

# Blue Growth

## Lebanon





## Analysis of Threats and Enabling Factors for Sustainable Tourism at Pilot Scale

# Blue Growth in Batroun Lebanon



Union for the Mediterranean  
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## OVERVIEW

The present document was produced within the framework of **Co-Evolve4BG** project “*Co-evolution of coastal human activities & Med natural systems for sustainable tourism & Blue Growth in the Mediterranean*” in relation to Threats and Enabling Factors for maritime and coastal tourism development on a national scale” Co-funded by ENI CBC Med Program (Grant Agreement A\_B.4.4\_0075).

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|              |  |
|--------------|--|
| <b>AEWA</b>  | African-Eurasian Migratory Water Birds Agreement                   |
| <b>AUB</b>   | American University of Beirut                                      |
| <b>BGI</b>   | Blue-Green Infrastructure  |
| <b>CAMP</b>  | Coastal Area Management Program of the Mediterranean Action Plan   |
| <b>CBD</b>   | Convention on Biological Diversity                                 |
| <b>CDR</b>   | Council for Development and Reconstruction                         |
| <b>CNRS</b>  | Conseil National de la Recherche Scientifique                      |
| <b>CoLD</b>  | Improving Coastal Land Degradation Monitoring in Lebanon and Syria |
| <b>DFW</b>   | Department of Fisheries & Wildlife                                 |
| <b>EIA</b>   | Environmental Impact Assessment                                    |
| <b>ERML</b>  | Environmental Resources Managers Limited                           |
| <b>EU</b>    | European Union   |
| <b>FAO</b>   | Food and Agricultural Organization of the United Nations           |
| <b>GDP</b>   | Global Domestic Product  |
| <b>GEF</b>   | Global Environmental Facility                                      |
| <b>GFCM</b>  | General Fisheries Commission for the Mediterranean                 |
| <b>GHG</b>   | Green Gaz Emission   |
| <b>ICZM</b>  | Integrated Coastal Zone Management                                 |
| <b>IMAP</b>  | Integrated Monitoring and Assessment Program                       |
| <b>IOE</b>   | Institute of Environment   |
| <b>LCC</b>   | Lebanon Chemicals Company  |
| <b>MAP</b>   | Mediterranean Action Plan  |
| <b>MEA</b>   | Multilateral Environmental Agreement                               |
| <b>MoA</b>   | Ministry of Agriculture  |
| <b>MoE</b>   | Ministry of Environment  |
| <b>MoPWT</b> | Ministry of Public Works and Transport                             |
| <b>MPA</b>   | Marine Protected areas   |
| <b>MRCZM</b> | Marine Resources and Coastal Zone Management                       |
| <b>NASO</b>  | National Aquaculture Sector Overview                               |



|               |   |
|---------------|---|
| <b>SDATL</b>  | Schéma Directeur d'Aménagement du Territoire Libanais                                     |
| <b>SEA</b>    | Strategic Environmental Assessment  |
| <b>SELDAS</b> | Strengthening the Environmental Legislation Development and Application System in Lebanon |
| <b>SDH</b>    | Synchronous Digital Hierarchy   |
| <b>UOB</b>    | University of Balamand  |

## Abstract

Blue Growth has been associated with a sustainable blue economy. BG is a concept that is directly related to the challenges facing the use of natural resources in the coastal and maritime environments. The BG main components are related mainly to the following: food security, fisheries, aquaculture, coastal tourism, marine biotechnology, ocean energy, natural habitats, navigation, maritime trade and transport, and mitigation of climate change.

Considering the sea conditions, and despite the direct involvement in many international conventions and agreements, the Blue Growth concept in Lebanon and Batroun is still poorly implemented. In fact, several laws, regulations, and decrees are in action in Lebanon. They tackle different sources of coastal/marine contamination, the protection of heritage and archeological sites, as well as the maritime public domains regulations together with fishing activities legalization, and recently the land use planning. Due to its important location along the Mediterranean Sea eastern shores, Lebanon has become an active member of Barcelona Convention, the Regional Seas Program for the protection of the Mediterranean Sea against pollution, and the General Fisheries Commission for the Mediterranean.

Blue Growth main challenges in Lebanon are first how to achieve inclusive economic growth from marine and aquatic resources while sustainably maintaining the health of the blue natural capital. The second challenge concerns the absence of a common ground of understanding between different involved sides such as scientists, policy experts and policy makers, stakeholders, and beneficiaries in this domain. Thereby, bridging the gaps and resolving conflicts between stakeholders certainly require holistic approach and responsible governance. Batroun City coast and its surrounding suffer from several calamities such as pollution, shoreline degradation, habitats degradation, uncontrolled urban activities, political instability, invasive species, and natural hazards like flood, coastal erosion, mass movements, earthquakes, and sea level rise. Despite all these exacerbated environmental troubles, the protection measures are restricted only to some segments of the shoreline. In fact, several laws and regulations addressing the marine protection, as well as coastal and inland ecosystem health have already been issued. In addition, Lebanon ratified Madrid Protocol on integrated coastal zone management, and Barcelona Convention and many others to prevent sea pollution. However, some decrees have led to the occupancy of all parts of the Lebanese seafront, regardless of their classification, permitted permanent construction that denatured the shoreline, disfigured the law, and resulted in distorted public interest.

A large number and area of infringes are illegally occupied along the Lebanese shoreline. In the Batroun area, there are 10,000 m<sup>2</sup> of tourist and industrial illegal occupation restricting public access. The use of harmful and irresponsible fishing practices in this city, such as small-mesh nets, hooks, and explosives, is totally controlled. However, the remarkable poor control of the timing, location of fishing, net size, and density of fishing, exacerbate the poor state of the Lebanese coastal and marine area. The fishery sector is one of the main factors affecting the Blue Growth implementation in Batroun. Indeed,

this sector suffers from lack of funding, ineffective policy, outdated legislation, and the lack of law enforcement. Other factors like agriculture exert significant pressure on water and sediment quality due to the use of chemicals on 3,600 ha of agricultural farms, occupying 11% of the area of Batroun district. Statistics reveal that 75% of farmers, mainly small farmers, are older than 45 years, which can restrict the precision farming introduction into the agricultural practices that can both control and improve the applied hazardous chemicals and pesticides efficiency. Other activities like marine transport, port activities, ship building, coastal and marine tourism, construction, industry, and gas-oil production represent an increasing risk to Blue Growth. hence, all the above activities must be seriously controlled and properly managed to enable Blue Growth to go for further developed tourism and more sustainable economy in Batroun.

## I. Blue Growth Concept

“Blue Growth” is an innovative, integrated, and multispectral approach to the aquatic resources management which aims at maximizing the ecosystem goods and services obtained from oceans, inland waters, and wetlands. It also targets the objective of providing further social and economic benefits (FAO, 2019). In fact, Blue Growth refers to sustainable development concept and the recent challenges facing the use of natural resources in the coastal and maritime environments. Therefore, it has become a common expectation that blue growth may ultimately lead to a more sustainable blue economy.

