate in a few lines on your perception of each sector. You can include relevant links to sources offering additional details and data on each sector if you think it helps.*

Blue economy sectors	**Full text with ideas and data** Justify the reasoning for the choices in the previous table
Maritime transport	
Shipbuilding/Repair	
Port activities	
Fisheries	
Marine aquaculture	
Coastal and maritime tourism	
Marine biotechnology	
Marine renewable energy	
Seawater desalination	
Green hydrogen	

Assessment of the main challenges/barriers for the sustainable development of the blue economy in COUNTRY ASSESSED /or in your region: *Please add an "X" where you think it is more relevant for each challenge (if you know), to understood their relevance so far and*

their development potential towards 2030 (i.e. low, some interest or effective). If the challenge is not relevant at all in the country (or your region), you can select "na".

Main challenges	Performance so far				Potentials around 2030			
	N/A	Weak	Some interest	Efficient	N/A	Weak	Some interest	Efficient
Resilience (coastal/maritime)								
Decarbonization of the blue economy and coastal activities								
Environmental sustainability								
Social sustainability								
Climate risks/impacts								
Institutional governance and convergence of sectoral policies								
New skills/technologies required								
other (explain, list)								

Based on your answers, ***from your own perspective, can you elaborate on why you think certain challenges are more or less promising for COUNTRY ASSESSED /or your region?*** *Please elaborate in a few lines on your perception of each challenge, including relevant links to sources offering additional details and data if you think that helps.*

Main challenges	Full text with ideas and data Justify the reasoning for the choices in the previous table
Resilience (coastal/maritime)	

Decarbonization of the blue economy and coastal activities	
Environmental sustainability	
Social sustainability	
Climate risks/impacts	
Institutional governance and convergence of sectoral policies	
New skills/technologies required	
other (explain, list)	

Assessment of the main opportunities to be exploited for better development of the potential of the blue economy in COUNTRY ASSESSED

Please add an "X" where you think it is most relevant to each opportunity area (if you know), including their relevance so far and their potential for development towards 2030 (i.e. weak, some interest or efficient). If a domain is not relevant at all in the country (or your region), you can select "na".

Main opportunities	Current state				How well they persist in 2030			
	N/A	Weak	Some interest	Efficient	N/A	Weak	Some interest	Efficient
Access to maritime and marine data								
Integrated spatial planning/protection								
Sustainable infrastructure								
Skills and careers								
Funding and innovation								

National/regional or local strategy								
Maritime research								
Innovation ecosystems								
Safety and quality								
Stakeholder engagement/awareness (political, sectoral)								

Based on your answers, from your own perspective, ***can you elaborate on why you think certain opportunities are more or less promising*** *for* ***COUNTRY ASSESSED****/region? Please elaborate in a few lines on your perception of each opportunity, including relevant links to sources offering additional details and data if you think that helps.*

Main opportunities	**Full text with ideas and data** Justify the reasoning for the choices in the previous table
Access to maritime and marine data	
Integrated spatial planning/protection	
Sustainable infrastructure	
Skills and careers	
Funding and innovation	
National/local strategy	
Maritime research	
Innovation ecosystems	
Safety and quality	
Stakeholder engagement/awareness (political, sectoral)	

Recommended actions to address the challenges and maximize the overall opportunities and potentials of the blue economy sectors for COUNTRY ASSESSED / or Administrative Region

Based on the answers above and your own perspective, what do you think are the 5 recommended actions to take to realize sectoral potentials and address existing challenges? Please also consider how maritime clusters in the country or region could be included in such actions!

Briefly name the action	Describe the action: what you propose, who should be involved, when and how such action could be carried out
Action 1: …	
Action 2: …	
Action 3: …	
Action 4: …	
Action 5: …	

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