The concept of Blue Growth is the newest of many recent calls for more holistic management of complex marine socio-ecological systems. Ocean systems complexity, combined with data and capacity limitations, necessarily require a management approach that is pragmatic, goal- solution-oriented, realistic, and practical (Burgess *et al.*, 2018).

The World occupies numerous coastal and island countries with lower and lower-middle income, for whom oceans represent a significant jurisdictional area and a source of income.

In those countries, innovation and growth in the coastal, marine, and maritime sectors could deliver food, energy, and transport, among other products and services. In Europe for example, the blue economy represents roughly 5.4 million jobs, and generates a gross added value of almost €500 billion a year (European Union, 2020).

The growth of the blue economy is possible in several areas, especially in fisheries, aquaculture, coastal tourism, marine biotechnology, and ocean energy. The main components of blue growth are listed in Table 1. While some of these components will require little encouragement and additional governance, others need further effective planning to achieve their full potential and return more sustainable outcomes. In Europe for example, the blue economy represents roughly 5.4 million jobs and generates a gross added value of almost €500 billion a year (European Union, 2020).

Providing technical knowledge of marine ecosystems, legal certainty, and security to attract private investment, have been key success factors. In this regard, the marine and freshwater ecosystems have a significant contribution as follows:

- Food security, nutrition, and health where fish contributes over 16% of the animal protein consumed by the world’s population, and 6.5% of all protein consumed, with 1 billion people relying on this source of protein.
- Livelihoods: FAO (2014) estimated that fishers and fish farmers assure the livelihoods of as many as 660-820 million people worldwide.
- Mitigation of climate change: Oceans constitute a major sink for anthropogenic emissions, absorbing 25% of the extra CO<sub>2</sub> added to Earth’s atmosphere by burning fossil fuel. ‘Blue carbon’ sinks like mangrove forests, sea grass beds and other vegetated ocean habitats, are up to five times as effective as tropical forests at sequestering carbon (Gattuso *et al.*, 2018).

- Habitat and shelter: Roughly 40% of the World's population lives within 100 kilometers proximity to the coast. Healthy coastal ecosystems provide protection from natural hazards, coastal erosion, and rising sea level.
- Sustainable economic growth: Several developing coastal countries depend on tourism and fisheries. Aquaculture is projected to keep growing rapidly and if done sustainably, it can serve as a major source of food and a cornerstone of the blue economy.
- Trade: Seafood is the most highly valued internationally traded food commodity in the World, with 36% of all fish produced exported in 2013-2014.

**Table 1.** Components of blue growth and economy (World Bank, 2016).

| Activity  | Ocean Service                     | Industry                                  | Drivers of Growth  |
|---|-----------------------------------|---|--|
| Harvest of living resources                                     | Seafood                           | Fisheries                                 | Food Security  |
|   |                                   | Aquaculture                               | Demand for Protein   |
|   | Marine biotechnology              | Pharmaceuticals, chemicals                | R&D for healthcare and industry                                    |
| Extraction of non-living resources, generation of new resources | Minerals                          | Seabed mining                             | Demand for minerals  |
|   | Energy                            | Oil and gas                               |  |
|   | Freshwater                        | Desalination                              | Demand for fresh water   |
| Commerce and trade in and around the oceans                     | Transport and trade               | Shipping                                  | Growth in seaborne trade; International regulations                |
|   |                                   | Port infrastructure and relevant services |  |
|   | Tourism and recreation            | Tourism                                   | Growth of global tourism   |
|   |                                   | Coastal Development                       | Coastal urbanization   |
| Response to ocean health challenges                             | Ocean monitoring and surveillance |   | Domestic regulations   |
|   |                                   | Technology and R&D                        | R&D in ocean technologies  |
|   | Carbon Sequestration              | Blue Carbon conservation activities       | Growth in coastal and ocean protection and conservation activities |
|   | Coastal Protection                | Habitat protection and restoration        |  |
|   | Waste Disposal                    | Assimilation of nutrients and wastes      |  |

## II. Blue Growth-Related Initiatives and Plans in Lebanon

The concept of “Blue Growth” in Lebanon is still uncommon, notably that the coastal zone is experiencing unfavorable conditions due to diverse facts that can be either natural or man-made. Therefore, blue growth is not considered as separate component of the circular economy but is usually regarded as a crucial part among other initiatives and plans for Lebanon coastal zone protection.

The blue growth in Lebanon is indirectly noted in many international conventions even though Lebanon has always been included officially as a main player in several conventions such as the 1982 UN Convention on the Law of the Sea and to the UN Compliance Agreement since 1995. Lebanon has also joined all the regional and international initiatives and conventions. For example, Lebanon is an active member of the General Fisheries Commission for the Mediterranean GFCM (DFW and MoE, 2013); especially the fact that the Lebanon geographic setting, along with its location on the Eastern region of the Mediterranean Sea, makes it a favorable economic destination. That is one reason why the Lebanese government announced several MPAs not only for their nature conservation role, but also for their crucial role in educating local communities and visitors about its culture, history, and heritage as an Eastern Mediterranean destination.

Several laws, regulations, and decrees have been adopted in Lebanon to mitigate the coastal/marine contamination sources, as well as the heritage and archeological sites preservation, the maritime public domains regulation as well, fishing activities organization, and recently the land use planning which was performed by “Schéma Directeur d’Aménagement du Territoire Libanais” (SDATL, 2004). In addition, the Ministry of Environment has recently adopted (MoE) “the code of the environment” (444-29/7/2002), which deals with the protection and conservation of the coastal and marine ecosystems. Yet, there is still a lack of court practices related to the environment in general, which would allow a proper assessment on the level of compliance/non-compliance to the laws, and regulations presently in place (MRCZM-IOE-UOB, 2014).

In addition, Lebanon is included in Barcelona Convention, the Regional Seas Program for the protection of the Mediterranean Sea against pollution, which was amended in 1995 under UNEP’s umbrella that addresses specific aspects to protect both the Mediterranean marine and coastal environments, while boosting regional and national plans to achieve sustainable development. In fact, it has been adopted in the framework of the Mediterranean Action Plan (MAP), which consists of the principal regional binding multilateral environmental agreement (MEA) in the Mediterranean.

The MoE in Lebanon is the main entity concerned with coastal/maritime regions and it implements, by the Decree n°4869 of 2/9/2010, the GEF grant on “Sustainable Management of Marine and Coastal Biodiversity and Habitats through Policy and Legislative Development for Mainstreaming in Lebanon”. Moreover, MoE launched a call after the adoption of Decision IG.22/7, on: “Integrated Monitoring and Assessment

Program (IMAP) of the Mediterranean and Related Assessment Criteria”. In this regard, Lebanon has initiated a Protocol on Integrated Coastal Zone Management in the Mediterranean in ratification with Decree n°639 dated 18/09/2014.

According to Nader (2015), there are several initiatives aimed at introducing ICZM, where some addressed ICZM only in the perspective of land-use planning. In this respect, CDR has been preparing to launch a Master Plan for the entire Lebanese Coast, in coordination with the MoPWT. The main ICZM initiatives in Lebanon include:

- Project for the Conservation of Wetlands and Coastal Ecosystems in the Mediterranean Region (Med-Wet-Coast), 2001.
- Improving Coastal Land Degradation Monitoring in Lebanon and Syria (CoLD) project, 2002.
- Coastal Area Management Program of the Mediterranean Action Plan (CAMP) project, 2002.
- Strengthening the Environmental Legislation Development and Application System in Lebanon (SELDAS), 2004.
- Assessment of the Institutional and Legal Setting for CZM in Lebanon developed within the IMAC project, 2007.
- Analysis of the Institutional and Legal Frameworks Related to the Management and Monitoring of Coastal and Marine Areas, developed within the context of the ERML, 2012.

So far, no national committee for CZM has been established in Lebanon. However, Decree no.2275/2009 has established the various departments and units of the MOE, granting each its own prerogatives. It is recommended to create CZM committees that may include the different institutes and ministries that may have a role in the IMAP, to review and study projects and legislations related to coastal zones (Fadel, 2017).



### III. Challenges in Blue Growth and Tourism

Although blue growth has a great deal of potential to secure sustainable use of the coasts and oceans, there are some challenges. Eikeset *et al.* (2018), illustrate a general aspect of challenges on the blue growth. This includes:

- The lack of a common and agreed-upon goal of blue growth. In fact, it should maximize inclusive economic growth derived from marine and aquatic resources, and at the same time preventing blue natural capital degradation.
- The interdisciplinary knowledge on how to “speak the same language”. This should involve, in addition to scientists, policy experts and policy makers, stakeholders who might have even more disparate interpretations of blue growth and other focal terms.
- the knowledge gaps identification, implying what a scientist thinks is a critical knowledge gap, may seem inconsequential to the government body deciding what to fund, and an obvious gap in knowledge for a politician. Again, communication is a key tool, although power imbalances caused by the unavailability of funding must be frequently monitored to avoid biased research, and biases in the knowledge that we gain from research.
- Resolving conflicts of interest, which are often rooted in agreements and tradeoffs between different uses of the coast and ocean space, but also often concern who decides what should be open for public debate. Resolving conflicts between stakeholders is difficult and requires holistic approach to governance.

The coast of Batroun City and its surrounding, as well as the adjacent maritime region are witnessing several challenges making the blue growth too difficult to be performed in the view of the existing challenges, which are the result of many compiled problems. Thus, challenges on the performing blue growth in Batroun area can be summarized as follows:

#### III.1. Pollution

Marine and coastal pollution is a chronic problem threatening biodiversity as well as the socio-economic well-being of the country. Its causes and sources can be the outcome of land and sea-based sources whose solutions require different approaches. The applied surveys along Batroun City Coast showed a few number (*i.e.*, 5 spots) of pollution sources, if compared to other Lebanese coastal stretches. Thus, most serious sources include wastewater and turbid water.

There is also the sporadic marine pollution which considered an accidental event that occur mainly due to oil spills and oily water distribution. It is a movable source of pollution, that moves between the maritime and coastal region and influences both the ecosystem and Tourism.

Even though Batroun Municipality is still managing waste disposal, the absence of efficient environmental controls to address and govern waste disposal in the region



makes it a challenge, and the problem of pollution is being exacerbated. Hence, it is not exaggerated that pollution might at any time hinder the tourism industry, not only along Batroun Coast but the entire Lebanese coast.

### III.2. Shoreline degradation

Generally, Tourism in Batroun City has always been attributed to its shoreline where the main recreational sites are located, therefore any distortion/or degradation in the shoreline will be regarded as a challenge, primarily on tourism and then on blue growth. This has been proved by applying a change detection method using satellite images for the coast of Batroun, which constitutes a miscellany of unconsolidated rock materials. Thereby, reflecting the relatively coastline rapid dynamics which are represented mainly by terrain instability. Hence, between 1963 and 2021, the shoreline of Batroun experienced the following:

- Regression by about 34,385 m<sup>2</sup> due to erosion and coastal processes.
- Aggregation by about 10,613 m<sup>2</sup> because of backfilling and dumping.

### III.3. Degraded habitats and threatened ecosystem

Batroun City coast, with its increased uncontrolled activities, has affected the habitat and endemic species in many ways. This includes mainly the seawater quality deterioration due to pollution, as well as overfishing, illegal and destructive urban sprawl, unreported human practices, and the invasive species. The impact of this challenge has been widened lately due to the absence of effective environmental controls and legislations, in addition to the unfavorable human ethics to protect the ecosystem, as well as the exacerbated political conflict and aggravated financial crisis and Covid-19 pandemic.

### III.4. Uncontrolled urban recreational activities

Clearly revealed lately, and it impacted both the inherent landscape of the city and its surrounding areas (Figure 1). These factors are represented by the following:

- Limited surface area (4.68 km<sup>2</sup>) with respect to its population (10,852 capita).
- Increased touristic activities, notably along the crowded coastline.
- The demographic changes, notably from the surrounding villages to Batroun City.
- Absence of effective urban planning.
- Presence of several archeological and heritage sites.



**Figure 1.** Impact of urban sprawl on the natural landscape in Batroun City.

### III.5. Threats of natural hazards

The geographic setting of Batroun City along the coast, surrounded with several mountainous hills, have made it an outlet zone for all terrain materials derived from these hills, notably during the wet seasons where huge masses of sediments are loaded along its shoreline, constituting a fragile coast with high vulnerability to terrain instability.

In this respect, Batroun City, with a special emphasis on its coast with the unconsolidated material, is a flood-prone area with several natural hazards, such as coastal erosion, mass movements and sea level rise. In addition, the city and its surrounding, as part of the active tectonic region, is vulnerable to the occurrence of earthquakes. However, protection measures are only limited to some shoreline segments.

### III.6. Habitat degradation and invasive species

Habitat degradation in Batroun area, notably in the marine ecosystem, is an ecological problem caused mainly by the crowded beach resorts, seasonal bungalows, and restaurants, especially in the proximity of the sandy beaches and the vermetid platforms, where many habitats have been affected and thereby, losing their ecological value.

Moreover, most of the Lebanese marine ecosystem as well as Batroun coast are witnessing the disappearance of several marine species, such as, *Posidonia oceania* and the sea fans *Paramuricea clavata* (Harmelin *et al.*, 2016). Besides, the invasive seaweed *Caulerpa taxifolia* has been introduced from the Red Sea via the Suez Canal due to the increased sea water temperature which facilitated the colonization and invasion of this seaweed, as well as its competition with the endemic *Posidonia oceania* (Pergent *et al.*, 2008).

### III.7. Political conflict

Political conflict in Lebanon is the main catalyst for most of the geo-environmental problems, which have been reflected on all vital sectors in the country including coastal tourism. In this respect, the blue growth along the coast and maritime region of Lebanon is under serious threat due to the lack of safety and security, which have been the

outcome of the political instability in Lebanon over the last decades. This is also the case in Batroun where the absence of formal regulations has left a negative impact on all municipal components, mainly the loss of confidence and tourists lacking comfort and luxury.

## IV. Taken Measures to Promote Blue Growth

The first comprehensive legislation tackling the marine protection, coastal and inland ecosystems' health is the MoE Code of the Environment 444 released on 29/07/2002. Together with the *Decree 4869 of 2/9/2010*, they granted the MoE the full responsibility for mainstreaming the national policy on marine and coastal biodiversity and habitats' protection and development. The *Law 2775, issued as Resolution on 28/9/1929, and amended on 25/05/1962* (<http://faolex.fao.org/docs/pdf/leb144524.pdf>). In fact, it consists of 55 articles, it aims mainly at controlling the fishing practices in Lebanon (<http://www.erml.moe.gov.lb>). Indeed, it has divided Lebanon's sea into five zones and identified the places where fishing is banned, permitted, or prohibited in certain periods. It has also set the rules for the use of nets, and fishing devices with restriction or even prohibition of certain fishing methods. The law sets the rules for the number of fishing boats operating at the same time, provides protection for some fishes and shells (sponge fishing is regulated by special laws), emphasizes the prohibition of the use of explosives in fishing, identifies the mechanism of inspection for boats and equipment, and the release of fishing permits and fees.

The *Decree 4810* issued on 24/6/1966, regulating the Maritime public domain consists of 2 articles and addresses the private properties adjacent to the sea (<http://www.moe.gov.lb>). It sets the conditions for the exploitation of the maritime public domain after governmental approval of the nature and area of the project exploitation. If the plot of land adjacent to the sea is fully owned by the project developer, the Decree allows the exploitation of an area three times the surface of the resort with the right to build a marina (<http://faolex.fao.org/docs/pdf/leb155503.pdf>). This Decree set the principles for the public character of the touristic maritime public domain that must remain free for public use, and the investment must not fragment the unity of the beach, and it forbade the permanent structures and constructions on maritime public domain but allowed the movable sport tools and equipment.

However, the *Decree 2522/1992* allowed construction of permanent structures on the beach including basements, stilt floors, and balconies. This modification distorted the *Legislative Decision 144/S* which prohibited permanent construction. Since then, the free access to the beach has not been feasible for 90% of the Lebanese families.

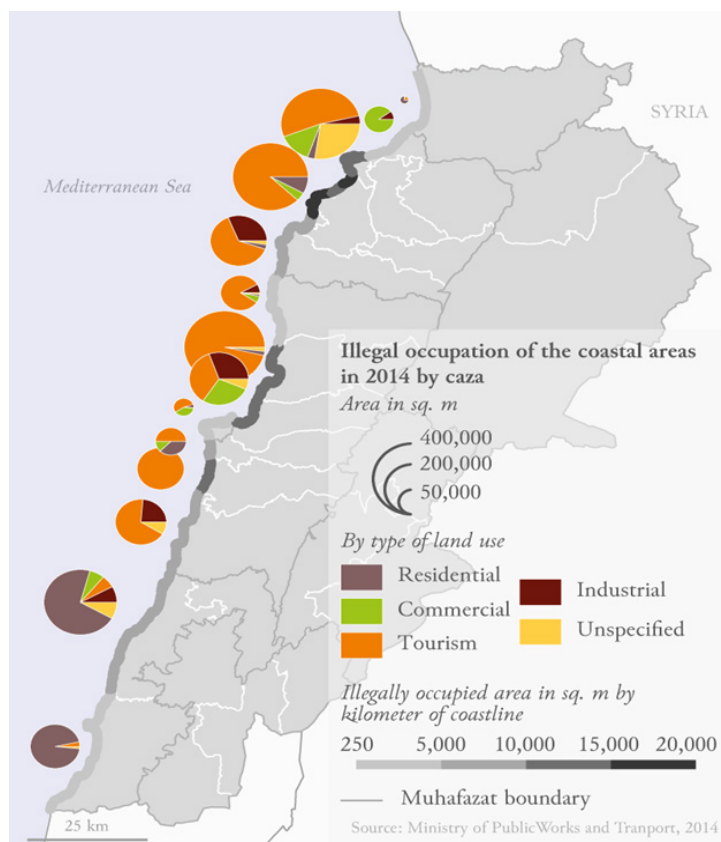
Even though Lebanon ratified on August 1, 2017, the Madrid Protocol on Integrated Coastal Zone Management in the Mediterranean, the prioritization of public maritime domain inherited from the French colonial times, was modified by the decrees issued between 1925 and 2017. These decrees, notably the Decree 4810 set out the legal framework for the exemption that became applicable over the entire coast in 1980, allowing the occupancy of all parts of the Lebanese seafront regardless of their classification. This in its turn has led to denatured shoreline, disfigured law, and resulted in distorted public interest and cherished in the law (Lamy *et al.*, 2017).

The management and conservation of Lebanese and Batroun marine and coastal natural reserves are also controlled by Lebanon obligations towards the ratified

Barcelona Convention to prevent the sea pollution, the Convention on Biological Diversity (CBD), the Ramsar Convention on Wetlands and the African-Eurasian Migratory Water Birds Agreement (AEWA), the Agreement on Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic area (ACCOBAMS) and the UNESCO Convention on the Protection of Cultural and Natural Heritage.

Lebanon also promulgated several other laws related to the blue growth such as *Law no. 708/98* declaring the Tyre Coast Nature Reserve on November 5, 1998, *Law no. 121/92* declaring the Palm Islands Nature Reserve on March 9, 1992, *Law no. 508/04* (hunting law), *Decree no. 8213*, dated 24/5/2012 related to the “Strategic Environmental Assessment for Proposed Policies and Plans and Programs in the Public Sector” or SEA decree, *Decree no. 8633*, dated 7/8/2012 related to the “Fundamentals of Environmental Impact Assessment” or EIA decree, *Decision of the Minister of Agriculture no. 125/1*, dated 23/9/1999 banning the fishing of marine turtles, monk seals and whales, and *Decision of the Minister of Agriculture no. 1/385*, issued January 26<sup>th</sup> 1997, stating that fishing activities are prohibited in all estuaries all year round.

Lebanon Atlas has determined the illegal occupancy of the Lebanese maritime coastal domain (Faour and Verdeil, 2016). Results reveal a large number and area of infringements, notably in Mount Lebanon and South Lebanon (Figure 2), which are characterized by the largest illegally occupied surface areas, mainly of tourism uses, like built “chalets” (complexes of small apartments) and artificial beaches with restricted public access. However, the Batroun area is characterized by up to 10,000 m<sup>2</sup> of touristic and industrial illegal occupation.



**Figure 2.** Illegal occupation of coastal areas in 2014 by caza (Faour and Verdeil, 2016).

Article 11 of the Tax Policy Act of October 2017 addressed the “Illegal Occupancy of Public Maritime Property” and imposed fines as annual fees ranging between 1.75% and 3.5% from the price of the square meter of the 1992 estimates, depending on the infringement case (Lamy and Bou Aoun, 2017). Despite these regulations, several gaps still exist in the promotion of blue growth such as considering the financial value and ignoring the cultural and environmental heritage of the marine coastal domain. In addition to the impact of urban coastal resorts unregulated expansion, different sources of contamination and illegal fishing practices. A total of 8 Mm<sup>2</sup> of sea filling, construction, and area of occupied water surface, 54% of which infringe on maritime public property, with only 20% of seashore available to the public, change currents and nutrient regimes in the sea (Lambrecht and van Rosse, 2021).



## V. Sectors Influencing Blue Growth

### V.1. Fisheries

Lebanese fisheries are classified as small-scale, artisanal, and traditionally based on bottom stationary gear (trammel nets and longlines), purse seine nets, and beach seines, which is suitable for stationary demersal equipment. In fact, Fishing operations are mostly carried out at medium depths of up to 50 meters. The Lebanese continental shelf is narrow except for North Lebanon, where it extends over 8 km strip from the coast. Besides, breakwater in Batroun Fishermen port is constructed out of rubble and reinforced concrete wall with a length of 140 m. It has a 250 m long fish handling basin for offloading, with 3 concrete slipways and one electrical winch with 2 tons capacity. Decision 129/1 23/10/1991 established a national maritime protected zone at the Oceanographic & Fishing Institute in Batroun while Decision 397/1 28/11/1997 created a Fishing and Hunting Guidance Center in this institute.

The Cooperative of Fishermen in Batroun contains 157 members and it is part of the North Lebanon Fishermen Syndicate grouping 37 cooperatives. The national fishing fleet operates from 44 ports and landing sites and locally from six landing sites in Batroun, Sel'aata and Anfeh. The estimated number of fishermen in Lebanon in 2004 was 6,500, among whom 62 in Batroun (Majdalani, 2004). The vessels number in 2022 increased to reach 165. The type of vessels in Batroun is mainly Flouka, 96% operating all year long, while 98% of vessels of which 100 for fishing, 40 for excursions and 20 for tourism (Albert Hannoush, personal communication). Vessels started operating in January and 97% work in December. The irresponsible harmful practices, such as small mesh, hooks, and explosives, are totally controlled in Batroun. However, the poor timing control, the fishing areas, net size, and density of fishing exacerbate the poor state of the Lebanese coastal and marine area increasingly affected by climate change, biodiversity degradation and huge species invasion from the Red Sea.

The concentration of effort on a narrow coastal strip has led to the coastal species overexploitation. Besides, the sector is suffering from weak funding, ineffective policies, outdated legislation, and the lack of enforcement (Sacchi and Dimech, 2011). In fact, both the recent pandemic and the economic crisis in the country negatively affected the fishermen ability to cope with the current and functioning cost.

### V.2. Aquaculture

The Batroun coastal area used to have an experimental aquaculture site developed by the MoA in the seventies and kept functional until the recent pandemic. In fact, it grew Dusky and Marbled spinefoot (*Siganus luridus* and *Siganus rivulatus*). Although the inland aquaculture activity has been established since the 1930s, more than 90% of small family aquaculture businesses in the country produce large amount of rainbow trout, *Onchorhynchus mykiss*, which is preferred by the inland inhabitants, while the coastal population is keener to consume sea fish. Batroun and Lebanon can benefit

from different commercial fishing activities, including aquaculture that can provide economic benefit and reduce the reliance on imported fish. However, there is only one onshore fishing farm producing up to 25 tons of marine shrimp (*Penaeus vannamei*), and it operates on 8 ha of land in Aabdeh, Akkar in north Lebanon (NASO, 2017).

Culture of other species is still experimental and limited to catfish and tilapia. Seabass and seabream culture was tested by the MOA and American University of Beirut (AUB) in raceways. Despite the high interest of the private sector in marine finfish species production, and the conclusions by the FAO and CNRS-Lebanon who prospected the potential for aquaculture in Lebanon, promoting the feasible use of submersible cages in mariculture, much effort must be taken to regulate and upgrade research to maintain this business.

### V.3. Agriculture

The Batroun Caza is distinguished by many farmers (~4,500) occupied with vegetable, olive orchards, citrus and protected greenhouse production. The total cultivated area in the district is more than 3,600 ha, *i.e.*, 11% of the total Caza area (Figure 3). It is obvious that any chemicals and pesticides used within the watershed would reflect on the soil, groundwater, and river water quality in the downstream areas, and accumulate notably on the coastal marine areas.

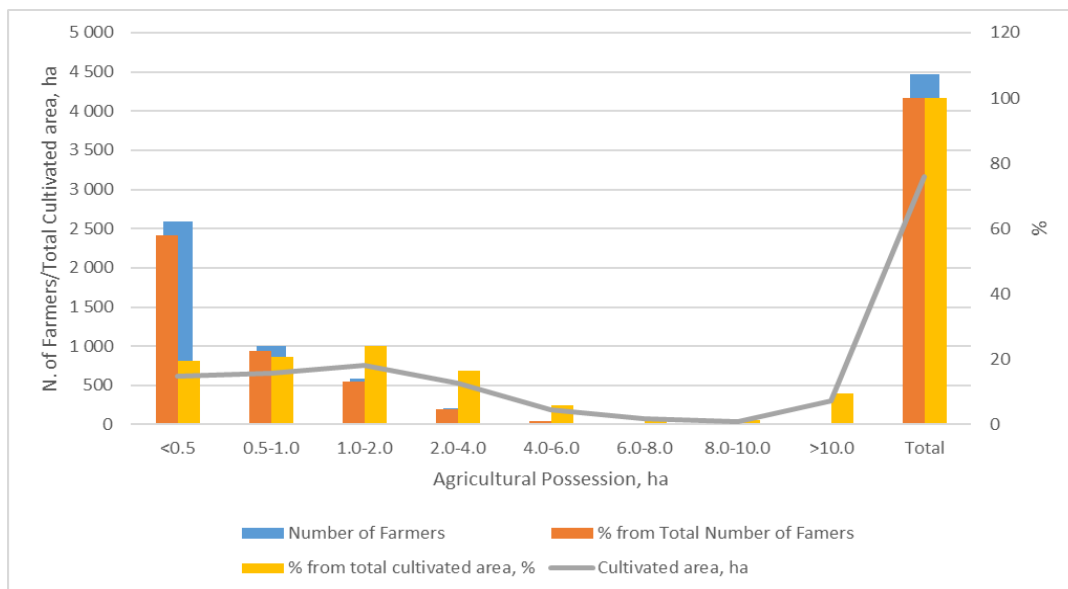


**Figure 3.** Agricultural lands from the Batroun inland area can be one of the sources of chemical contamination of the soil and water, notably with River Jawz traversing the middle of the Plain Kfar Halda, with vegetable production (Darwish et al., 2006)



This pressure will exacerbate the impact on coastal agriculture as well as on the Jawz River mouth. Sediments carried by this river could affect water and fish quality along the coast, which in its turn can eventually affect the seafood chain and fishermen livelihood and tourist destinations (Pinello and Majdalani, 2018). Indeed, relatively high concentrations of Pb (181.4-518.9  $\mu\text{g.g}^{-1}$ ), Cd (1.33-6.7  $\mu\text{g.g}^{-1}$ ) and Cu (141-246.8  $\mu\text{g.g}^{-1}$ ) were reported in the sediments inside the port of Beirut and partly in Tripoli (Abi-Ghanem *et al.*, 2016).

Therefore, both water and fertilizer mismanagement inputs from agricultural practices can harm the coastal Batroun waters chemical composition and affect the biodiversity in a very sensitive ecosystem. Farmers in Lebanon and in the Batroun Caza alike, apply uncontrolled amounts of nutrients and pesticides that can result in public hazards emerging from the consumption of land and sea products with compromised quality (Darwish *et al.*, 2021). Farmers, both in the coastal and inland Batroun district are often small farmers, who often irrigate without following scientific guidelines like water quantity that should be applied either in one irrigation cycle or during the season, as it should be depending on crop demands, climatic conditions, and soil properties (Darwish *et al.*, 2022). This is important given the fact that most of the farmers in the district are small farmers with 58% possessing lands below 0.5 ha (5 dunums) cultivating 619 ha, equivalent to the surface cultivated by 1.6% of large farmers possessing areas larger than 4 ha (Figure 4).



**Figure 4.** Mosaic of cultivated lands of Batroun District classified into possessions per farmer (MoA/FAO Agricultural Census, 2011).

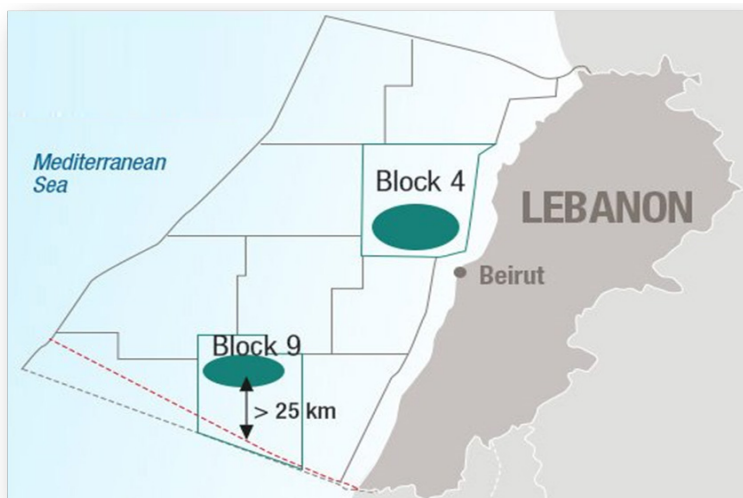
Most of these farmers are not only small, but up to 60% of them are relying on another occupation in addition to agriculture, for their livelihood (Table 2). It is worth mentioning that while 69% of old farmers, and 40% of young people relying only on agriculture for living, less and less youth people are involved in food production and food security, with 75% of farmers older than 45 years. In fact, this is crucial for food security given the fact that modern agriculture relies on precision farming and remote sensing tools for the management of agricultural fields and cultivated crops.

**Table 2.** Grouping of Batroun District Farmers according to age groups and economic occupation (MoA/FAO Agricultural Census, 2010).

| Only agriculture |              | Owners |              | Age group, years |
|------------------|--------------|--------|--------------|------------------|
| %                | Total Number | %      | Total Number |                  |
| 0.11             | 23           | 1      | 58           | <25              |
| 2.43             | 44           | 6      | 282          | 25-34            |
| 10.74            | 194          | 17     | 750          | 35-44            |
| 18.32            | 331          | 26     | 1,172        | 45-54            |
| 17.16            | 310          | 20     | 891          | 55-64            |
| 50               | 905          | 29     | 1,304        | >65              |
| 100              | 1,807        | 100    | 4,484        | Total            |

## V.4. Offshore Oil and Gas

Petroleum industry is almost absent in Lebanon, and neither offshore oil platforms nor oilfields for petroleum production exist. In fact, both offshore oil and gas industry are still a matter of economic planning, and yet the investment in Lebanon of offshore hydrocarbon has not come to implementation due to the geo-political situation. In this regard, the “Israeli regime” referred to Lebanon’s Block 9 award as “challenging and provocative conduct.” It claims part of Block 9 (and both blocks awarded) are in trend with deep-water gas discoveries off Occupied Palestine (Figure 5). While Lebanon is still concerned with delineating its offshore border, “Israel” has been exploring hydrocarbon for over two decades and has been pumping oil and gas from shared oil traps (subsurface reservoirs) with Lebanon. This reflects the total failure in the Lebanon’s expertise in this domain as well as the impact of its erroneous politics and its politicians’ expectations in advocating their inner interests.



**Figure 5.** Potential areas of operation (green color), Lebanon maritime border claim (dashed green line) and “Israeli” maritime border claim (dashed red line).

The estimated hydrocarbon volume (oil/or gas) reserve in Lebanon’s offshore is still nonexistent in the science-based assessment. In other words, several estimates were theoretically presented, sometimes considering only the results of the geophysical surveys. For example, Abdallah and Salami (2015), stated that the current estimates show that almost 45% of the Lebanese offshore water harbor 95.9 trillion cubic feet of gas and 865 million barrels of oil. Nevertheless, one must be extremely careful when referring to such estimates since no wells have been drilled yet in the Lebanese offshore to prove those speculations.

Only one offshore well was dug in Lebanon in 2020 to explore hydrocarbon resource potentiality. The well was dug by TOTAL Company, with 40% interest (OGJ, 2018) in Block 4 (adjacent to the maritime region between Beirut and Chekka region).

In fact, it was almost a 1,500-meter depth well, and it penetrated on the Oligo-Miocene age rock stratum which has no potential to store hydrocarbon. While it is not the case with the cap rock capture hydrocarbon in the seafloor in Lebanon whose depth should exceed 3,500 m to penetrate the Triassic age rock stratum (Shaban, personal contribution).

If well invested, maritime hydrocarbon (oil and gas) in Lebanon would significantly contribute to the GDP of the country. Globally, it is obvious that the average annual GDP has increased from USD 63.61 million in 2008 to USD 85.91 million in 2018 due to the newly explored offshore oil fields, while in the Mediterranean Basin it has decreased from USD 9.13 million in 2008 to USD 8.59 million in 2018 (Manoli, 2021).

Oil and gas offshore investments in Lebanon will bring further job opportunities for thousands of people, and it will contribute to at least half of the country’s GDP. This economic aspect is expected to make economic progress and national development, notably for the coastal cities like Batroun, which in its turn will be reflected on other sectors, namely tourism.

## V.5. Maritime Transport and Ports Activities

Marine commercial shipping transport cover 80% of global trade, playing the role of an essential driver for global growth, with intra-Mediterranean maritime trade flows accounting for 25% of global traffic, over just 3.5% of world water (Union for the Mediterranean, 2021). However, the sector creates many challenges for the region such as greenhouse gas emissions, air, and water pollution, as well as accidents and marine spills, in addition to noise, and the marine ecosystems and biodiversity imbalance. Besides, Batroun port is equipped with boat maintenance station. As to Solid waste management, it is fulfilled through waste collection into boxes and then dumped by the municipality. While fish residues are thrown into the sea as feed stuff for sea crabs. Wastewaters are managed in special toilets within the port and connected to the community network carrying waste to the treatment plant.

Due to the lack of planning, insufficient governance, as well as weekly coordination between different Lebanese governmental bodies, a reliable public transport service, including the maritime transport linking Beirut with other main cities along the coast, (to the north and south) is still lacking. Although, this has alleviated the pressure on marine water quality, synergy between the development of land use and transport planning along the Lebanese coast through specialized agencies, it is necessary to ensure resilient public transport networks. In fact, maritime transport in Batroun is restricted to fishing and touristic activities even though the Port of Batroun is in the heart of the city (Figures 6 and 7).



**Figure 6.** Aerial view of Batroun port.



**Figure 7.** Batroun Port with different types of fishing, excursion, and touristic boats.

Beside the 165 flouka and touristic boats traveling along and within the port, the large vessels carrying Gypsum Phosphates to the Chekka Cement Factory, clean their depots in front of Batroun at an eye distance and reject the phosphate-rich solution into the sea. Our visual observation confirmed the fast reach of the white spill to the Batroun coast. Waste oil from different vessels is collected in one site and disposed-off by the municipality.

## V.6. Shipbuilding and Repair

Shipbuilding industry is currently under the impact of the Lebanese economic crisis, the Pandemic, and the war between Russia and Ukraine.

In Lebanon, a total of 19 shipbuilding and repair companies are available in Tripoli, Halat, Dbayeh, Zouk, Ghazzir, Beirut and Damour. Recently, a dry dock and shipyard project is under construction in Al Arida village, Akkar with USD 75 million investment, including a factory for manufacturing and maintaining yachts and Ship repair and maintenance in Lebanon, as well as transport occupy the second place (24-33%) after labor (40-47%) in the cost of production (Pinello and Majdalani, 2018).

## V.7. Coastal and Maritime Tourism

Tourism industry development is highly significant to the economic growth as well as to the related sectors such as transportation, leisure services and hospitality. Moreover, ecotourism has become the symbol to support communities especially in mobilizing the circular economy. This tourism industry can generate income, currency exchange, as well as providing job opportunities.

Despite its small surface area (10,452 km<sup>2</sup>), Lebanon is considered one of the spotlights and destination for tourists from all around the World. This is not only due to its geographic location along the Eastern Mediterranean Sea, but thanks to its mountainous setting which makes it a meteorological barrier receiving cold air masses from the west and condensates them as rainfall and snow. Therefore, Lebanon is characterized by considerable precipitation rate (averaging about 900 mm), and this is clearly mirrored on its diverse variety of water resources and on its amazing dominant vegetation cover. Consequently, the most important Tourism attractions in Lebanon Tourism are mainly natural and human assets. This can be summarized as follows:

For the natural ones, they are represented by the presence of many water sources (*e.g.*, rivers, springs, lakes, *etc.*), mild climate with snow cover over the mountains for a couple of months, mountainous landscape, and charming views with dense forests, as well as the proximity between mountains and sea (*i.e.*, few kilometers). All these features have made Lebanon one of the most remarkable geographic destinations for touristic activities in the entire Mediterranean Region.



On the other hand, the human activity is highly significant through its contribution to the economic cycle in Lebanon which proved to be a tourism-dependent country. Hence, easily accessible services in Lebanon have encouraged Tourism development and growth, consolidated further by its valuable archeological and heritage sites, skilled hospitalization, and educational hubs, *etc.*

Undoubtedly, the closeness between the coastal zone in Lebanon and the adjacent mountains is a significant factor in the development of tourism industry in the country. In other words, none can imagine Lebanon tourism without its geographic extent along the Mediterranean Sea

Indeed, coastal, and marine areas are highly attractive regions for tourists, and coastal and marine tourism has become a major pillar of the economic sector, not only for the local communities but also for the whole country with accessible and attractive coastline. In fact, this is clearly echoed in Batroun City settings, where the economic development almost dependent on the coastal and maritime Tourism. indeed, it is a sector that is characterized by either individual with low-income, simplified income, or by the governmental institutions. This can be viewed in different tourism-related aspects, such as fishing, sailing, and diving activities, marine crafts and arts, marine industries (*e.g.*, salt, sands, *etc.*), marine culture and education, restaurants, and recreational sites, *etc.*

The coastal and maritime regions are highly significant for the blue growth. Hence, it is necessary to evaluate the environmental impacts of coastal and maritime activities on the local level (Batroun) to identify the enabling conditions that will necessarily entail the integration of environmental planning and sustainable management strategies. For example, a considerable number of people in Batroun are fishermen (among the poorest groups of the Lebanese society), and their livelihood is widely and directly depending on natural coastal and marine resources. Those resources are under severe pressure threatening fishermen livelihoods and their families (Nader *et al.*, 2013).

## V.8. Salt extraction

In Batroun area and its surrounding, there are numerous non-living resources extracted either from seawater or the coastal materials. One of these resources is the table salt which was adopted as a source of income in many coastal areas in Lebanon, including Batroun. Salt was extracted through the construction of evaporation pans directly in the same way in Batroun, in the Coast and along its neighboring shorelines.

Lebanon extracted about 50,000 tons of salt annually before 1975 (Elaph, 2017). Yet, for the coastal zone local communities, this income source has led to devastating results. This is due to many reasons, mainly the economic crisis in Lebanon, the speculation, and low benefits from these resources entailed by customs duties elimination on salt imported from abroad, which led in its turn to these resources neglectation. Therefore, municipalities gave up authorizing permission for salt extraction from seawater which has led to pans evaporation elimination in Batroun, and only remains of the ancient ones still exist which collect salt accidentally (Figure 8).

## V.9. Industrial activities

Both the city and the Union of Batroun Municipalities are members of the Med-Cities Network, and they have already pointed out to the potential of the area in terms of nature tourism and religious tourism as one of the strategic priorities for the socio-economic growth of the region. Nevertheless, industrial activities are hindering the process of making Batroun fitting well the Med-Cities Network scope. This is also a consequence of the absence of formal regulations and urban planning to manage industrial activities in terms of scale, quality, and geographic positioning.



**Figure 8.** Ancient salt evaporation pans along Batroun coastline.

Industrial activities in Batroun and its surrounding encompass many dimensions and forms, starting from small-scale, up to giant industrial hubs. However, both are considered harmful to the terrestrial and marine environments, and then have a significant impact on the tourism industry and blue growth. This includes marine pollution, air pollution, destruction of landscape and archeological and heritage sites, as well as the exhaustion of other natural resources. In Batroun City and its neighborhood areas including mainly Chekka and Sela'ata, there are two large-scale industries: the Cement Factory in Chekka and the Lebanon Chemicals Company S.A.L. (LCC) which is in Sela'ata at the northern border of Batroun City. The latter produces mainly phosphoric and sulfuric acids. These two large-scale industrial hubs have significantly impacted the seawater (& its ecosystem) and even the air in the entire region. In addition, there are several middle and small-scale industries in Batroun which have affected the blue growth, such as petrochemical products, poultry and meat production, furniture, *etc.*

## V.10. Industrial activities

During the Phoenician Age, Batroun was a target source for construction materials, which started by exploiting the natural coastal materials with a special emphasis on the building stones made from the consolidated and well cemented sandstone rock masses. This has been attributed to Batroun City as “Batroun Sandstone” for ages. In this regard, the Phoenician Wall remained until now a state of the art for the excavated rock masses of sandstone, while the largest part of the old Batroun homes were built from (Figure 9).



**Figure 9.** Ancient home in Batroun built from local Sandstone.

There is no large-scale production of construction materials in Batroun, except the Cement Factory of Chekka which is few kilometers (9-10 km) north to Batroun City. However, the exploitation of other natural construction materials was totally banned when the Batroun Municipality and the related governmental authorities (*e.g.*, ministries) prevented any building construction on the area. Yet, these rock masses remained unprotected under all kinds of weather changes and under weathering by the natural processes (*e.g.*, coastal erosion, *etc.*) along the coast.

Friable shore sand along the beach and into the seafloor, was also sought to be exploited as a source of construction material (*e.g.*, concrete). That was carried out illegally through history, but it did not continue as in the case of other coastal stretches in Lebanon, such as in Sour and Jounieh. If this sand is extracted, it will impact the marine ecosystem as well as the coastal landscape of the city, which in turn affects the blue growth. Furthermore, there exists limited exploitation of gravel for construction, sporadically witnessed nearby the outlet of Al-Jawz River, where considerable number of pebbles and cobbles are derived along the river mouth.



In Batroun Region, there are many industrialized construction materials, but their ingredients are not taken from the natural resources of the region. This includes a variety of concrete blocks and pavers. Hence, this might have no impact on the blue growth, if these industries comply with the environmental aspects.

## V.11. Urbanism

There has always been a hot debate on the issue of whether urbanism fosters the development of blue growth, or it hinders it negatively. According to *Din Dar et al.*, (2021), the exponential growth of urban areas is putting a strain on urban land resources and leading to serious implications on the urban environment. Blue Green Infrastructure (BGI) is an emerging solution for further sustainable urban planning and more efficient urban areas management. This reveals that urbanism is interlinked with blue growth, and if properly managed, they complement each other.

In a country like Lebanon, the exacerbated urbanization along the coast is likely to entail a kind of exhaustion on the economic setting of the coastal/maritime regions. In fact, there is an obvious shortage in the environmental legislations and regulations that are designated to conserve the natural components, including the marine environment. Unfortunately, this is exactly what is happening in Lebanon which is unable to pass effective laws to preserve nature and the coastal ecosystems and mitigate the degradation of coastal/maritime regions.

For Batroun City, the development in urbanism is considered high over the last few decades. According to *Verdeil et al.*, (2016), Batroun City and its surroundings have increased by about 50% between 1993 and 1998. While the ratio of urbanization with respect to the total surface area reached 90%, with an annual urban development of about 73%. Even though many believe that the increased urbanism may generate an economic growth, this has been reflected negatively on Batroun City and its surrounding's natural components, including the terrestrial and marine environment. Thus, urbanization has affected Batroun's blue growth, and consequently the economic situation.

## V.12. Submarine Cables

Lebanon is connected to the World through Cyprus. The first cable was established in 1995 under the name CADMOS, 230 km length is of synchronous digital hierarchy (SDH) technology. The second cable, BERYTAR, 134 km length, interconnects Cyprus with Lebanon and Syria. The several landing points connecting Lebanon with Egypt, Italy, United Arab Emirates (UAE), Saudi Arabia, Pakistan, France, and India. It is owned by Telecom Italia Sparkle, Etisalat of the UAE, Tata Communications (India), Pakistan Telecommunications Company Ltd., Orange (France), Airtel (Bharti, India), Saudi Telecom, Ogero, Telecom Egypt. To boost the Internet service locally and to turn Lebanon into a hub for Internet distribution to countries in the region, a new Another undersea cable project is scheduled to be launched to replace the 'Cadmos' cable which links Lebanon to Cyprus.

## V.13. Enabling Blue Growth for Developing Tourism in Batroun

A good governance of the Blue Economy in the Mediterranean requires a solid, inclusive, and active multi-stakeholders' framework to assess the state of play, discuss options, and propose actions related to the promotion of specific Blue Economy sectors and actors (Union for the Mediterranean, 2020). The Blue Economy can contribute to the development of touristic activities in Batroun, by transforming tourism into circular blue economy, and adopting effective policies to maintain local and regional ecosystems, involving all stakeholders and measures, to transform the current seasonal blue economy into sustainably permanent one. This requires higher GHG emissions control, stronger oil spill restriction, more effective solid and liquid sources contamination management as well as continuous underwater noise pollution prohibition, and finally more organized fishing and touristic activities. The prevention or deterioration of marine ecosystems, implementation of curative measures derived from new biotechnologies and innovative bioproduction, can help adapting to climate change, restricting the damage caused by invasive pests, and may as well contribute to the protection of the Mediterranean biodiversity, and generate income to local communities. This requires capacity building for local communities and regional authorities, and strong cooperation and coordination between different ministries and stakeholders at the national and international levels. It requires more effective collaboration as well with the General Fisheries Commission for the Mediterranean (GFCM).

The fishing sector sustainability can be boosted thanks to the development of well-established fisheries and growing aquaculture sectors, which can not only diversify sea products, but also enhance the sustainability of the whole fishing sector (Union for the Mediterranean, 2021). To attain the above objectives, several requirements are needed. For instance, improve innovation capabilities of local communities as well as their small-scale industries through further investment in infrastructure, research, and innovation. Awareness raising and protection against business risks, competition, and creation of an enabling environment or the production and realization of high-quality products are all crucial as well to realize the already set targets.

With the pandemic high risks, as well as the economic crisis, the geopolitical and military situation in the region, efforts must continue to ensure further development of the East Mediterranean region as a unique tourism brand. Hereby, promoting the safe accessibility to Batroun resorts along with the development of green tourism infrastructures, as well as the reduction of seasonality associated to mass tourism flow, the adoption of both the innovative touristic models and digitalization to ensure easier access to all information, and the diversification of touristic markets, products, and services, are all the most important assets for further success of the Blue Growth.

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